3.1.5.2 **Keyboard Operation.** Operation [illegible] pushbutton shall result in the described indication or result:

a. Verb: (Preceding and in conjunction with [illegible] numeral pushbuttons) illumination of the same two numerals in the VERB display window.

b. Noun: (Preceding and in conjunction with two numeral pushbuttons) illumination of the same two numerals in the NOUN display window.

c. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, +, -: Illumination of the respective characters on the DSKY display.

d. CLR: The illuminated characters of Row 1, 2, or 3 of the DSKY display shall extinguish provided the ENTER pushbutton has not been pressed during a DSKY load sequence.

e. STBY: All DSKY illumination shall extinguish with the exception of the STBY, TEMP, and RESTART lamps. Refer to 3.1.2.1.4 for CGC standby requirements.

f. CAUT RSET: Any or all of the following DSKY display lamps shall extinguish if illuminated initially:

(1) PROG
(2) RESTART
(3) OPR ERR

g. KEY REL: The KEY REL lamp shall extinguish and the DSKY display control shall return to the monitoring routine commanded by the CGC.

h. ENTER: Completes a legal entry depending upon the actuation of the proper sequence of VERB or VERB, NOUN, and numeral pushbuttons.

3.1.5.3 **Display Operation.** Each listed display lamp shall illuminate as a result of the specified stimuli, and its element operation verified through the use of Verb 35.

a. STBY: Actuation of the STBY pushbutton for at least 3 seconds after entry of Verb 60.

b. KEY REL: Presence of a "1" in bit 5 of Channel 11 of the CGC.

c. GIMBAL LOCK: Presence of a "1" in bit 6 of RLY WD 1100 with the middle gimbal CDU indicating angles from +07000 to +29000 as shown by the contents of the CDU counter, address (00052) in the CGC.

d. TEMP: Presence of a "1" in bit 4 of Channel 11 of the CGC.

e. PROG: Presence of a "1" in bit 9 of RLY WD 1100 as generated by the CGC program.

3.1.7 Same as basic specification except change 3.1.7a & b as follows:

"

a.	Control power at half power level Continuity between J2-C and TP4	IMU HOT and IMU COLD lamps flashing Alarm bell ringing
b.	No continuity between J2-C and TP4 and system reset.	Control power shall remain at approximately half power level

3.1.8 Same as basic specification.

3.1.9 Same as basic specification.

3.1.10 Same as basic specification.

3.1.10.1 Same as basic specification.

3.1.10.2 Same as basic specification except change 3.1.10.2.a and d as follows:

a.	138° CAL switch depressed and held	No power output IMU HOT flashing Alarm bell ringing
d.	138° CAL switch released, momentary continuity between J3-D & J3-J.	Same OPERATION as in b., except half power output

3.1.11 Same as basic specification.

3.2 Same as basic specification.

3.2.1 Same as basic specification.

3.2.2 Same as basic specification.

TABLE III Same as basic specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 Same as basic specification.

4.2 Same as basic specification.

4.2.1 Same as basic specification.

4.2.1.1 Same as basic specification.

4.2.1.2 Same as basic specification.

4.2.1.3 Same as basic specification.

4.2.1.4 Same as basic specification.

4.2.2 Same as basic specification.

4.3 Same as basic specification.

4.3.1 Same as basic specification.

4.3.2 Same as basic specification.

4.3.3 Same as basic specification.

Figure 1 Same as basic specification.

4.3.4 Same as basic specification except change 4.3.4.e as follows:

> "e. With resistor R2 set at 2201.3 ohms, the temperature meter shall indicate 138° ±0.5°F with the 138° calibration switch depressed or released.

4.3.5 Same as basic specification.

4.3.5.1 Same as basic specification.

4.3.5.2 Temperature Alarm Operation (Hot). The hot temperature alarm operation shall be tested as follows:

a. With resistor R2 set at 2240 ohms, the resistance shall be decreased slowly in 1 ohm increments. Between 2230 ohms and 2220 ohms the following shall occur:

(1) The alarm bell shall ring. (See 4.3.5.2.c.)
(2) The IMU HOT lamp shall illuminate.
(3) Continuity shall exist between J3-A and J3-B.

b. With the ALARM INHIBITED (SYSTEM RESET) switch depressed and held, and resistor R2 slowly increased in resistance in 1 ohm increments, the IMU HOT lamp shall extinguish before resistor R2 is increased to 2270 ohms and continuity shall exist between J3-B and J3-C.

c. If the alarm bell has rung outside the resistance range specified in 4.3.5.2.a., the system shall be reset as follows:

(1) With resistor R2 set to 2500 ohms and the ALARM INHIBITED (SYSTEM RESET) switch depressed, the ALARM LIMIT HI control shall be turned fully cw.

(2) With the resistance of R2 decreased to 2225 ohms, the ALARM LIMIT HI control shall be turned ccw slowly until the alarm bell rings. With resistor R2 reset to 2500 ohms, the ALARM INHIBITED (SYSTEM RESET) switch shall be depressed.

(3) With the 138° CAL switch momentarily depressed, the IMU HOT lamp shall illuminate.

(4) The tests specified in 4.3.5.2.a. and b. shall be repeated.

d. The tests specified in 4.3.5.1.a. and b. and 4.3.5.2.a. and b. shall be repeated for each of the following input voltage levels:

(1) 103.5 vac ±1%
(2) 126.5 vac ±1%
(3) 25.2 vdc ±1%
(4) 30.8 vdc ±1%

When varying the 28 vdc input, the 60 cps power shall be removed and switch S2 opened.

e. Decrease input voltage to 28 vdc, reapply 115V, 60 Hz power. Set resistance of R2 to 2254.1 ohms. Momentarily turn POWER switch to off. Alarm bell shall not be ringing and HOT IMU lamp shall not be flashing.

4.3.5.3 Temperature Alarm Memory. The temperature alarm memory shall be tested as follows:

a. With the 125° CAL switch depressed and held, the alarm bell shall ring and the IMU COLD lamp shall flash. The alarm shall be silenced by momentarily depressing the ALARM INHIBITED (SYSTEM RESET) switch. Release 125° CAL switch. All input power shall be momentarily removed. The IMU COLD lamp shall have continued flashing. The system shall be reset.

b. With the 138° CAL switch depressed and held, the alarm bell shall ring and the IMU HOT lamp shall flash. The alarm shall be silenced by momentarily depressing the ALARM INHIBITED (SYSTEM RESET) switch. Release 138° CAL switch. All input power shall be momentarily removed. The IMU HOT lamp shall have continued flashing. The system shall be reset.

4.3.6 Same as basic specification except change 4.3.6.g as follows:

"g. With the 60 cps power removed, switch S2 open and the input voltage decreased to 25.2 vdc, the output power as calculated from the readings of meters M3 and M6 shall be 60 watts minimum."

4.3.7 Control Bypass Modes. Same as basic specification except change 4.3.7.a as follows:

a. With switch S2 closed, resistor R1 adjusted for a PTC meter reading of 1.5±0.5 amperes and the 138° CAL switch depressed and held, meter M3 shall indicate zero output power. The CAL switch shall be released and the system reset by depressing the ALARM INHIBITED (SYSTEM RESET) switch.

4.3.8 Same as basic specification.

4.3.9 Indicating Bridge Failure. With the control current adjusted to 1.5±0.5 amperes on the PTC meter, J2-C jumpered to test point TP4, the IMU HOT and IMU COLD lamps shall be flashing, the alarm bell shall be ringing, and control current shall be restored to the same level. With the jumper removed, the system shall be reset by depressing the ALARM INHIBITED (SYSTEM RESET) switch.

4.3.10 Same as basic specification

4.3.11 Same as basic specification.

4.3.12 Same as basic Specification.

4.2.12.1 Same as basic specification.

12 12

4.3.12.2 Same as basic specification except change 4.3.12.2 a and d as follows:

a. With the 138° CAL switch depressed and held, meters M3 and M6 shall indicate zero power output, the IMU HOT lamp shall be flashing and the alarm bell shall be ringing.

d. With the 138° CAL switch released, and J3-D jumpered momentarily to J3-J, meters M3 and M6 shall indicate half power output, the IMU HOT lamp shall be extinguished and the alarm bell shall cease ringing.

4.3.13 Same as basic specification.

5. PREPARATION FOR DELIVERY

5.1 Same as basic specification.

6. NOTES.

APOLLO G&N Specification
PS2016129 REV B
Original Issue Date: 11/28/66
Release Authority: TDRR 32123
Class A Release

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

CONTROLLER, TEMPERATURE, PORTABLE

DRAWING NO. 2900060

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				ccb	NASA
Ⓐ 11/28/66	A	32123	1-9 INITIAL RELEASE		
8/10/67	B	34302	2, 5, 6, 8, 9 RDG/AC	EA	--

This specification consists of page 1 to 9 inclusive.

APPROVALS	NASA/MSC	J. M. Watson 11-17-66	John E Miller MIT/IL	AC

ADDENDUM NOTICE

This specification has been prepared as an addendum to:

Specification No. 2900060
Revision B
Release Date 3-22-66

FOR

CONTROLLER, TEMPERATURE, PORTABLE

Used With

The APOLLO G&N System

The exact content of Specification PS2900060 used as the basic document for this addendum is the revision referenced above plus the following specification change notices to Specification PS2900060.

3.1.7 Same as basic specification except change 3.1.7a & b as follows:

"

a.	Control power at half power level Continuity between J2-C and TP4	IMU HOT and IMU COLD lamps flashing Alarm bell ringing
b.	No continuity between J2-C and TP4 and system reset.	Control power shall remain at approximately half power level

3.1.8 Same as basic specification.

3.1.9 Same as basic specification.

3.1.10 Same as basic specification.

3.1.10.1 Same as basic specification.

3.1.10.2 Same as basic specification except change 3.1.10.2.a and d as follows:

a.	138° CAL switch depressed and held	No power output IMU HOT flashing Alarm bell ringing
d.	138° CAL switch released, momentary continuity between J3-D & J3-J.	Same OPERATION as in b., except half power output

3.1.11 Same as basic specification.

3.2 Same as basic specification.

3.2.1 Same as basic specification.

3.2.2 Same as basic specification.

TABLE III Same as basic specification except delete 'J1-B' in the FROM column, 'J1-L' in the TO column, and '<1' in the RESISTANCE column.

4. QUALITY ASSURANCE PROVISIONS

4.1 Same as basic specification.

4.2 Same as basic specification.

4.2.1 Same as basic specification.

4.2.1.1 Same as basic specification.

4.2.1.2 Same as basic specification.

4.2.1.3 Same as basic specification.

4.2.1.4 Same as basic specification.

4.2.2 Same as basic specification.

4.3 Same as basic specification.

4.3.1 Same as basic specification.

4.3.2 Same as basic specification.

4.3.3 Same as basic specification.

Figure 1 Same as basic specification.

4.3.4 Same as basic specification except change 4.3.4.e as follows:

> "e. With resistor R2 set at 2201.3 ohms, the temperature meter shall indicate 138° ±0.5°F with the 138° calibration switch depressed or released.

4.3.5 Same as basic specification.

4.3.5.1 Same as basic specification.

4.3.5.2 Temperature Alarm Operation (Hot). The hot temperature alarm operation shall be tested as follows:

4.3.5.3 Temperature Alarm Memory. The temperature alarm memory shall be tested as follows:

a. With the 125° CAL switch depressed and held, the alarm bell shall ring and the IMU COLD lamp shall flash. The alarm shall be silenced by momentarily depressing the ALARM INHIBITED (SYSTEM RESET) switch. Release 125° CAL switch. All input power shall be momentarily removed. The IMU COLD lamp shall have continued flashing. The system shall be reset.

b. With the 138° CAL switch depressed and held, the alarm bell shall ring and the IMU HOT lamp shall flash. The alarm shall be silenced by momentarily depressing the ALARM INHIBITED (SYSTEM RESET) switch. Release 138° CAL switch. All input power shall be momentarily removed. The IMU HOT lamp shall have continued flashing. The system shall be reset.

4.3.6 Same as basic specification except change 4.3.6.g as follows:

"g. With the 60 cps power removed, switch S2 open and the input voltage decreased to 25.2 vdc, the output power as calculated from the readings of meters M3 and M6 shall be 60 watts minimum."

4.3.7 Control Bypass Modes. Same as basic specification except change 4.3.7.a as follows:

a. With switch S2 closed, resistor R1 adjusted for a PTC meter reading of 1.5±0.5 amperes and the 138° CAL switch depressed and held, meter M3 shall indicate zero output power. The CAL switch shall be released and the system reset by depressing the ALARM INHIBITED (SYSTEM RESET) switch.

4.3.8 Same as basic specification.

4.3.9 Indicating Bridge Failure. With resistor R1 adjusted to 1.5±0.5 amperes on the PTC meter, J2-C jumpered to test point TP4, the IMU HOT and IMU COLD lamps shall be flashing, the alarm bell shall be ringing, and control current shall be restored to the same level. With the jumper removed, the system shall be reset by depressing the ALARM INHIBITED (SYSTEM RESET) switch.

4.3.10 Same as basic specification

4.3.11 Same as basic specification.

4.3.12 Same as basic Specification.

4.2.12.1 Same as basic specification.

12 12

4.3.12.2 Same as basic specification except change 4.3.12.2 a and d as follows:

a. With the 138° CAL switch depressed and held, meters M3 and M6 shall indicate zero power output, the IMU HOT lamp shall be flashing and the alarm bell shall be ringing.

d. With the 138° CAL switch released, and J3-D jumpered momentarily to J3-J, the PTC meter shall indicate 1.5±0.5 amperes, the IMU HOT lamp shall be extinguished and the alarm bell shall cease ringing.

4.3.13 Same as basic specification.

5. PREPARATION FOR DELIVERY

5.1 Same as basic specification.

6. NOTES.

APOLLO G&N Specification
PS2016130 REV A
Original Issue Date: 23 JUN 67
Release Authority: TDRR 34008
Class A **Release**

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

PSA ADAPTER MODULE (BLOCK II)

DRAWING NO. 2901143

Record of Revisions

Ⓜ

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
8/24/67	A	34447	7 MG/AC	MGM EA	--

This specification consists of page 1 to 32 inclusive.

APPROVALS	NASA/MSC	E.N. J. M. Watson 6-19-67	W Stameris 19 June 67 MIT/IL	CCB	J. Harding AC

APOLLO G&N Specification
PS2016130 REV B
Original Issue Date: 23 JUN 67
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

PSA ADAPTER MODULE (BLOCK II)

DRAWING NO. 2901143

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
8/24/67	A	34447	7	MGM EA	--
9/21/67	B	34664	16, 21	MGM EA	--

This specification consists of page 1 to 32 inclusive.

APPROVALS	NASA/MSC	E.N. J. M. Watson 6-19-67	19 June 67 MIT/IL		J. Harding AC

APOLLO G&N Specification
PS2016130 REV C
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

PSA ADAPTER MODULE (BLOCK II)

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Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals AC	Approvals NASA
8/24/67	A	34447	7	MGM EA	--
9/21/67	B	34664	16, 21	MGM EA	—
12/21/67	C	35309	6, 31	MGM EA	—

This specification consists of page 1 to 32 inclusive.

APPROVALS	NASA/MSC	E.N. J. M. Watson 6-19-67	19 June 67 MIT/IL		J. Harding AC	

APOLLO G&N Specification
PS2016130 REV
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

PSA ADAPTER MODULE (BLOCK II)

DRAWING NO. 2901143

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA

This specification consists of page 1 to 32 inclusive.

APPROVALS	NASA/MSC	E.N. J. M. Watson 6-19-67	W Stameris 19 June 67 MIT/IL	CCB	J. Harding	AC

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the PSA Adapter Module, Part Number 29001143-021 hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

DRAWINGS

APOLLO G&N

2001143	PSA Adapter Module

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

TABLE I

INHIBIT VOLTAGE FAIL TEST

CONDITIONS	OUTPUT PINS		SIGNAL
	From (Hi)	To (Lo)	
Jumper pins J3-5 to J3-39	J6-40	J3-18	27.5 vdc ±5%
Jumper pins J3-5 to J3-20	J6-21	J3-18	27.5 vdc ±5%
Jumper pins J3-5 to J3-22	J6-27	J3-18	27.5 vdc ±5%
Jumper pins J3-5 to J3-6	J6-27	J3-18	27.5 vdc ±5%
Inhibit Voltage Fail Switch in "ON" position	J6-39	J3-18	27.5 vdc ±5%
Inhibit Voltage Fail switch in "OFF" position	J6-39	J3-18	<1 vdc

2.1.9 800 CPS Phase Sensitive Demodulator

2.1.9.1 Gain. The demodulator gain shall be adjustable to provide the gains specified in Table II.

2.1.9.2 Linearity. The gain linearity shall be within ±2 percent from 0.5 to 2 vdc out and within ±5 percent from 0.15 to 0.5 vdc out.

2.1.9.3 Quadrature Rejection. The quadrature rejection shall be greater than 30 to 1 at 2 vdc out.

2.1.9.4 Offset Voltage. The offset voltage shall be less than 5 mvdc when the input is shorted.

2.1.9.5 Operating Frequency. The operating frequency shall be 800 cps.

2.1.9.6 Output Ripple. The output ripple shall be less than 150 mv pp at 2 vdc out.

TABLE II

800 CPS PHASE SENSITIVE DEMODULATORS

Card Number	Gain $\frac{V_{dc\ out}}{V_{ac\ in}}$	Input		Output		R_S (Ohms ±2%)	Input Phase* ±1/2°	Reference	
		Hi	Lo	Hi	Lo			Hi	Lo
A7	2/5	J6-44	J6-24	J1-77	J1-76	3.5K	0°	J5-59	J5-60
A6	2/5	J6-11	J6-10	J1-52	J1-51	3.5K	0°	J5-59	J5-60
A5	2/5	J6-23	J6-43	J1-30	J1-29	3.5K	0°	J5-59	J5-60
A39	1/1	J5-30	J5-40	J1-2	J1-10	51K	0°	J5-58	J5-34
A40	1/1	J5-51	J5-38	J1-1	J1-4	51K	0°	J5-58	J5-34
A31	2/5	J5-39	J5-40	J1-5	J1-14	30K	0°	J5-58	J5-34
A30	2/5	J5-61	J5-38	J1-12	J1-13	30K	0°	J5-58	J5-34
A29	2/5	J5-44	J5-45	J1-75	J1-50	30K	0°	J5-58	J5-34
A38	1/1	J5-47	J5-46	J1-74	J1-49	30K	0°	J5-58	J5-34
A41	2/5	J5-31	J6-40	J1-3	J1-11	4.7K	0°	J5-58	J5-34
A42	2/5	J5-52	J5-38	J1-28	J1-27	4.7K	0°	J5-58	J5-34

* With respect to reference.

3.1.10 3200 CPS Phase Sensitive Demodulator.

3.1.10.1 Gain. The demodulator gain shall be adjustable to provide the gain specified in Table III.

3.1.10.2 Linearity

a. The gain linearity of (0°) demodulators A24, A25, and A26 shall be within ±2 percent from 0.5 to 2 vdc out and within ±5 percent from 0.15 to 0.5 vdc output.

b. The gain linearity of (90°) demodulators A15, A16 and A17 shall be within 5 percent from 0.5 to 2.0 vdc.

3.1.10.3 Quadrature Rejection. The quadrature rejection shall be greater than 30 to 1 at 2 vdc out.

3.1.10.4 Offset Voltage. The offset voltage shall be less than 5 mvdc when the input is shorted.

3.1.10.5 Operating Frequency. The operating frequency shall be 3200 cps.

3.1.10.6 Output Ripple. The output ripple shall be less than 20 mv pp at 2 vdc out.

3.1.11 Current Drain. The total current drain at J6-57, J6-58 and J6-59 shall be less than 0.4 amperes.

3.1.12 Input Impedance. The input impedance shall be greater than 4 megohms between J5-39 and J5-40, J5-61 and J5-38, J5-44 and J5-45, and J5-47 and J5-46.

TABLE V

800 CPS PHASE DIFFERENCE

CARD NUMBER	INPUT		OUTPUT		R_S (OHMS ±2%)	INPUT PHASE*	REFERENCE	
	HI	LO	HI	LO			HI	LO
A9	J5-58	J5-34	J1-53	J1-31	10K	0°	J5-59	J5-60
A8	J5-18	J5-7	J1-78	J1-54	10K	-90°	J5-17	J5-7

* With respect to 800 cps reference

3.2.2.5 Glitch Detector Calibration. The Power Switch shall be in the "ON" position during calibration.

a. Connect the detector as recommended in Figure 4 and Table VI. The detectors are located in the assembly as shown in Figure 2. The source resistor shall be located within 1 ft of connector J5 or J6, specified in Table VI.

TABLE VI

GLITCH DETECTOR CONNECTIONS

CARD NUMBER	INPUT		R_S OHMS ±1%	INPUT VOLTAGE (Volts)	OUTPUT		BUFFERED OUTPUT
	HI	LO			HI	LO	
A47	J6-22	J5-14	2K	5.0	J2-85	J2-61	J1-84
A48	J6-9	J5-14	2K	5.0	J2-84	J2-60	J1-82
A49	J6-47	J6-48	28K	5.0	J2-83	J2-59	J1-62
A50	J6-26	J6-27	10K	5.0	J2-82	J2-58	J1-36
A51	J5-15	J5-14	10K	5.0	J2-38	J2-39	J1-56
A52	J5-5	J5-14	10K	5.0	J2-37	J2-20	J1-16
A53	J6-41	J5-14	2K	5.0	J2-36	J2-19	J1-6
A54	J5-6	J5-16	10K	5.0	J2-35	J2-18	J1-19

b. Apply positive pulses with a pulse width of 2 μsec ±5 percent, a rise time of less than 100 nsec, a magnitude as specified in Table VI ±5 percent and a repetition rate of 2000±100 pps.

c. Adjust potentiometer R13 on the applicable assembly card until an output pulse greater than 20 μsec long with a magnitude greater than 5.5 volts is observed.

d. Apply negative input pulses with a pulse width of 2 μsec ±5 percent, a rise time of less than 100 nsec and the magnitude adjusted until it just triggers an output pulse greater than 20 μsec long with a magnitude greater than 5.5 volts.

e. The magnitude of both positive and negative pulses that just trigger an output shall be as specified in Table VI, ±15 percent.

f. Readjust R13 to assure triggering at the proper level if necessary.

4.2.1.3 Pulses. The assembly shall be tested with pulses as follows:

a. Positive and negative pulses having the following characteristics:

(1) Width: 1 μsec ±5 percent
(2) Rise Time: <100 nsec
(3) Repetition Rate: 2000 pps ±10 percent
(4) Magnitude: Variable from 1 volt to 6 volts

b. Positive and negative pulses having the following characteristics:

(1) Fall Time: >50 μsec
(2) Rise Time: 24 μsec ±5 percent
(3) Magnitude: 1.30, ±5 percent, times the magnitude of pulses specified in 4.2.1.3.a(4)

c. Positive and negative pulses having the following characteristics:

(1) Fall Time: >100 μsec
(2) Rise Time: 60 μsec ±5 percent
(3) Magnitude: 1.30, ±5 percent, times the magnitude of pulses specified in 4.2.1.3.a(4)

d. Positive and negative pulses having the following characteristics:

(1) Width: 1 μsec ±5 percent
(2) Rise Time: <100 nsec
(3) Magnitude: 1.1 times the magnitude of the pulses specified in 4.2.1.3.a(4).

e. Positive and negative pulses having the following characteristics:

(1) Width: 2 μsec ±5 percent
(2) Rise Time: <100 nsec
(3) Repetition Rate: 2000 pps ±10 percent
(4) Magnitude: Variable from 1 volt to 6 volts

4.2.1.4 DC power Connections. Whenever power is applied to the assembly, the power supply DC Lo shall be connected to the interconnection of J5-7, J5-14, J5-16, J5-34, J5-38, J5-40, J5-45, J5-46, J5-55, J5-57, J5-60, J6-25, J6-27 and J6-48. DC Hi shall be connected through a 10 ohm ±5 percent resistor to J6-57.

4.2.1.5 Calibration. Prior to performing the test specified in 4.3, the assembly shall be calibrated in accordance with paragraphs 3.2.2.3 through 3.2.2.7.

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3.10.4 Phase Shift. With the Accel Mon switch in the "Z Pips" position, the Amplifier connected as recommended in Figure 7 and E_{in} adjusted to 5V rms ±1 percent at 3200 cps ±1 percent, the phase shift between E_{in} and E_{out} shall be 0° ±4°.

4.3.11 Inhibit Voltage Fail Test. With 27.5 vdc ±5% between pins J3-5 (Hi), J6-57 (Hi), and J3-18 (lo) and under the conditions specified in Table I, the assembly shall provide signals between the corresponding pins specified in Table I. With the Inhibit Voltage Fail switch in the "ON" position and +27.5 vdc removed from J6-57 the output voltage between J6-39 (Hi) and J3-18 (Lo) shall be less than 1 vdc.

4.3.12 800 CPS Phase Sensitive Demodulators. With the Power Switch "ON", the demodulators connected as recommended in Figure 3 and as specified in Table II and the input signal adjusted to 800 cps ±1/2 percent, the demodulator test shall be as follows. The demodulator locations are shown in Figure 2.

a. With the phase of the input signal adjusted to the phase specified in Table II and the amplitude of the input signal adjusted for output voltages of 0.15, 0.3, 0.5, 1.0, 1.5, and 2.0 vdc ±1 percent, the gain (vdc out/V rms in) shall be calculated. The gain at 0.15 and 0.3 vdc out shall be within ±5 percent of the value specified in Table II and the gain from 0.5 to 2.0 vdc shall be within ±2 percent of the value specified in Table II.

b. Repeat 4.3.12.a with the input signal shifted 180°. The output voltage is negative.

c. With the input signal phase adjusted to the phase specified in Table II and the amplitude adjusted to produce an output voltage of 2 vdc ±1 percent, the ripple voltage at the output shall be less than 150 mv pp.

d. With the input signal shifted +90° from the value specified in 4.3.12.c, the output voltage shall be 0±67 mvdc. With the phase shifted -90° from the phase specified in 4.3.12.c, the output voltage shall be 0±67 mvdc.

e. With the input terminals shorted, the dc offset at the output shall be 0±5 mvdc.

4.3.13 3200 cps Phase Sensitive Demodulators. With the Power Switch "ON", the demodulators connected as recommended in Figure 5 and as specified in Table III and the input signal adjusted to 3200 cps ±1 percent, the demodulator test shall be as follows. The demodulator locations are shown in Figure 2. Check A15, A16 and A17 at only 0.5, 1.0, 1.5 and 2.0 vdc. Gain shall be within 5 percent of the value specified in Table III.

a. With the phase of the input signal adjusted to the phase specified in Table III and the amplitude of the input signal adjusted for output voltages of 0.15, 0.3, 0.5, 1.0, 1.5, and 2.0 vdc ±1 percent, the gain (vdc out/V rms in) shall be calculated. The gain at 0.15 and 0.3 vdc out shall be within ±5 percent of the value specified in Table III and the gain from 0.5 to 2.0 vdc shall be within ±2 percent of the value specified in Table III.

b. Repeat 4.3.13.a with the input signal phase shifted 180°. The output voltage is negative.

c. With the input signal phase adjusted to the phase specified in Table III and the amplitude adjusted to produce an output voltage of 2 vdc ±1 percent, the ripple voltage at the output shall be less than 20 mv pp.

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

AUXILIARY BATTERY PACK

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA

This specification consists of page 1 to 6 inclusive.

APPROVALS	NASA/MSC	J. M. Watson 8-23-68 W Stameris 22 Aug 68 8-23-68 MIT/IL	AC

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Auxiliary Battery Pack, Part Number 1901492-041, hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support equipment

DRAWINGS

APOLLO G&N

1901492	Auxiliary Battery Pack

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

APOLLO G&N Specification
PS2016140 REV A
Original Issue Date: 23 NOV 1965
Release Authority: TDRR 24296
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY X ASSEMBLY CDU

DRAWING NO. 2007090

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/15/66	A	26326	4	WK	ACM

This specification consists of page 1 to 8 inclusive.

APPROVALS	A. C. METZGER **NASA/MSC**	W Kupfer 13 NOV 65 **MIT/IL**	W. Krier R. Priest 10-15-65 **ACSP**

3. REQUIREMENTS

3.1 PERFORMANCE.

3.1.1 Continuity and DC Resistance. Continuity shall be as specified on Drawings 6007033 and 6010108. All pins electrically connected except X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265 shall exhibit dc resistance of 0.5 ohm or less. The dc resistance from X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265 shall be 650 ohms to 760 ohms.

3.1.2 Grounding Pin Resistance. Each pin listed in Table I shall exhibit a dc resistance of 5.0 milliohms or less to the frame.

TABLE I

GROUNDING PINS

PIN	PIN	PIN	PIN
X53-106	X53-346	X08-201	X53-408
↑ 107	↑ 347	X7-171	↑ 409
108	348	X9-270	410
109	349	X10-151	640
110	↓ 406	X11-104	641
111	X58-407	X12-201	642
340	X01-139	X13-171	643
341	X02-201	X14-201	644
342	X03-153	X15-270	645
343	X04-227	X16-151	646
↓ 344	X05-104	[illegible]	647
X53-345	X06-201	[illegible]	↓ 648
			X53-649

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 2007090 and all drawings and engineering data referenced thereon.

APOLLO G&N Specification
PS2016140 REV B
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Release Authority: TDRR 24296
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY X ASSEMBLY CDU

DRAWING NO. 2007090

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/15, 66	A	26326	4 EO4A	WK	ACM
5/3, 66	B	28494	4 EO4A	WK	--

This specification consists of page 1 **to** 8 **inclusive.**

APPROVALS	NASA/MSC	W Kupfer B Nov 65 MIT/IL	ACSP

3. REQUIREMENTS

3.1 PERFORMANCE.

3.1.1 Continuity and DC Resistance. Continuity shall be as specified on Drawings 6007033 and 6010108. All pins electrically connected except X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265 shall exhibit dc resistance of 0.5 ohm or less. The dc resistance from X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265 shall be 650 ohms to 760 ohms.

3.1.2 Grounding Pin Resistance. Each pin listed in Table I shall exhibit a dc resistance of 15.0 milliohms or less to the frame.

TABLE I

GROUNDING PINS

PIN	PIN	PIN	PIN
X53-106	X53-346	X08-201	X53-408
↑ 107	↑ 347	X7-171	↑ 409
108	348	X9-270	410
109	349	X10-151	640
110	↓ 406	X11-104	641
111	X53-407	X12-201	642
340	X01-139	X13-171	643
341	X02-201	X14-201	644
342	X03-153	X15-270	645
343	X04-227	X16-151	646
↓ 344	X05-104		647
X53-345	X06-201		↓ 648
			X53-649

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 2007090 and all drawings and engineering data referenced thereon.

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY X ASSEMBLY CDU

DRAWING NO. 2007090

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
(A) 2/15/66	A	26326	4 RDL/AV	WK	ACM
5/3/66	B	28494	4 RDL/AV	WK	--
5/3/66	C	28490	2 RDL/AV	WK	--

This specification consists of page 1 **to** 8 **inclusive.**

APPROVALS	A. C. METZGER **NASA/MSC**	W Kupfer 13 NOV 65 **MIT/IL**	D W Krier 12 ... R. Print 12-15-65 **ACSP**

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Tray X Assembly CDU hereafter called the assembly, Part Number 2007090-041 and 2007090-061.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007090	Tray X Assembly CDU
6007033	Lead Set AA, Electrical - CDU Electronics Tray X LEM
6010108	Wire Wrap Card Deck Tray X LEM

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY X ASSEMBLY CDU

DRAWING NO. 2007090

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/15/66	A	26326	4 RDL/AC	WK	ACM
5/3/66	B	28494	4 RDL/AC	WK	--
5/3/66	C	28490	2 RDL/AC	WK	--
8/11/66	D	30307	5, 6 RDL/AC	EA	--

This specification consists of page 1 to 8 inclusive.

APPROVALS	A. C. METZGER **NASA/MSC**	W Kupfer 23 Nov 65 **MIT/IL**	R. Priest **ACSP**

4.3.2 Continuity and DC Resistance. Continuity and dc resistance shall be measured using a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202. Measurements shall be made from each individual pin to all other pins electrically connected, but duplicate tests of pins previously tested need not be made. All readings for pins electrically connected per Drawings 6007033 and 6010108 shall be less than 0.5 ohm, with the exception of pins X04-245, X04-250, X07-260, X07-265, X13-260, and X13-265. Any readings greater than 0.5 ohm for pins electrically connected as per Drawings 6007033 and 6010108 shall be recorded and shall be cause for rejection. The dc resistance measured from pins X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265 shall be 650 ohms to 760 ohms when measured with a low current resistance measuring device. This measurement shall be made by passing 2.50 ma or less current through pins X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265.

4.3.3 Grounding Pin Resistance. With a dc current of 3.0±2.5 amperes passed through the frame and the pin being tested, and the dc voltage measured across the pin and the frame as shown in Figure 1, the dc resistance between each individual pin listed in Table I and the frame shall be calculated and recorded. The resistance shall be calculated using the equation specified in 6.2 and the value shall be as specified in 3.1.2. To ensure good electrical connections when measuring the voltage and current the protective finish of the frame may be penetrated.

4.3.4 Insulation Resistance. The insulation resistance between each electrically connected network and all other networks shall be as specified in 3.1.3 when measured in accordance with Method 302 of Standard MIL-STD-202. The megohmmeter used shall have an output voltage of 500±100 vdc limited to a short circuit current of 2.0 milliamperes or less. Any reading of less than 100 megohms shall be recorded and shall be cause for rejection. Spare pins shall be included as individual networks. Megger voltage shall not be applied to the pins specified in 6.1.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES

6.1 THERMAL SENSOR RIBBON RESISTANCE. It is imperative that the current utilized in measuring the dc resistance from pins X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265 shall not exceed 2.50 ma. Any current greater than 2.50 ma will result in exceeding the resistance tolerance of the thermistor sensor ribbon.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY X ASSEMBLY CDU

DRAWING NO. 2007090

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/15/66	A	26326	4 RDL/AV	WK	ACM
5/3/66	B	28494	4 RDL/AC	WK	--
5/3/66	C	28490	2 RDL/AC	WK	--
8/11/66	D	30307	5, 6 RDL/AC	EA	--
9/22/66	E	31166	2 JH/Ac	MGM EA	ACM

This specification consists of page 1 to 8 inclusive.

APPROVALS	A. C. METZGER **NASA/MSC**	W Kupfer 23 Nov 65 MIT/IL	D.W. Krier 12 R. Priest 10-15-65 ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Tray X Assembly CDU hereafter called the assembly, Part Numbers 2007090-041, 2007090-061 and 2007090-111.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007090	Tray X Assembly CDU
6007033	Lead Set AA, Electrical - CDU Electronics Tray X LEM
6010108	Wire Wrap Card Deck Tray X LEM

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY X ASSEMBLY CDU

DRAWING NO. 2097090

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 8 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	W Kupfer 23 Nov 65 MIT/IL	D W Kries R. Priest 12-15-65 ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Tray X Assembly CDU hereafter called the assembly, Part Number 2007090-041.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007090	Tray X Assembly CDU
6007033	Lead Set AA, Electrical - CDU Electronics Tray X LEM
6010109	Wire Wrap Card Deck Tray X LEM

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 PERFORMANCE. -

3.1.1 Continuity and DC Resistance. Continuity shall be as specified on Drawings 6007033 and 6010108. All pins electrically connected except X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265 shall exhibit dc resistance of 0.5 ohm or less. The dc resistance from X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265 shall be 650 ohms to 760 ohms.

3.1.2 Grounding Pin Resistance. Each pin listed in Table I shall exhibit a dc resistance of 5.0 milliohms or less to the frame.

TABLE I

GROUNDING PINS

PIN	PIN	PIN	PIN
X53-106	X53-346	X08-201	X53-408
↑ 107	↑ 347	X7-171	↑ 409
108	348	X9-270	410
109	349	X10-151	640
110	↓ 406	X11-104	641
111	X53-407	X12-201	642
340	X01-139	X13-171	643
341	X02-201	X14-201	644
342	X03-153	X15-270	645
343	X04-227	X16-151	646
↓ 344	X05-104	X51-240	647
X53-345	X06-201	X53-639	↓ 648
			X53-649

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 2007090 and all drawings and engineering data referenced thereon.

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test Examination	Requirement	Method
Continuity and DC Resistance	3.1.1	4.3.3
Grounding Pin Resistance	3.1.2	4.3.4
Insulation Resistance	3.1.3	4.3.5
Drawing Compliance	3.2.1	4.3.1

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25° ±10°C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3 TESTS

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 2007090. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, pin misalignment, and legibility and appearance of markings.

4.3.2 Workmanship-Vibration. For spare units only, the assembly shall be vibrated with dummy modules which simulate the respective module weight. The proper connector pins shall be wired and monitored for continuity during the vibration test. The assembly shall be mounted on the vibration fixture in a manner similar to the way it will be mounted in service so that it will be vibrated along the simulated lunar excursion module X, Y, and Z axes. The assembly shall be vibrated with simple harmonic motion swept from 10 to 2000 cps at a rate of one octave/15 sec. The magnitude of vibration shall be 3.5g rms limited to a 0.3 inch pp constant displacement from 10 cps to the crossover frequency. During vibration the continuity of the assembly shall be constantly monitored per Drawings 6007033 and 6010108. Any evidence of discontinuity shall be recorded and shall be cause for rejection. The monitoring circuitry shall have a response time of 10 μsec or less for any open circuit. Workmanship-vibration shall be performed on all units other than spares at the higher assembly level with operational modules installed.

4.3.3 Continuity and DC Resistance. Continuity and dc resistance shall be measured using a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202. Measurements shall be made from each individual pin to all other pins electrically connected, but duplicate tests of pins previously tested need not be made. All readings for pins electrically connected per Drawings 6007033 and 6010108 shall be less than 0.5 ohm, with the exception of pins X04-245, X04-250, X07-260, X07-265, X13-260, and X13-265. Any readings greater than 0.5 ohm for pins electrically connected as per Drawings 6007033 and 6010108 shall be recorded and shall be cause for rejection. The dc resistance measured from pins X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265 shall be 650 ohms to 760 ohms when measured with a low current resistance measuring device. This measurement shall be made by passing 2.50 ma or less current through pins X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265.

4.3.4 Grounding Pin Resistance. With a dc current of 3.0±2.5 amperes passed through the frame and the pin being tested, and the dc voltage measured across the pin and the frame as shown in Figure 1, the dc resistance between each individual pin listed in Table I and the frame shall be calculated and recorded. The resistance shall be calculated using the equation specified in 6.2 and the value shall be as specified in 3.1.2. To ensure good electrical connections when measuring the voltage and current the protective finish of the frame may be penetrated.

4.3.5 Insulation Resistance. The insulation resistance between each electrically connected network and all other networks shall be as specified in 3.1.3 when measured in accordance with Method 302 of Standard MIL-STD-202. The megohmmeter used shall have an output voltage of 500±100 vdc limited to a short circuit current of 2.0 milliamperes or less. Any reading of less than 100 megohms shall be recorded and shall be cause for rejection. Spare pins shall be included as individual networks. Megger voltage shall not be applied to the pins specified in 6.1.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES

6.1 THERMAL SENSOR RIBBON RESISTANCE. It is imperative that the current utilized in measuring the dc resistance from pins X04-245 to X04-250, X07-260 to X07-265, and X13-260 to X13-265 shall not exceed 2.50 ma. Any current greater than 2.50 ma will result in exceeding the resistance tolerance of the thermistor sensor ribbon.

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY S ASSEMBLY CDU

DRAWING NO. 2007091

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/15/66	A	26325	3 RK/WK	WK	ACM

This specification consists of page 1 to 7 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	W Kupfer 23 Nov 65 MIT/IL	10-15-65 ACSP

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Continuity and DC Resistance. Continuity shall be as specified on Drawings 6007032 and 6010107. All pins electrically connected except S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265, shall exhibit dc resistance of 0.5 ohms or less. The dc resistance from S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall be 650 ohms to 760 ohms.

3.1.2 Grounding Pin Resistance. Each pin listed in Table I shall exhibit a dc resistance of 5.0 milliohms or less to the frame.

3.1.3 Insulation Resistance. The resistance between each network and all other networks shall be greater than or equal to 100 megohms.

TABLE I

GROUNDING PINS

PIN
S01-104
S02-201
S03-171
S04-201
S05-270
S06-151
S07-104
S08-201
S09-171
S10-201
S11-270
S12-151
S13-104
S14-201
S15-171
S16-201
S17-270
S18-151

3.2 PRODUCT CONFIGURATION

3.2.1 Drawing. The configuration of the assembly shall be in accordance with Drawing 2007091 and all drawings and engineering data referenced thereon.

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY S ASSEMBLY CDU

DRAWING NO. 2007091

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/15/66	A	26325	3	WK	ACM
5/3/66	B	28491	3	WK	---

This specification consists of page 1 to 7 inclusive.

APPROVALS	NASA/MSC	MIT/IL	ACSP

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 **Continuity and DC Resistance.** Continuity shall be as specified on Drawings 2007032 and 2010107. All pins electrically connected except S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265. shall exhibit dc resistance of 0.5 ohms or less. The dc resistance from S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall be 650 ohms to 760 ohms.

3.1.2 Grounding Pin Resistance. Each pin listed in Table I shall exhibit a dc resistance of 15.0 milliohms or less to the frame.

3.1.3 Insulation Resistance. The resistance between each network and all other networks shall be greater than or equal to 100 megohms.

TABLE I

GROUNDING PINS

PIN
S01-104
S02-201
S03-171
S04-201
S05-270
S06-151
S07-104
S08-201
S09-171
S10-201
S11-270
S12-151
S13-104
S14-201
S15-171
S16-201
S17-270
S18-151

3.2 PRODUCT CONFIGURATION

3.2.1 Drawing. The configuration of the assembly shall be in accordance with Drawing 2007091 and all drawings and engineering data referenced thereon.

APOLLO G&N Specification
PS2016141 REV C
Original Issue Date: 23 NOV1965
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY S ASSEMBLY CDU

DRAWING NO. 2007091

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
(A) 2/15/66	A	26325	3	WK	ACM
5/3/66	B	28491	3	WK	---
5/3/66	C	28489	2	WK	--

This specification consists of page 1 to 7 inclusive.

APPROVALS	C. [illegible] NASA/MSC	MIT/IL	ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Tray S Assembly CDU, hereafter called the assembly, Part Number 2007091-041 and 2007091-061.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007091	Tray S Assembly CDU
6007032	Lead Set AA, Electrical Electronics Tray S LEM
6010107	Wire Wrap Card Deck Tray CDU LEM

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY S ASSEMBLY CDU

DRAWING NO. 2007091

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
(A) 2/15/66	A	26325	3 RDG/AC	WK	ACM
5/3/66	B	28491	3 RDG/AC	WK	---
5/3/66	C	28489	2 RDG/AC	WK	--
5/11/66	D	28708	3 RDG/AC	MGM	--

This specification consists of page 1 to 7 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	W Kupfer 23 Nov 65 MIT/IL	R. Brunt 10-15-65 ACSP

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Continuity and DC Resistance. Continuity shall be as specified on Drawings 6007032 and 6010107. All pins electrically connected except S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265, shall exhibit dc resistance of 0.5 ohms or less. The dc resistance from S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall be 650 ohms to 760 ohms.

3.1.2 Grounding Pin Resistance. Each pin listed in Table I shall exhibit a dc resistance of 15.0 milliohms or less to the frame.

3.1.3 Insulation Resistance. The resistance between each network and all other networks shall be greater than or equal to 100 megohms.

TABLE I

GROUNDING PINS

PIN
S01-104
S02-201
S03-171
S04-201
S05-270
S06-151
S07-104
S08-201
S09-171
S10-201
S11-270
S12-151
S13-104
S14-201
S15-171
S16-201
S17-270
S18-151

3.2 PRODUCT CONFIGURATION

3.2.1 Drawing. The configuration of the assembly shall be in accordance with Drawing 2007091 and all drawings and engineering data referenced thereon.

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Continuity and DC Resistance	3.1.1	4.3.2
Grounding Pin Resistance	3.1.2	4.3.3
Insulation Resistance	3.1.3	4.3.4
Drawing Compliance	3.2.1	4.3.1

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25° ±10°C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg.

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3 TESTS

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements Drawing 2007091. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, pin misalignment, and legibility and appearance of markings.

[illegible]

4.3.2 Continuity and DC Resistance. Continuity and dc resistance shall be measured using a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202. Measurements shall be made from each individual pin to all other pins, electrically connected, but duplicate tests of pins previously tested need not be made. All readings for pins electrically connected per Drawings 6007032 and 6010107 shall be less than 0.5 ohm, with the exception of pins S03-260, S03-265, S09-260, S09-265, S15-260, and S15-265. Any readings greater than 0.5 ohm for pins electrically connected as per Drawings 6007032 and 6010107 shall be recorded and shall be cause for rejection. The dc resistance measured from pins S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall be 650 ohms to 750 ohms when measured with a low current resistance measuring device. This measurement shall be made by passing 2.50 ma or less current through pins S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265.

4.3.3 Grounding Pin Resistance. With a dc current of 3.0±2.5 ampers passed through the frame and the pin being tested, and the dc voltage measured across the pin and the frame as shown in Figure 1, the dc resistance between each individual pin listed in Table I and the frame shall be calculated and recorded. The resistance shall be calculated using the equation specified in 6.3 and the value shall be as specified in 3.1.2. To ensure good electrical connections when measuring the voltage and current the protective finish of the frame may be penetrated.

4.3.4 Insulation Resistance. The insulation resistance between each electrically connected network and all other networks shall be as specified in 3.1.3 when measured in accordance with Method 302 of Standard MIL-STD-202. The megohmmeter used shall have an output voltage of 500±100 vdc limited to a short circuit current of 2.0 milliamperes or less. Any reading of less than 100 megohms shall be recorded and shall be cause for rejection. Spare pins shall be included as individual networks. Megger voltage shall not be applied to the pins specified in 6.1.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES

6.1 THERMAL SENSOR RIBBON RESISTANCE. It is imperative that the current utilized in measuring the dc resistance from pins S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall not exceed 2.50 ma. Any current greater than 2.50 ma will result in exceeding the resistance tolerance of the thermal sensor ribbon.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY 8 ASSEMBLY CDU

DRAWING NO. 2007091

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/15/66	A	26325	3	WK	ACM
5/3/66	B	28491	3	WK	---
5/3/66	C	28489	2	WK	--
8/11/66	D	28708	2	MGM	--
8/11/66	E	30307	1-7	EA	--

This specification consists of page 1 to 7 inclusive.

APPROVALS	L. C. METZGER NASA/MSC	23 Nov 65 11/22/65 MIT/IL	10-15-65 ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Tray S Assembly CDU, hereafter called the assembly, Part Number 2007091-041.and 2007091-061.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007091	Tray S Assembly CDU
6007032	Lead Set AA, Electrical Electronics Tray S LEM
6010107	Wire Wrap Card Deck Tray CDU LEM

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Continuity and DC Resistance. Continuity shall be as specified on Drawings 6007032 and 6010107. All pins electrically connected except S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265, shall exhibit dc resistance of 0.5 ohms or less. The dc resistance from S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall be 650 ohms to 760 ohms.

3.1.2 Grounding Pin Resistance. Each pin listed in Table I shall exhibit a dc resistance of 15.0 milliohms or less to the frame.

3.1.3 Insulation Resistance. The resistance between each network and all other networks shall be greater than or equal to 100 megohms.

TABLE I

GROUNDING PINS

PIN
S01-104
S02-201
S03-171
S04-201
S05-270
S06-151
S07-104
S08-201
S09-171
S10-201
S11-270
S12-151
S13-104
S14-201
S15-171
S16-201
S17-270
S18-151
[illegible]

3.2 PRODUCT CONFIGURATION

3.2.1 Drawing. The configuration of the assembly shall be in accordance with Drawing 2007091 and all drawings and engineering data referenced thereon.

Any evidence of discontinuity shall be recorded and shall be cause for rejection. The monitoring circuitry shall have a response time of 10 microseconds or less for any open circuit. Workmanship [illegible] shall be performed on all [illegible] other [illegible] at the [illegible] level with [illegible].

4.3.2 Continuity and DC Resistance. Continuity and dc resistance shall be measured using a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202. Measurements shall be made from each individual pin to all other pins, electrically connected, but duplicate tests of pins previously tested need not be made. All readings for pins electrically connected per Drawings 6007032 and 6010107 shall be less than 0.5 ohm, with the exception of pins S03-260, S03-265, S09-260, S09-265, S15-260, and S15-265. Any readings greater than 0.5 ohm for pins electrically connected as per Drawings 6007032 and 6010107 shall be recorded and shall be cause for rejection. The dc resistance measured from pins S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall be 650 ohms to 750 ohms when measured with a low current resistance measuring device. This measurement shall be made by passing 2.50 ma or less current through pins S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265.

4.3.3 Grounding Pin Resistance. With a dc current of 3.0±2.5 ampers passed through the frame and the pin being tested, and the dc voltage measured across the pin and the frame as shown in Figure 1, the dc resistance between each individual pin listed in Table I and the frame shall be calculated and recorded. The resistance shall be calculated using the equation specified in 6.3 and the value shall be as specified in 3.1.2. To ensure good electrical connections when measuring the voltage and current the protective finish of the frame may be penetrated.

4.3.4 Insulation Resistance. The insulation resistance between each electrically connected network and all other networks shall be as specified in 3.1.3 when measured in accordance with Method 302 of Standard MIL-STD-202. The megohmmeter used shall have an output voltage of 500±100 vdc limited to a short circuit current of 2.0 milliamperes or less. Any reading of less than 100 megohms shall be recorded and shall be cause for rejection. Spare pins shall be included as individual networks. Megger voltage shall not be applied to the pins specified in 6.1.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES

6.1 THERMAL SENSOR RIBBON RESISTANCE. It is imperative that the current utilized in measuring the dc resistance from pins S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall not exceed 2.50 ma. Any current greater than 2.50 ma will result in exceeding the resistance tolerance of the thermal sensor ribbon.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

TRAY 8 ASSEMBLY CDU

DRAWING NO. 2007091

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 5 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	23 Nov 65 11/22/65 MIT/IL	10-15-65 ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Tray S Assembly CDU, hereafter called the assembly, Part Number 2007091-041.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007091	Tray S Assembly CDU
6007032	Lead Set AA, Electrical Electronics Tray S LEM
6010107	Wire Wrap Card Deck Tray CDU LEM

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Continuity and DC Resistance. Continuity shall be as specified on Drawings 6007032 and 6010107. All pins electrically connected except S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265, shall exhibit dc resistance of 0.5 ohms or less. The dc resistance from S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall be 650 ohms to 760 ohms.

3.1.2 Grounding Pin Resistance. Each pin listed in Table I shall exhibit a dc resistance of 5.0 milliohms or less to the frame.

3.1.3 Insulation Resistance. The resistance between each network and all other networks shall be greater than or equal to 100 megohms.

TABLE I

GROUNDING PINS

PIN
S01-104
S02-201
S03-171
S04-201
S05-270
S06-151
S07-104
S08-201
S09-171
S10-201
S11-270
S12-151
S13-104
S14-201
S15-171
S16-201
S17-270
S18-151
S51-240

3.2 PRODUCT CONFIGURATION

3.2.1 Drawing. The configuration of the assembly shall be in accordance with Drawing 2007091 and all drawings and engineering data referenced thereon.

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Continuity and DC Resistance	3.1.1	4.3.3
Grounding Pin Resistance	3.1.2	4.3.4
Insulation Resistance	3.1.3	4.3.5
Drawing Compliance	3.2.1	4.3.1

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25° ±10° C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg.

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3 TESTS

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements Drawing 2007091. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, pin misalignment, and legibility and appearance of markings.

4.3.2 Workmanship-Vibration. For spare units, only, the assembly shall be vibrated with dummy modules which simulate the respective module weight. The proper connector pins shall be wired and monitored for continuity during the vibration test. The assembly shall be mounted on the vibration fixture in a manner similar to the way it will be mounted in service so that it will be vibrated along the simulated lunar excursion module X, Y, and Z axes. The assembly shall be vibrated with simple harmonic motion swept from 10 to 2000 cps at a rate of one octave/15sec. The magnitude of vibration shall be 3.5g rms limites to a 0.3 inch pp constant displacement from 10 cps to the crossover frequency. During vibration the continuity of the assembly shall be constantly monitored per Drawings 6007032 and 6010107.

Any evidence of discontinuity shall be recorded and shall be cause for rejection. The monitoring circuitry shall have a response time of 10 µseconds or less for any open circuit. Workmanship - vibration testing shall be performed on all units other than spares at the higher assembly level with operational modules installed.

4.3.3 Continuity and DC Resistance. Continuity and dc resistance shall be measured using a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202. Measurements shall be made from each individual pin to all other pins, electrically connected, but duplicate tests of pins previously tested need not be made. All readings for pins electrically connected per Drawings 6007032 and 6010107 shall be less than 0.5 ohm, with the exception of pins S03-260, S03-265, S09-260, S09-265, S15-260, and S15-265. Any readings greater than 0.5 ohm for pins electrically connected as per Drawings 6007032 and 6010107 shall be recorded and shall be cause for rejection. The dc resistance measured from pins S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall be 650 ohms to 750 ohms when measured with a low current resistance measuring device. This measurement shall be made by passing 2.50 ma or less current through pins S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265.

4.3.4 Grounding Pin Resistance. With a dc current of 3.0±2.5 ampers passed through the frame and the pin being tested, and the dc voltage measured across the pin and the frame as shown in Figure 1, the dc resistance between each individual pin listed in Table I and the frame shall be calculated and recorded. The resistance shall be calculated using the equation specified in 6.3 and the value shall be as specified in 3.1.2. To ensure good electrical connections when measuring the voltage and current the protective finish of the frame may be penetrated.

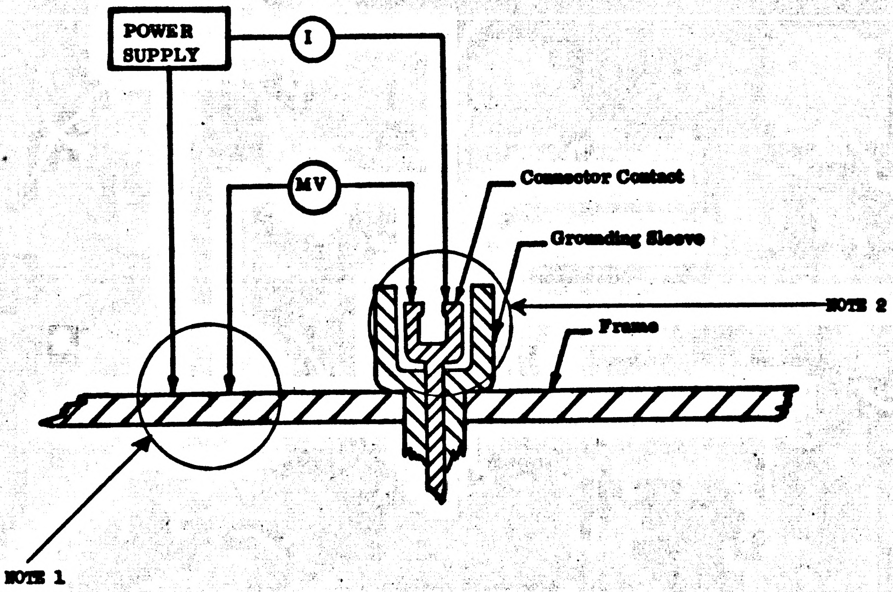
4.3.5 Insulation Resistance. The insulation resistance between each electrically connected network and all other networks shall be as specified in 3.1.3 when measured in accordance with Method 302 of Standard MIL-STD-202. The megohmmeter used shall have an output voltage of 500±100 vdc limited to a short circuit current of 2.0 milliamperes or less. Any reading of less than 100 megohms shall be recorded and shall be cause for rejection. Spare pins shall be included as individual networks. Megger voltage shall not be applied to the pins specified in 6.1.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES

6.1 THERMAL SENSOR RIBBON RESISTANCE. It is imperative that the current utilized in measuring the dc resistance from pins S03-260 to S03-265, S09-260 to S09-265, and S15-260 to S15-265 shall not exceed 2.50 ma. Any current greater than 2.50 ma will result in exceeding the resistance tolerance of the thermal sensor ribbon.


POWER SUPPLY
I
MV
Connector Contact
Grounding Sleeve
NOTE 2
Frame
NOTE 1

GROUNDING PIN RESISTANCE MEASUREMENT

FIGURE 1

NOTE 1: Connection to be made at an anodize free surface.

NOTE 2: Connection to be made using a two section simulated male pin which provides electrical isolation between the supply and voltmeter leads.

6.2 MALE INTERFACE PINS. Particular care must be exercised to assure that the male interface pins of S51 are not bent, misaligned, or otherwise damaged during handling.

6.3 GROUNDING PIN RESISTANCE EQUATION. Grounding pin resistance shall be calculated using the following equation:

$R = \frac{E}{I}$ milliohms where: E is the millivoltmeter indication
I is the ammeter indication

GWK:prz

APOLLO G&N Specification
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Release Authority: TDRR
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

DRAWING NO. 2007222

Record of Revisions

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				AC	NASA
5/3/68	AA	36173	6; total pages 31	MGM EA	--

This specification consists of page 1 to 30 inclusive.

APPROVALS	A.C. Metzger **NASA/MSC**	John E. Miller 12/7/65 G. Cushman 12/7/65 W. Kupfer 12/7/65 **MIT/IL**	M. W. Smith R. Mura **AC**

APOLLO G&N Specification
PS2016142 REV AB
Original Issue Date: 7 Dec 1965
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

DRAWING NO. 2007222

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
5, 3/68	AA	36173	6; total pages 31	MGM EA	--
9/27/68	AB	36868	8 - 30. Was 30 pages; new	MGM EA	- -
			32 pages.		

This specification consists of page 1 to 32 inclusive.

APPROVALS	A.C. Metzger NASA/MSC	John E. Miller G. Cushman	12/7/65 12/7/65 MIT/IL	W. Kupfer 12/7/65	M. W. Smith	R. Mura AC

3.1.17 Cage Override (IMU). The DAC AC Error output shall be 198±12 mv rms and the CA relay drive voltage shall be 28±3 vdc when an Error Counter Enable and 15 $+\Delta\theta_C$ pulses are applied. The CA relay drive voltage shall be 1.5 vdc max and the DAC AC Error output shall be 10 mv rms max when a Cage Override is applied in addition to the Error Counter Enable and 15 $+\Delta\theta_C$ pulses.

3.1.18 Switch and System Error. The system digitizing error shall be within +0.075 and -0.045 degrees for the 16X resolver system and ±0.6 degrees max for the 1X resolver system.

3.1.19 General Null. The $\Delta\theta_G$ pulses and error T.P. voltages shall be generated as specified in Table III when the 1X and 16X resolvers are adjusted to the angles specified.

3.1.20 Coarse and Fine Amplitude and Phase Variation. The CDU Read Loop shall not oscillate under the conditions specified in Table IV.

3.1.21 Thermal Stability. The assembly shall meet the requirements of 3.1.1, 3.1.8.1, 3.1.10, 3.1.12, and 3.1.20 with the assembly mounted on a cold plate and the interface temperatures maintained at 50° ±3°F and 110° ±3°F.

3.1.22 Noise Susceptibility. The ECDU IMU and RR Axis Read Counters shall not change status as specified when the IMU 1X resolver sine and cosine inputs are exposed to noise. The noise inputs shall be a ±240±10V peak damped sinusoid, with a carrier frequency of 3300K HZ ±20% when applied to the IMU 1X resolver Sine and Cosine Hi's Common to Sine and Cosine Lo's Common; and with a carrier frequency of 830K HZ ±20% when applied from each individual IMU 1X resolver Sine and Cosine Hi to Power Lo.

Read Counter State change indications shall be CDUZ or 2^{11} resets as defined below.

The input amplitude threshold for "CDUZ" or "2^{11} - Resets" shall be measured if either or both occur.

Definition of Read Counter State Changes

"CDUZ" shall be defined as a simultaneous reset of all set Read Counter stages.

"2^{11} - Resets" shall be defined as a reset of the 2^{11} Read Counter stage only, when the 2^{11} and other Read Counter stages (including 2^7 thru 2^{11}) are previously set.

Failure of an ECDU to meet the requirements of the Noise Susceptibility Test shall not constitute cause for rejection.

TABLE III

GENERAL NULL

INPUT RESOLVER (Degrees)		OUTPUT ERROR VOLTAGE		PULSE TOTAL
		Fine	Coarse	$(+\Delta\theta_B) - (-\Delta\theta_G)$
1X	16X	Max	Max	
0	0	75MV P-P	0.650V P-P	0
75.9	135			6912
2.8	45			256
168.7	180			15,360
5.6	90			512
239	225			21,760
19.7	315			1,792
331.8	270			30,208
0	0	75MV P-P	0.650V P-P	0

TABLE IV

OSCILLATION OF CDU READ LOOP

CONDITIONS					
Carrier ∆Φ (°)		Resolver (°)		Resolver Excit (V rms)	
1X	16X	1X	16X	1X	16X
COARSE SYSTEM					
0	0	45	0	30	28
-10	↕	45	0	31	↕
+25	↕	45	0	27	↕
0	↕	47.8	45	23	↕
-10	↕	47.8	45	23.5	↕
+15	0	47.8	45	23	28
FINE SYSTEM					
0	+20	0	0	26	32
0	+20	0	0	26	24
0	-20	0	0	26	32
0	-20	0	0	26	24

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 2007222 and all drawings and engineering data referenced thereon.

3.2.2 Standards of Manufacturing, Manufacturing Process and Production

3.2.2.1 Continuity and DC Resistance. The resistance between the pins specified in Table V shall be as specified therein, when the resistance is measured on a Millivac ohmmeter type MV 279C or equivalent.

3.2.3 Weight. The maximum weight of the assembly shall be as specified in Table XI.

TABLE V

CONTINUITY AND DC RESISTANCE

SIGNAL		PINS		RESISTANCE (Ohms)	
		Hi	Lo	Min	Max
ISS	+28VDC-0VDC	136	236	500	
	+28VDC-Chassis	136	639	100K	
	0VDC-Chassis	236	639	100K	
	+ 4VDC-0VDC	422	119	5K	
	+ 4VDC-Chassis	422	639	100K	
	Forward Velocity	237	337		0.5
	Lateral Velocity	437	537		0.5
OSS	+28VDC-0VDC	336	436	500	
	+28VDC-Chassis	336	639	100K	

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Basic Null	3.1.1	4.3.4
Coarse Align Read Counter Lock (IMU)	3.1.2	4.3.5
Coarse Align Relay Driver (IMU)	3.1.3	4.3.6
Coarse Align Rate (IMU)	3.1.4	4.3.7
DID Read Counter Lock (RR)	3.1.5	4.3.8
Fine Bit Size	3.1.6	4.3.9
Coarse Bit Size	3.1.7	4.3.10
Schmitt Trigger Threshold Levels	3.1.8	4.3.11
Speed	3.1.9	4.3.12
Computer $\pm\Delta\Theta_G$ Pulse	3.1.10	4.3.13
CDU Fail Detection	3.1.11	4.3.14
D/A Converter	3.1.12	4.3.15
A/D to D/A Feedback Loop	3.1.13	4.3.16
Coarse Align Amplifier (IMU)	3.1.14	4.3.17
Ambiguity	3.1.15	4.3.18
Cage Voltage (IMU)	3.1.16	4.3.19
Cage Override (IMU)	3.1.17	4.3.20
Switch and System Error	3.1.18	4.3.21
General Null	3.1.19	4.3.22
Coarse and Fine Amplitude and Phase Variation	3.1.20	4.3.23
Thermal Stability	3.1.21	4.3.24
Drawing Compliance	3.2.1	4.3.1
Continuity and DC Resistance	3.2.2.1	4.3.3
Noise Susceptibility	3.1.22	4.3.25

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein, in the sequence specified in Figure 6.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assembly shall be tested under the following ambient conditions.

a. Temperature: 25° ±10°C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg

4.2.1.1.1 Induced Environment. The assembly shall be tested at a temperature of 90° ±3°F and 110 ±3°F as specified in 4.3.24.

4.2.1.2 Pin Connections. Unless otherwise specified herein, input and output connections and loads shall be as specified in Table VI.

4.2.1.3 **Previbration Tests.** Previbration testing shall include 3.1.1, 3.2.1, and 3.2.2.1.

4.2.1.4 **Final Electrical Tests.** All the tests specified in 4.1 except 3.1.21, 3.2.1, . . . shall be performed as final electrical tests.

4.2.1.5 **Inputs.** Unless otherwise specified, the assembly shall be tested using the following inputs.

a. 28±1 vdc, 3 amps maximum, 34.0±0.5 vdc enhanced, 22.0±0.5 vdc degraded. (See 4.2.1.5.1).

b. 50±3 vdc.

c. 28.00±0.28V rms, 800.0±1.0 cps System Reference, synchronized to 51.2 Kpps.

d. Simulated resolver systems consisting of the following:

(1) 1X Resolver, 28±.28V rms output, 0±2° phase
(2) 16X Resolver, 5±.05V rms output, 0±2° phase

e. Clock pulses as specified in Table I, Type I.

f. $\pm\Delta\theta_C$ pulses as specified in Table I, Type II, gated in non-repetitive pulse bursts of 1, 2, 4, 8, 16, 23, 32, 64, 128, 256, 383, 384, 386, and 1023 pulses per burst.

g. All mode inputs shall be OVDC thru 2K±10 percent except CAGE OVERRIDE which shall be 0 VDC (ON) and thru 1 Meg (OFF).

4.2.1.5.1 **DC Stability.** Each of the following tests shall be run with the +28 vdc supply voltage adjusted to 22.0±0.5 vdc and then repeated with the voltage adjusted to 34.0±0.5 vdc, except 4.3.15 and 4.3.24.1(c) which shall be tested at 24.0±0.5 and 34.0±0.5 vdc. All other tests shall be run with a 28.0±1.0 vdc supply voltage, except 4.3.2.1 which shall be run at 22.0±0.5 vdc.

4.3.4, 4.3.6, 4.3.9, 4.3.10, 4.3.11, 4.3.14.1, 4.3.17, 4.3.21 (as specified therein), 4.3.22, 4.3.23 (as specified therein), 4.3.24.

4.2.2 Purge and Fill. The assembly shall be internally dried and maintained, using the following procedure, at the time specified in Figure 6.

a. Evacuate header to 0.5 atmosphere.

b. Fill to atmospheric pressure with dry nitrogen.

c. Repeat Steps 1 and 2, three additional times.

d. The final pressure will be 16 to 17.5 psia using a fill gas mixture which will result in a final mixture with a minimum of 10 percent helium per residue gas from purging and the remaining nitrogen per .

e. Install cap on pressure valve assembly and leak check sealing edges using the sniffer technique. The leak rate shall be less than 1×10^{-5} cc/sec at any single point along the sealing surfaces.

4.2.3 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

TABLE VI

SIGNAL AND LOAD CONNECTION LIST

	SIGNAL	IG	MG	OG	SHAFT	TRUN	OTHER	LOAD (Ohms)
RESOLVER								
SIN 16X	Hi	140	142	144	146	148		
	Lo	240	242	244	246	248		
	Shld	340	342	344	346	348		
COS 16X	Hi	440	442	444	446	448		
	Lo	540	542	544	546	548		
	Shld	640	642	644	646	648		
SIN 1X	Hi	141	143	145	147	149		
	Lo	241	243	245	247	249		
	Shld	341	343	345	347	349		
COS 1X	Hi	441	443	445	447	449		
	Lo	541	543	545	547	549		
	Shld	641	643	645	647	649		
POWER SERVO ASSEMBLY								
IMU	Cage	129	429	130				
	OV	229	529	230				
	(F) Shld	329	629	330				
Coarse Align Signal	Hi	430	131	431				20K±1%
	Lo	530	231	531				
	(F) Shld	630	331	631				
D/A AC Signal	Hi	132	432	133	433	134		20K±1%
	Lo	232	532	233	533	234		
	(F) Shld	332	632	333	633	334		
D/A DC Signal	Hi				237	437		20K±1%
	Lo				337	537		
	(F) Shld				137	637		
OSS 28 V rms 1% 800 cps	Hi						228	
	Lo						328	
	Shld						128	
ISS 28 V rms 1% 800 cps	Hi						428	
	Lo						528	
	Shld						628	

TABLE VI (Continued)

SIGNAL		IG	MG	OG	SHAFT	TRUN	OTHER	LOAD (Ohms)
POWER SERVO ASSEMBLY								
ISS +28 vdc CDU	Hi						136	
	OV						236	
OSS +28 vdc CDU	Hi						336	
	Lo						436	
CA Relay Drive							138	300±10% to +28 vdc
CDU Common to PSA							238	
Cage Override							338	
COMPUTER								
$+\Delta\theta_C$	Hi	610	609	608	607	606		
	Lo	510	509	508	507	506		
	Shld	410	409	408	407	406		
$-\Delta\theta_C$	Hi	310	309	308	307	306		
	Lo	210	209	208	207	206		
	Shld	110	109	108	107	106		
$+\Delta\theta_G$	Hi	605	604	603	602	601		510±10%
	Lo	505	504	503	502	501		
	Shld	405	404	403	402	401		
$-\Delta\theta_G$	Hi	305	304	303	302	301		510±10%
	Lo	205	204	203	202	201		
	Shld	105	104	103	102	101		
RR CDU Fail							313	10K±20%
IMU CDU Fail							213	10K±20%
IMU Operate							611	10K±20%
ISS CA Enable							113	MODES
ISS EC Enable							612	
ISS CDU Zero							512	
RR D/A Enable							412	
RR CDU Zero							312	
Display Inertial Data							112	
51.2K pps	Hi						311	
	Lo						211	
	Shld						111	

TABLE VI (Continued)

SIGNAL		IG	MG	OG	SHAFT	TRUN	OTHER	LOAD (Ohms)
LEM ABORT GUIDANCE (LAG)								
$+\Delta\theta$	Hi	115	515	316				510±5%
	Lo	215	615	416				
$-\Delta\theta$	Hi	315	116	516				510±5%
	Lo	415	216	616				
CDU Zero	Hi						117	510±5%
	Lo						217	
	Shld						—	
TEST POINTS								
Fine Error		620	221	421	621	222		10.15K ±0.1%
Coarse Error		121	321	521	122	322		10.15K ±0.1%
P_I		219	319	419	519	619		
U_L		120	220	320	420	520		
A_D		323	423	523	123	223		
F_1		623	324	624	325	625		
F_2		124	424	125	425	126		
C_1		224	524	225	525	226		
Test Point Common							119	
+4 vdc							422	[illegible]
+14 vdc ISS							522	2K to 8K Fail Adjustment
+14 vdc RR							622	
TEMP SENSOR								
TEMP 1	Hi						626	
	Lo						627	
TEMP 2	Hi						127	
	Lo						627	
TEMP 3	Hi						227	
	Lo						627	
TEMP 4	Hi						327	
	Lo						627	
TEMP 5	Hi						427	
	Lo						627	
TEMP 6	Hi						527	
	Lo						627	

4.3 TESTS. The following tests shall be performed on each of the three IMU axes and on each of the two RR axes unless otherwise specified herein.

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 2007222. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, contaminants, encapsulant defects, pin misalignment, and legibility and appearance of marking. Following completion of the final Pressure Fill and Leak test as specified on 2007222, the assembly shall be externally visually inspected for scratches, dents, nicks, and legibility of marking.

4.3.2 Workmanship-Vibration. The assembly shall be mounted on a vibration fixture in a manner in which it is mounted in the spacecraft and vibrated along the three orthogonal axes. The vibration shall be simple harmonic motion swept from 10 to 2000 cps at a rate of 1 octave per 15 sec. The magnitude of vibration shall be 3.5g rms limited to ±0.3 inch p-p constant displacement from 10 cps to the crossover frequency. During vibration the assembly shall be electrically tested as specified in 4.3.2.1. The vibration transmissibility of the mounting fixture shall be such that the total input to the item shall not exceed 1.5 times the specified value throughout the frequency range.

4.3.2.1 Electrical. During vibration the assembly shall be electrically tested through one complete vibration sweep at each of the resolver settings specified in Table VII. The electrical tests shall be as follows:

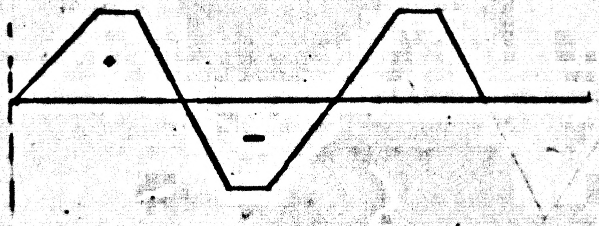
a. P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulse lines shall be monitored throughout the sweep cycle and presence of P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulses shall constitute failure.

b. With an EC Enable (IMU) or a D/A Enable (RR) applied, a 3200 pps signal in pulse bursts of 1023 pulses per burst applied alternately to the $+\Delta\theta_C$ and $-\Delta\theta_C$ inputs and the 1X and 16X resolvers and read counter at the angles specified in Table VII, the DAC AC and DC Error Signals shall be modulated at 1.56±0.10 cps and shall be as shown in Figure 2 and as specified in Table VII. The DAC DC shall be tested for the RR axis only, and DID shall be moded for the RR axis. A discontinuity of 0.5 msec, or more shall constitute a failure of the dc output. A discontinuity of 0.5 msec or more shall constitute a failure of the ac output. The ISS and OSS 28V rms, 800 cps excitation shall be maintained as close to nominal value as possible during this test.

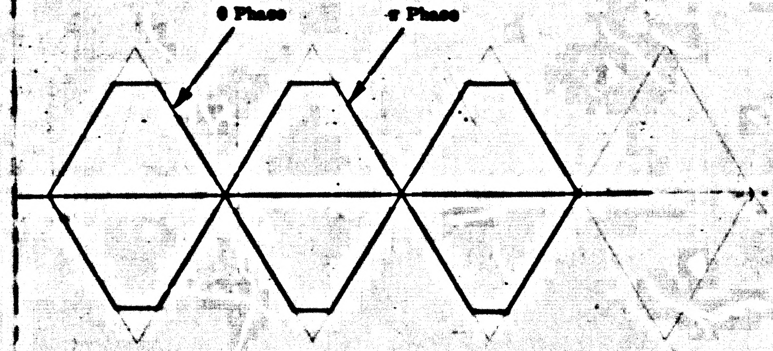
c. The output discretes specified in Table VIII shall be continuously monitored for state change or pulse presence in accordance with Table VIII.

TABLE VII
DAC ERROR OUTPUT

RESOLVER ANGLE		READ COUNTER ANGLE (± 1 bit)	DAC AC ERROR (V rms)	DAC DC ERROR (vdc)
1X (°)	16X (°)			
2.8	45	2^9	4.7 to 5.4	4.7 to 5.4
165	135	2^9 2^{10} 2^{12} 2^{13} 2^{14}	↕	↕
239	225	2^9 2^{11} 2^{13} 2^{15}	↕	↕
334	315	2^9 2^{10} 2^{11} 2^{13} 2^{14} 2^{15}	4.7 to 5.4	4.7 to 5.4



DC OUTPUT


0 Phase
π Phase

AC OUTPUT

DAC OUTPUTS

FIGURE 2.

TABLE VIII

OUTPUT DISCRETES

DISCRETE	DC VOLTAGE LEVEL	PULSE PRESENCE	
		YES	NO
IMU OPER	17.0±6.0 vdc		
RR Fail	5 vdc max		
ISS Fail	5 vdc max		
CA Relay	22±5 vdc		
CDUZ LAG			X

4.3.3 Continuity and DC Resistance. The dc resistance between the points specified in Table V shall be measured in accordance with Method 303 of Standard MIL-STD-202 and shall be as specified in Table V.

4.3.4 Basic Null. With the 1X and 16X resolvers sequentially adjusted to the angles specified in Table III, the $\Delta\theta_G$ pulses shall be generated as specified ±1 bit, and the coarse and fine error TP voltages shall be as specified.

4.3.5 CA Read Counter Lock (IMU). With the 1X and 16X resolvers set to 0 degrees, CDUZ momentarily applied and the 16X resolver angle increased to 11.25 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With CA mode added and the 16X resolver angle increased to 90 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With CA removed, the read counter angle shall change to 90 degrees ±1 bit.

4.3.6 CA Relay Driver (IMU). With a 300 ohm, 10W resistor connected from CA Relay Drive to ISS +28 vdc, the CA Relay Drive voltage shall be ±1 vdc from the ISS power supply voltage. With CA Enable applied, the CA Relay Drive voltage shall decrease to 1.5 vdc max. With the 300 ohm resistor and CA removed and the CA Relay Drive connected to +50 ±3 vdc through a 2.4K ohm resistor, the CA Relay Drive voltage shall be 39±4 vdc. Measure +4 ±.2 vdc and .20V pp max at +4 VDC TP.

4.3.7 CA Rate (IMU). With the 1X resolver set to 0 degrees and the 16X resolver set to 180 degrees, the P_I pulses shall have a pulse width of 4±2 µsec and shall be spaced 78±4 µsec apart. With CA and ECE applied, the P_I pulses shall have a pulse width of 4±2 µsec and shall be spaced 156±8 µsec.

4.3.8 DID READ COUNTER LOCK (RR). With the 1X and 16X resolvers set to 0 degrees and CDUZ momentarily applied, the read counter shall contain an angle of 0 degrees. With the 16X resolver advanced to 11.25 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With DID applied, followed with a CDUZ, and the 16X resolver set to 90 degrees, the read counter shall remain at 11.25 degrees ±1 bit. With CDUZ removed, the read counter shall contain an angle of 90 degrees ±1 bit.

4.3.9 Fine Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 16X resolver adjusted to obtain a Fine Error null, then advanced 0.066 degrees, the Fine Error TP voltage shall be 15.75±2.25 mv rms π phase.

4.3.10 Coarse Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 1X resolver adjusted to obtain a Coarse Error null, then advanced 2.8 degrees, the Coarse Error TP voltage shall be 60±7 mv rms, π phase.

4.3.11 Schmitt Trigger Threshold Levels

4.3.11.1 Fine Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until a stable 800 pps pulse train appears at the Fine Ternary Schmitt TP, the Fine Error TP voltage shall be 23.33±3.33 mv rms π phase and the net increase in the 16X resolver angle shall be 0.131±0.020 degrees.

4.3.11.2 High Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until an 800 pps pulse train appears at the High Ternary Schmitt TP, the Fine Error TP voltage shall be 0.40±0.10V rms π phase and the net increase in the 16X resolver angle shall be 2.200±0.440 degrees.

4.3.11.3 Coarse Ternary (Type I). With CDUZ applied and the 1X resolver angle increased from a Coarse Error null until an 800 pps pulse train appears at the Coarse Ternary Schmitt TP, the Coarse Error TP voltage shall be 186.6±26.6 mv rms π phase and the coarse error angle shall be 8.4±1.4 degrees. The ISS and OSS 28V 800 cps reference excitation and 1X resolver standard excitation shall be maintained as close to the nominal value as possible during this test.

4.3.11.3.1 Coarse Ternary (Type II). With CDUZ applied and the 1X resolver angle increased from a Coarse Error null until an 800 pps pulse train appears at the Coarse Ternary Schmitt TP, the coarse error TP voltage shall be 145±15 mv rms, π phase and the coarse error angle shall be 7±0.50. The ISS and OSS 28V 800 cps reference excitation and 1X resolver standard excitation shall be maintained as close to the nominal value as possible during this test.

4.3.11.4 Ambiguity Detect. With CDUZ applied, the 16X resolver set to 0 degrees and the 1X resolver increased from 115 degrees until an 800 pps pulse train appears at the Ambiguity Detect TP, the 1X resolver angle shall be 120±5 degrees. The pulse train shall continue to exist until the 1X resolver angle is increased to 240±5 degrees.

4.3.12 Speed. With the 16X resolver set to 0 degrees, the 1X resolver set to 112.5 degrees and CDUZ applied, the Coarse Schmitt (C1) pulses shall disappear within 4 seconds after CDUZ is removed and the read counter shall contain an angle of 112.5 degrees ±1 bit.

4.3.13 Computer $\pm\Delta\theta_G$ Pulses. With the 1X resolver set to 0 degrees and the 16X resolver set to 180° ±5°, the $\pm\Delta\theta_G$ and $\pm\Delta\theta_G$ LAG signals shall have the characteristics specified in Table I, Type VI. With CDUZ added, the CDUZ LAG pulse shall have the characteristics specified in Table I, Type V.

4.3.14 CDU Fail Detection. Unused 16X resolver inputs shall be excited by connecting a 5V rms 0 phase voltage to the unused cos 16X inputs.

4.3.14.1 Fine Error Fail. With the 1X resolver set to 0 degrees, CDUZ applied and the 16X resolver set to 8.000 degrees, no fail signal shall be generated. With the 16X resolver increased to 14.000 degrees, a fail signal shall be generated within 2 to 10 seconds. With CDUZ removed, the fail signal shall cease within 1 second. (1.5 seconds at 34.0±0.5 vdc applied as specified in 4.2.1.5.a).

4.3.14.2 Coarse Error Fail. With the 16X resolver set to 0 degrees, the 1X resolver set to 20 degrees and CDUZ applied, no failure signal shall be generated. With the 1X resolver increased to 33 degrees and 16X R.S. set to 180 degrees a fail signal shall be generated within 3 to 9 seconds.

4.3.14.3 14 VDC Fail. With the 1X and 16X resolvers set to 0 degrees, no fail signal shall be generated. With the 14 vdc TP voltage adjusted to 8.0±0.1 vdc, a fail signal shall be generated within 3 to 9 seconds.

4.3.14.4 Cos $(\Phi - \Psi)$ Fail. With the 1X and 16X resolvers set to 0 degrees and the excitation to the 16X resolver adjusted to 25.0±1.0V rms, no fail signal shall be generated. With the excitation reduced to 9.0±1.0V rms, a fail signal shall be generated within 3 to 9 seconds.

4.3.14.5 Limit Cycle Fail. With the 1X resolver set to 0 degrees, the 16X resolver set to 355.00 degrees CDUZ applied and a 100±1 cps limit cycle input signal applied as shown in figure 5 or equivalent, no failure signal shall be generated. With the limit cycle increased to 200±2 cps, a fail signal shall be generated within 3 to 9 seconds.

4.3.15 D/A Converter. With an EC Enable (for IMU) or a D/A Enable (for RR) applied and the read counter counted up and down in accordance with Table II, the ac and dc DAC outputs shall be as specified therein except that a dc output shall not be present for IMU axes and that a dc output shall not be present for RR axes until DID is applied. ISS and OSS 28.0V rms, 800 cps excitation shall be maintained as close to the nominal value as possible during the test.

4.3.16 A/D to D/A Feedback Loop.

4.3.16.1 IMU Axes. With the 1X and 16X resolvers set to 0 degrees, CDUZ momentarily applied, CA Enable and Error Counter Enable applied and the 16X resolver adjusted to produce a read counter reading of 8 bits, the D/A AC Error voltage shall be 0.0133±0.0016V rms π phase. With the 16X resolver adjusted to produce a read counter reading of 16 bits, the D/A AC Error voltage shall be 0.0266±0.0019V rms π phase. With the 16X resolver adjusted near 358.5 degrees to produce a read counter reading of -16 bits, the D/A AC Error voltage shall be 0.0266±0.0019V rms, 0 phase. Repeat tests without CA Enable applied. The D/A AC Error shall be 10 mv rms max.

4.3.16.2 RR Axes. With the 16X resolver set to 0 degrees and a D/A Enable applied, the D/A AC Error output shall be 10 mv rms max. With the 16X resolver adjusted to produce a read counter reading of 8 bits, the D/A AC Error output shall be 10 mv rms max. With the 16X resolver set to 90 degrees, the D/A AC Error output shall be 10 mv rms max.

4.3.17 Coarse Align Amplifier (IMU)

4.3.17.1 Fine Error Gain. With the 1X resolver set to 0 degrees and the CA mode applied, the 16X resolver shall be adjusted to produce a minimum null at the Fine Error TP. With the 16X resolver angle increased 1.760 degrees from the 16X null angle, the CA Error output voltage shall be 45±5 mv rms, 0 phase.

4.3.17.2 DAC Gain.

a. With the 1X resolver set to 0 degrees, and the CDUZ mode applied, the 16X resolver shall be adjusted to produce a Fine Error TP null. With the CDUZ mode removed, the D/A AC Error output shall be 10 mv rms max.

b. With an Error Counter Enable and 10+ $\Delta\theta_C$ pulses applied, the D/A AC Error output shall be 132.0 ±7.0 mv rms 0 phase. The CA Error output shall be 35.0±6.0 mv rms π phase. With the Error Counter Enable removed, the CA Error output shall be 10 mv rms max.

c. Repeat b. using 10 -$\Delta\theta_C$ pulses. D/A AC Error and CA Error phases shall change by 180 degrees.

4.3.17.3 DAC Saturation. With an Error Counter Enable and 384 +$\Delta\theta_C$ pulses applied, the CA Error output shall be [illegible] mv rms total, π phase. With 384 -$\Delta\theta_C$ pulses, applied, the CA Error output shall be [illegible] mv rms total, 0 phase.

4.3.17.4 Coarse Error Gain. With the 1X resolver set to 0 degrees, the 16X resolver set to obtain a Fine Error null with the read counter at zero, and the CDUZ mode applied and then removed, the CA Error output shall be less than 5 mv rms. With the CDUZ mode applied and the 1X resolver adjusted for a Coarse Error TP voltage of 150 mv rms, π phase, the CA Error TP voltage shall be 1.30 ±0.25V rms, 0 phase.

4.3.18 Ambiguity

4.3.18.1 Override. With the 1X resolver set to 225 degrees, the 16X resolver set to 0 degrees and CDUZ applied, the Fine Error TP null shall be less than 16.66 mv rms and the Coarse Error TP null voltage shall be less than 100 mv rms. With CDUZ subsequently removed, the read counter shall read 225 degrees ±1 bit.

4.3.18.2 Turn-On (IMU). With the 16X resolver set to 0 degrees, the 1X resolver set to 225 degrees, and CDUZ and CA Enable applied, the Coarse Error TP voltage shall be 1.660±0.083V rms π phase and the CA Error TP voltage shall be 11±3V rms 0 phase. With the 1X resolver increased to 245 degrees, the CA Error TP voltage shall be 3.2±0.4V rms, π phase.

4.3.19 Cage Voltage (IMU). With the 16X resolver set to 0 degrees and the 1X resolver set to 0 degrees, the IMU Cage voltage shall be less than 10 mv rms. With the 1X resolver adjusted to 1 degree, the IMU Cage voltage shall be 0.45±0.02V rms. With the 1X resolver set to 90 degrees, the IMU Cage voltage shall be 26±1V rms.

4.3.20 Cage Override (IMU). With a 300 ohm 10W resistor connected between ISS +28 vdc and CA Relay Drive, the CA Relay Drive voltage shall be 28±3 vdc. With a "CDU Common to PSA" applied to Cage Override, the CA Relay Drive voltage shall be 1.5 vdc max. With the 300 ohm resistor removed, an Error Counter Enable applied and 15 $+\Delta\theta_C$ pulses applied, the D/A AC Signal shall be 198±12 mv rms. With a Cage Override applied, the D/A AC Signal shall be 10 mv rms.max.

4.3.21 Switch and System Error

a. With the 1X and 16X resolvers adjusted to obtain the read counter bits specified in Table 1X, the read counter locked by applying a CA Enable (IMU Axis) or a DID followed by CDUZ (RR Axis), and the 16X resolver readjusted to obtain a Fine Error TP null, the angular difference between the 16X resolver angle specified in Table 1X and the final 16X resolver angle shall be calculated to be between +0.075 and -0.045 degrees. The read counter shall be unlocked by removing the CA Enable (IMU Axis) or CDUZ (RR Axis).

b. The requirements specified in a. shall be met for each fine system angle specified in Table IX.

c. With the 1X and 16X resolvers adjusted to obtain the read counter bits of the coarse system specified in Table IX, then readjusted to obtain a null at the Coarse Error TP, the angular difference between the final 1X resolver setting and the 1X resolver angle specified in Table IX shall be calculated to be $\le$0.6 degrees.

d. The test requirements specified in c. shall be met for each coarse system angle specified in Table IX.

4.3.22 General Null. With the 1X and 16X resolvers sequentially adjusted to the angles specified in Table III, the $\Delta\theta_G$ pulses shall be generated as specified, ±1 bit, and the Coarse and Fine Error TP voltages shall be as specified.

4.3.23 Coarse and Fine Amplitude and Phase Variation. With the 1X and 16X resolver input angle, excitation and phase shift adjusted as specified in Table IV, the CDU Read Loop shall not oscillate. Oscillation in the coarse system shall be tested by adjusting the 1X resolver angle plus and minus 0.1 degree from the angle specified in Table IV. Oscillation in the fine system shall be tested by adjusting the 16X resolver angle from 0 degree to 90 degrees then back to 0 degree. The coarse system shall be tested first at a 22.0±0.5 vdc supply voltage, then retested at a 36.0±0.5 vdc supply voltage. The fine system shall be tested at 28.0±1.0 vdc supply voltage.

TABLE IX

SYSTEM ERROR

1X RS COARSE CTR ANGLE	16X RS FINE CTR ANGLE	READ COUNTER BITS															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FINE SYSTEM																	
0.0°	0 *																
↑	0.088	1															
	0.176		1														
	0.352			1													
	0.703				1												
	1.406					1											
	2.813						1										
	5.625							1									
	11.162	1	1	1	1	1	1	1									
	11.250								1								
	16.875							1	1								
	22.412	1	1	1	1	1	1	1	1								
	22.500									1							
	28.125							1		1							
	33.662	1	1	1	1	1	1	1		1							
↓	33.750								1	1							
	39.375							1	1	1							
2.8°	44.912	1	1	1	1	1	1	1	1	1							
2.8°	45.000*										1						
↑	50.625							1			1						
	56.162	1	1	1	1	1	1	1			1						
	56.250								1		1						
	61.875							1	1		1						
	67.412	1	1	1	1	1	1	1	1		1						
	67.500									1	1						
	73.125							1		1	1						
	78.662	1	1	1	1	1	1	1		1	1						
↓	78.750								1	1	1						
	84.375							1	1	1	1						
2.8°	89.912	1	1	1	1	1	1	1	1	1	1						
5.6°	90.00 *											1					
↑	95.625							1				1					
	101.162	1	1	1	1	1	1	1				1					
	101.250								1			1					
	106.875							1	1			1					
	112.412	1	1	1	1	1	1	1	1			1					
	112.500									1		1					
	118.125							1		1		1					
	123.662	1	1	1	1	1	1	1		1		1					
	123.750								1	1		1					
	129.375							1	1	1		1					
↓	134.912*	1	1	1	1	1	1	1	1	1		1					
	135.000										1	1					
8.8°	140.625							1			1	1					

TABLE IX (Continued)

1X RS COARSE CTR ANGLE	16X RS FINE CTR ANGLE	READ COUNTER BITS															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FINE SYSTEM																	
5.6°	146.162	1	1	1	1	1	1	1			1	1					
	146.250								1		1	1					
	151.875							1	1		1	1					
	157.412	1	1	1	1	1	1	1	1		1	1					
	157.500									1	1	1					
	163.125							1		1	1	1					
	168.662	1	1	1	1	1	1	1		1	1	1					
	168.750								1	1	1	1					
	174.375							1	1	1	1	1					
5.6°	179.912	1	1	1	1	1	1	1	1	1	1	1					
11.2	180.000*												1				
11.2	225.000										1		1				
16.8	270.000											1	1				
16.8	315.000										1	1	1				
22.5	360.000																
COARSE SYSTEM																	
2.8	67.500									1	1						
5.6	90.000											1					
11.2	180.000												1				
16.9	270.000											1	1				
22.5	000.000													1			
45.0	000.000														1		
67.5	000.000													1	1		
90.0	000.000															1	
157.5	000.000*													1	1	1	
180.0	000.000																1
247.5	000.000*													1	1		1
270.0	000.000															1	1
337.5	000.000*													1	1	1	1

*Angles to be tested with the +28 vdc supply voltage adjusted first to 22.0±0.5 vdc and then retested at a supply voltage of 34.0±0.5 vdc.

4.3.24 Thermal Stability. The assembly shall be mounted on a cold plate. The cold plate -CDU interface temperature shall be monitored by four interface sensors mounted as shown in Figure 3. The coldplate temperature shall be adjusted until any one interface sensor reaches 50° ±3°F and maintained there during the cold soak and test period shown in Figure 4. The coldplate temperature shall be adjusted until any one interface sensor reaches 110±3°F and maintained there during the hot soak and test period shown in Figure 4.

The four interface sensors and six internal sensors shall be monitored continuously through soaking and testing. The interface temperatures must be within 47 to 113°F and the internal temperatures must be between 41 to 130°F throughout soaking and testing. All the interface sensor temperatures shall be within 10°F of each other.

Power shall be applied continuously through soaking and testing.

The CDU assembly shall be covered by an insulating box (lined with 1 inch thick polyurethane foam or equivalent).

4.3.24.1 Electrical Test. The electrical tests shall be performed with the dc supply voltage adjusted to 22.0±0.5 vdc (24.0±0.5 vdc for 4.3.24.1.c) when the temperature is 50° ±5° F and 24.0±0.5 vdc when the temperature is 110° ±5°F. The electrical tests shall consist of the following tests performed during the intervals shown in Figure 4.

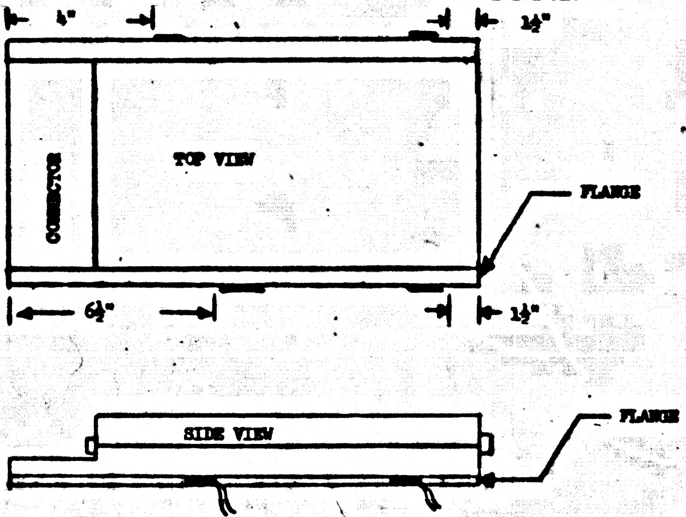
a. Basic Null (4.3.4)
b. Fine Ternary Schmitt Trigger Level (4.3.11.1). The tolerance on the 16X Resolver angle shall be ±0.040°.) The fine error test point voltage shall be 23.33±6.5 mv rms,$\pi\phi$.
c. D/A Converter (4.3.15). Use Table X instead of Table II. Use D/A DC output for PR. The ISS and OSS 28.0V rms, 800 cps excitation shall be maintained as close to the nominal value as possible during this test.
d. Computer $\pm\Delta\theta_G$ Pulses (4.3.13)
e. Coarse and Fine Amplitude and Phase Variation (4.3.23)

TABLE X

D/A OUTPUT

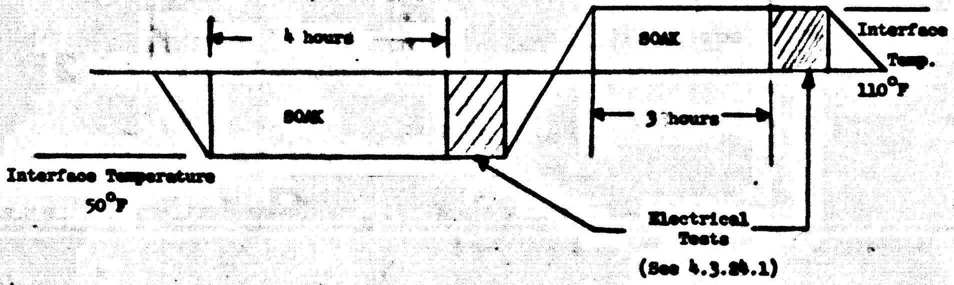
COUNTER CONDITION	PULSES APPLIED	D/A AC OUTPUT (V rms) (0 or π Phase)		D/A ±DC OUTPUT Volts	
		Min	Max	Min	Max
Null	0	0	0.0125	0	0.0125
2^0	1	0.0116	0.0148	0.0117	0.0147
$2^7 \cdot 2^8$	384	4.856	5.368	4.912	5.216
$2^0 \cdot 2^1 \cdot 2^2 \cdot 2^4$	23	0.288	0.318	0.294	0.316

4.3.25 Weight. The assembly shall be weighed to determine that the maximum weight of the assembly shall be as specified in Table XI.


4"
1½"
CONNECTOR
TOP VIEW
FLANGE
6½"
1½"
SIDE VIEW
FLANGE

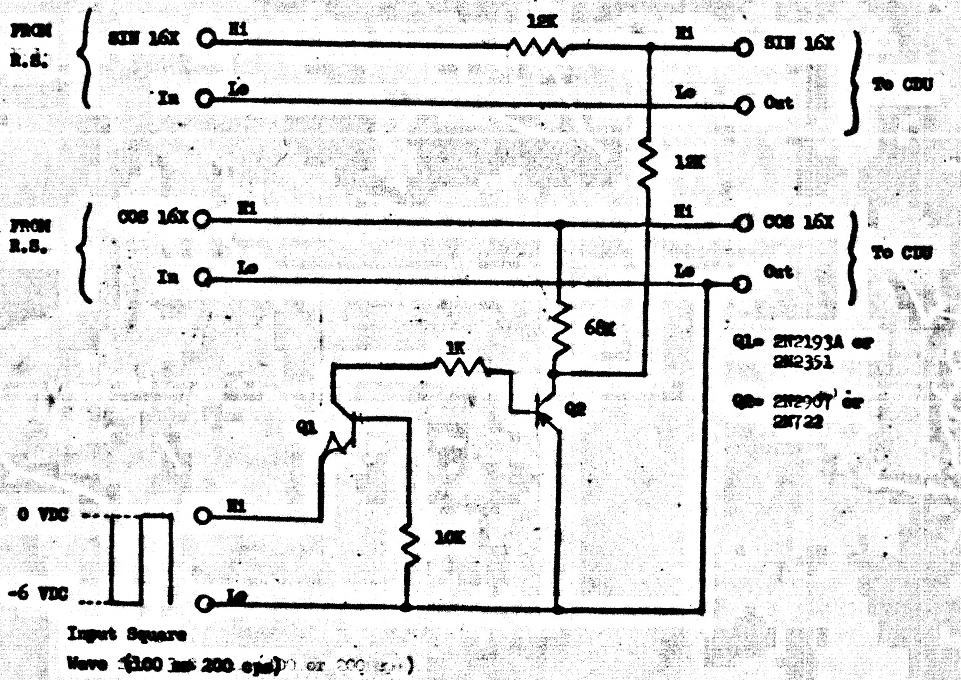
INTERFACE SENSOR LOCATION

FIGURE 3


4 hours
SOAK
Interface Temperature
50°F
SOAK
Interface
Temp.
110°F
3 hours
Electrical
Tests
(See 4.3.24.1)

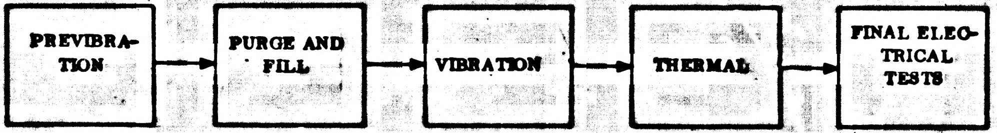
SOAK AND ELECTRICAL TEST SCHEDULE

FIGURE 4.


FROM
R.S.
SIN 16X
In
Hi
Lo
12K
Hi
Lo
SIN 16X
Out
To CDU
12K
FROM
R.S.
COS 16X
In
Hi
Lo
Hi
Lo
COS 16X
Out
To CDU
68K
1K
Q1
Q2
Q1= 2N2193A or
2N2351
Q2= 2N2907 or
2N722
0 VDC
-6 VDC
Hi
Lo
10K
Input Square
Wave (100 or 200 cps)

LIMIT CYCLE GENERATOR

FIGURE 5


PREVIBRATION
PURGE AND FILL
VIBRATION
THERMAL
FINAL ELECTRICAL TESTS

TEST FLOWGRAM

FIGURE 6

TABLE XI

PART NO.	WEIGHT (lbs)
2007222-021	42.5
2007222-041	42.5
2007222-061	37.5
2007222-081	37.5
2007222-121	38.13
2007222-131	38.13
2007222-141	42.5
2007222-171	38.13
2007222-211	42.5
2007222-221	38.13
2007222-241	38.13

4.3.26 Noise Susceptibility tests shall be performed as specified in Paragraph 3.1.22. The noise generator of Figure 7, or equivalent, shall be applied to two types of input configurations:

Type A - IMU 1X Sin and Cos Hi's common to 1X sin and cos lo's common.
Type B - Individual 1X sin and cos hi's to pwr lo. Unused 1X inputs open.

The IMU 1X sine and cos and the 16X cos resolver inputs of the ECDU shall not be connected to the resolver standard. The 16X resolver standard sine output shall be simultaneously connected to all five ECDU axis sin 16X inputs, and shall be adjusted (1X = 0°, 16X = 359°), to insure that the ECDU 2^7 thru 2^{11} stages of all Read Counters (I, M, O, SH and TR) are set prior to the application of noise input.

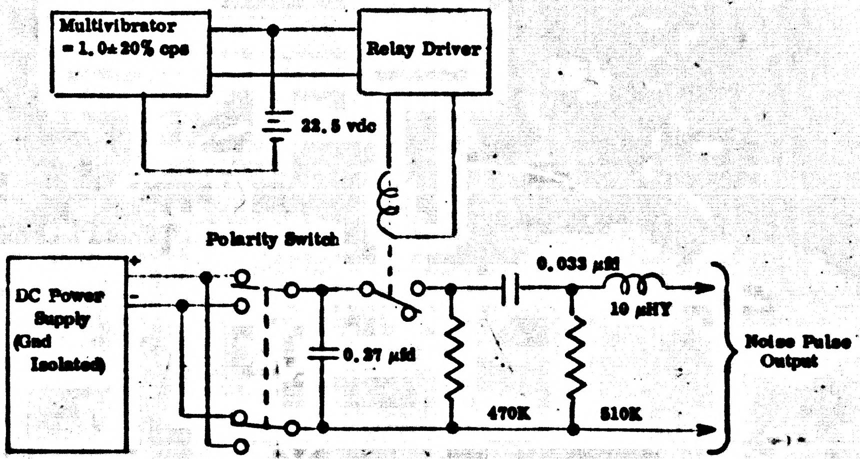
The test period for each ECDU input (types A and B) and each polarity of noise input shall be 60 seconds ±20% of uninterrupted application.

5. PREPARATION FOR DELIVERY

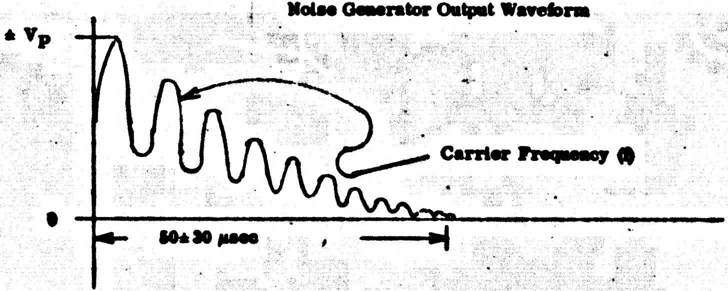
5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

Noise Generator


Multivibrator
= 1.0± 20% cps
Relay Driver
22.5 vdc
Polarity Switch
DC Power Supply (Gnd Isolated)
+
-
0.27 µfd
0.033 µfd
10 µHY
470K
510K
Noise Pulse Output

Noise Generator Output Waveform



Noise Generator and Waveform

Figure 7

APOLLO G&N Specification
PS2016142 REV AC
Original Issue Date: 7 Dec 1965
Release Authority: TDRR
Class A Release 24634
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

DRAWING NO. 2007222

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
5/3/68	AA	36173	6; total pages 31	MGM EA	--
9/27/68	AB	36868	8 - 30. Was 30 pages; now	MGM EA	- -
			32 pages.		
11/8/68	AC	37011	8	EA	WLS

This specification consists of page 1 to 32 inclusive.

APPROVALS	A.C. Metzger **NASA/MSC**	John E. Miller G. Cushman	12/7/65 12/7/65 **MIT/IL**	W. Kupfer 12/7/65	M. W. Smith	R. Mura **AC**

APOLLO G&N Specification
PS2016142 REV AD
Original Issue Date: 7 Dec 1965
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PROCUREMENT SPECIFICATION

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			32 pages.		
11/8/68	AC	37011	8	EA	WLS
12/27/68	AD	37162	10, 27, 31	MGM EA	--

This specification consists of page 1 to 32 inclusive.

APPROVALS	A.C. Metzger **NASA/MSC**	John E. Miller G. Cushman	12/7/65 12/7/65 **MIT/IL**	W. Kupfer 12/7/65	M. W. Smith	R. Mura AC

APOLLO G&N Specification
PS2016142 REV AE
Original Issue Date: 7 Dec 1965
Release Authority: TDRR
Class A **Release** 24634
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

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			32 pages.		
11/8/68	AC	37011	8	EA	WLS
12/27/68	AD	37162	10, 27, 31	MGM EA	--
4/15/69	AE	37512	2	MGM EA	--

This specification consists of page 1 to 32 inclusive.

APPROVALS	A.C. Metzger **NASA/MSC**	John E. Miller 12/7/65 G. Cushman 12/7/65 **MIT/IL**	W. Kupfer 12/7/65	M. W. Smith R. Mura **AC**

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Coupling Data Unit, Part Number 2007222-021, -041, -061, -081, -121, -131, -141, -171, -211, -221, -241, -251 and -261 hereafter called the CDU.

1.2 CLASSIFICATION. The test requirements for the CDU shall be classified as follows. Unless identified by the respective type, all requirements are applicable to all types.

a. Type I. The test requirements for part numbers 2007222-021, -041, -061, -081 and -121 shall be designated as Type I, and so identified in this specification.

b. Type II. The test requirements for part numbers 2007222-131, -141, -171, -211, -221 -241, -251 and -261 shall be designated as Type II and so identified in this specification.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
ND1002290	Process Specification for Helium Leak Test

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Components Parts

DRAWINGS

APOLLO G&N

2007222	Coupling Data Unit

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

APOLLO G&N Specification
PS2016142 REV A
Original Issue Date: 7 DEC 1965.
Release Authority: TDRR 24634
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

DRAWING NO. 2007222

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
4/20/66	A	28179	3-6, 8, 9, 12-23, 24, 25, 26,	WK	TM
			28, 29 RD/WK		

This specification consists of page 1 to 29 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	12/7/65 12/7/65 W. Kupfer MIT/IL 12/7/65	M. W. Smith | R Mura ACSP

3. REQUIREMENTS

3.1 PERFORMANCE. The following performance characteristics are applicable to each of 5 CDU channels (3 IMU Axes and 2 RR Axes) unless otherwise specified herein. The Fine Align mode of operation is implied unless otherwise specified.

3.1.1 Basic Null. The $\Delta\theta G$ pulses and error T.P. voltages shall be generated as specified in Table III when the 1X and 16X resolvers are adjusted to the angles specified.

3.1.2 Coarse Align Read Counter Lock (IMU). The read counter shall become locked to the last resolver angle being received ±1 bit by the application of a CA Enable and shall not count any new resolver angles being received. The read counter shall resume counting the new resolver angles when the CA Enable is removed.

3.1.3 **C/A Relay Drive Voltage.** The CA relay drive voltage shall be 22±1 vdc when the dc supply voltage is 22±1 vdc or 33±1 vdc when the dc supply voltage is 33±1 vdc, when the CDU is in the Fine Align mode. The drive voltage shall be 1.5 vdc maximum when a CA Enable signal is applied.

3.1.4 Coarse Align Rate (IMU). The P_I pulse characteristics shall be as specified in Table I, Type IV and Figure 1 when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180 degrees to cause read loop oscillation. When the CA Enable and EC Enable modes are applied the P_I pulse characteristics shall be as specified in Table I, Type III.

3.1.5 DID Read Counter Lock (RR). The read counter shall become locked to the last resolver angle received by the application of a DID signal followed by a CDU Z signal. Further changes in resolver angles shall have no effect until the CDU Z signal is removed, then the read counter shall resume counting and contain the last resolver angle received.

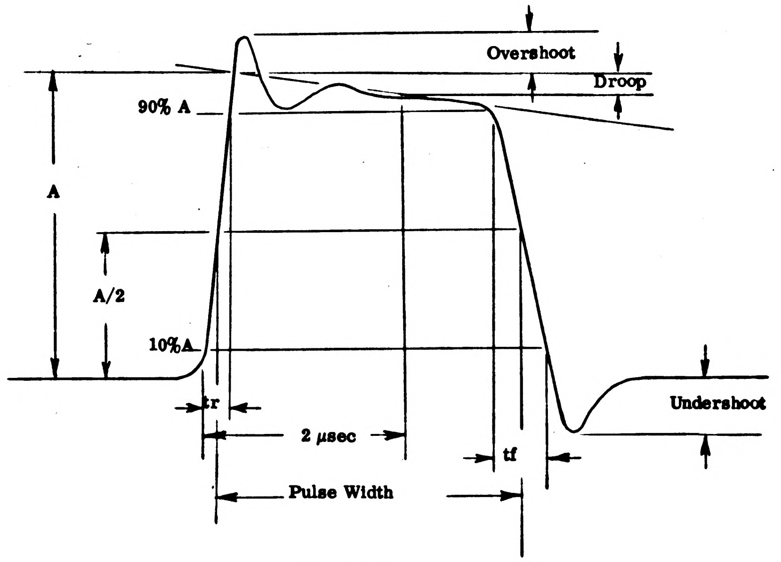
3.1.6 Fine Bit Size. The in-phase component of the Fine Error signal appearing at the Fine Error TP shall be 16±2 mv rms, π phase when the 16X resolver input angle is increased 0.088 degrees from the fine read system null condition.

3.1.7 Coarse Bit Size. The in-phase component of the Coarse Error signal appearing at the Coarse Error TP shall be 60±7 mv rms, π phase when the 1X resolver input angle is increased 2.8 degrees from the coarse read system null condition.

3.1.8 Schmitt Trigger Threshold Levels

3.1.8.1 Fine Ternary. The Fine Ternary Schmitt Trigger shall have an 800 pps output when the 16X resolver is set to 0.131±0.020 degrees and the fine error output shall be 23.33±3.33 mv rms, π phase.

3.1.8.2 High Ternary. The High Ternary Schmitt Trigger shall have an 800 pps output when the 16X resolver is set to 2.20±0.44 degrees and the fine error output shall be 0.40±0.10V rms, π phase.


Overshoot
Droop
90% A
A
A/2
10%A
tr
2 μsec
tf
Pulse Width
Undershoot

WAVEFORM

FIGURE 1

TABLE I

PULSE TRAIN CHARACTERISTICS

PARAMETER	TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V	TYPE VI
PRF	51.2K pps	3.2K pps	6.4K pps	12.8K pps	51.2K pps	6.4K pps
Amplitude (A)	4.5±0.5V p	4.5±0.5V p	3.5±1V p	3.5±1V p	7±3V p	7±3 V p
Width (at 1/2 A)	3.0±0.5 μsec	3.0±0.5 μsec	3±1 μsec	3±1 μsec	3±1 μsec	3±1 μsec
Droop at 2 μsec	<20% A	<20% A	<20% A	<20% A	<20% A	<20% A
Overshoot	<20% A	<20% A	<20% A	<20% A	<20% A	<20% A
Undershoot	<20% A	<20% A	<20% A	<20% A	<20% A	<20% A
Risetime (tr)	≤0.2 μsec	≤0.2 μsec	≤1.0 μsec	≤0.2 μsec	≤0.2 μsec	≤ 1 μsec
Falltime (tf)	≤1.0 μsec	≤1.0 μsec	≤1.0 μsec	≤1.0 μsec	≤1.0 μsec	≤ 1 μsec

3.1.8.3 Coarse Ternary. The Coarse Ternary Schmitt Trigger shall have an 800 pps output when the 1X resolver is set to 8.40±1.40 degrees and the coarse error output shall be 196.0±32.6 mv.rms, π phase.

3.1.8.4 Ambiguity Detect. The Ambiguity Detect Schmitt shall have an 800 pps output when the 1X resolver angle lies between 120±5 degrees and 240±5 degrees.

3.1.9 Speed. The digitizing loop shall settle to a null and the read counter shall contain an angular change of 112.5 degrees within 4.0 seconds maximum when a step change of 112.5 degrees in 1X resolver input angle is applied.

3.1.10 Computer $\pm\Delta\theta_G$ Pulse. The $\pm\Delta\theta_G$ pulse shall have the characteristics specified in Table I, Type VI when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180 degrees to cause read system oscillation. The CDU Z LAG pulse shall have the characteristics specified in Table I, Type V when the CDU Z signal is also applied.

3.1.11 CDU Fail Detection. The CDU failure circuit shall indicate a failure or no failure as specified when any of the following conditions exist for a period greater than 7 seconds.

a. Fine Error Fail shall not occur when the 16X resolver angle is 8.0 degrees, the 1X resolver angle is 0 degrees and the system is in the CDU Z mode. A Fine Error Fail shall occur when the 16X resolver angle is changed to 12.0 degrees.

b. Coarse Error Fail shall not occur when the 1X resolver angle is 20 degrees, the 16X resolver angle is 0 degrees and the system is in the CDU Z mode. A Coarse Error Fail shall occur when the 1X resolver angle is increased to 33 degrees, and the 16X R.S. is increased to 180 degrees.

c. Cos $(\theta-\psi)$ Fail shall not occur when the 16X resolver excitation is reduced to 25±1V rms while the 1X and 16X resolver angles are at 0 degrees. A Cos $(\theta-\psi)$ Fail shall occur when the 16X resolver excitation is reduced to 14±1V rms.

d. Limit Cycle Fail shall not occur when the digitizing loop is in a limit cycle condition at a rate of 100±1 cps. Limit Cycle Fail shall occur when the limit cycle rate is 200±2 cps.

e. 14 VDC Fail shall not occur when the 14 vdc IMU or RR supply voltage is equal to 10±0.1 vdc. A 14 vdc Fail shall occur when the 14 vdc IMU or RR supply voltage is 8±0.1 vdc.

3.1.12 D/A Converter. The DAC output shall be as specified in Table II when the error counter is counted up or down.

TABLE II

DAC OUTPUT

EC&L COUNTER CONDITION	PULSES APPLIED	+ DC OUTPUT -DC VOLTS	AC OUTPUT 0 OR π V RMS
Null	0	0.0000±5 mv	0.0000±5 mv
2^0	1	0.0132±11%	0.0133±12%
2^1	2	0.0264±6%	0.0266±7%
2^2	4	0.0527±6%	0.0532±7%
2^3	8	0.1055±3%	0.1065±5%
2^4	16	0.2110	0.2130
2^5	32	0.4220	0.4260
2^6	64	0.8440	0.8520
2^7	128	1.6880±3%	1.704±5%
$2^5 . 2^7$	160	2.1100±1%	2.130±2%
2^8	256	3.3760±3%	3.408±5%
$2^7 . 2^8$	384	5.064	5.112
$2^0 . 2^7 . 2^8$	385*1	5.064	5.112
$2^0 . 2^1 . 2^2 . 2^3$ $2^4 . 2^5 . 2^6 . 2^8$	-1*2	5.0508±3%	5.0987±5%

*1 Reading shall be within ±3 mv of the previous reading at 384 pulses.

*2 Apply one pulse in the opposite direction to obtain this condition. The null voltage of the dc output shall be added to (if minus) or subtracted (if plus) from the dc output.

3.1.13 A/D to D/A Feedback Loop

3.1.13.1 IMU Axes. The D/A AC output shall be as follows when the CDU is in the Coarse Align Mode (CA Enable and EC Enable applied) and the 16X resolver is adjusted to the following read counter angles:

a. The D/A AC Error output shall be 13.3±1.6 mv rms π phase when the read counter angle is 0.703 degrees.

b. The D/A AC Error output shall be 26.6±1.9 mv rms π phase when the read counter angle is 1.4 degrees. With CA Enable removed, the D/A AC error shall be 10 mv rms maximum.

c. The D/A AC Error output shall be 26.6±1.9 mv rms 0 phase when the read counter angle is 358.6 degrees.

3.1.17 Cage Override (IMU). The DAC AC Error output shall be 198±12 mv rms and the CA relay drive voltage shall be 28±3 vdc when an Error Counter Enable and 15 $+\Delta\theta_C$ pulses are applied. The CA relay drive voltage shall be 1.5 vdc max and the DAC AC Error output shall be 10 mv rms max when a Cage Override is applied in addition to the Error Counter Enable and 15 $+\Delta\theta_C$ pulses.

3.1.18 Switch and System Error. The system digitizing error shall be within +0.075 and -0.035 degrees for the 16X resolver system and ±0.5 degrees max for the 1X resolver system.

3.1.19 General Null. The $\Delta\theta_G$ pulses and error T.P. voltages shall be generated as specified in Table III when the 1X and 16X resolvers are adjusted to the angles specified.

3.1.20 Coarse and Fine Amplitude and Phase Variation. The CDU Read Loop shall not oscillate in the CDU Z mode under the conditions specified in Table IV.

3.1.21 Thermal Stability. The assembly shall meet the requirements of 3.1.1, 3.1.8.1, 3.1.10, 3.1.12, and 3.1.20 with the assembly mounted on a cold plate and the interface temperatures maintained at 50° ±3°F and 110° ±3°F.

TABLE III

GENERAL NULL

INPUT RESOLVER (Degrees)		OUTPUT ERROR VOLTAGE Fine	OUTPUT ERROR VOLTAGE Coarse	PULSE TOTAL $[(+\Delta\theta_G) - (-\Delta\theta_G)]$
1X	16X	Max	Max	
0	0	75MV P-P	0.650V P-P	0
75.9	135	↑	↑	6912
2.8	45			256
168.7	180			15,360
5.6	90			512
239	225			21,760
19.7	315			1,792
331.8	270	↓	↓	30,208
0	0	75MV P-P	0.650V P-P	0

TABLE IV

OSCILLATION OF CDU READ LOOP

CONDITIONS					
Carrier ∠φ (°)		Resolver (°)		Resolver Excit (V rms)	
1X	16X	1X	16X	1X	16X
COARSE SYSTEM					
0	0	45	0	30	28
-15	↑	45	0	32	↑
+15		45	0	28	
0		47.8	45	23	
-15	↓	47.8	45	23	↓
+15	0	47.8	45	23	28
FINE SYSTEM					
0	+20	0	0	28	32
0	+20	0	0	28	24
0	-20	0	0	28	32
0	-20	0	0	28	24

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 2007222-021 and all drawings and engineering data referenced thereon.

3.2.2 Standards of Manufacturing, Manufacturing Process and Production

3.2.2.1 Continuity and DC Resistance. The resistance between the pins specified in Table V shall be as specified therein, when the resistance is measured on a Millivac ohmmeter type MV 279C or equivalent.

4.2.1.3 Previbration Tests. Previbration testing shall include 3.1.1, 3.2.1, and 3.2.2.1.

4.2.1.4 Final Electrical Tests. All the tests specified in 4.1 except 3.1.21 and 3.2.1 shall be performed as final electrical tests.

4.2.1.5 Inputs. Unless otherwise specified, the assembly shall be tested using the following inputs.

a. 28±1 vdc, 3 amps maximum, 33.0±0.5 vdc enhanced, 22.0±0.1 vdc degraded. (See 4.2.1.5.1).

b. 50±3 vdc.

c. 28.00±0.28V rms, 800.0±1.0 cps System Reference, synchronized to 51.2 Kpps.

d. Simulated resolver systems consisting of the following:

   (1) 1X Resolver, 26±.26V rms output, 0±2° phase
   (2) 16X Resolver, 5±.05V rms output, 0±2° phase

e. Clock pulses as specified in Table I, Type I.

f. $\pm\Delta\theta_C$ pulses as specified in Table I, Type II, gated in non-repetitive pulse bursts of 1, 2, 4, 8, 16, 23, 32, 64, 128, 256, 383, 384, 385, and 768 pulses per burst.

g. All mode inputs shall be OVDC thru 2K±10 percent except CAGE OVERRIDE which shall be 0 VDC (ON) and thru 1 Meg (OFF).

4.2.1.5.1 DC Stability. Each of the following tests shall be run with the +28 vdc supply voltage adjusted to 22.0±0.5 vdc and then repeated with the voltage adjusted to 33.0±0.5 vdc. All other tests shall be run with a 28±3 vdc supply voltage, except 4.3.2.1 which shall be run at 22.0±0.5 vdc.

4.3.4, 4.3.6, 4.3.9, 4.3.10, 4.3.11, 4.3.14.1, 4.3.15, 4.3.17, 4.3.21 (as specified therein), 4.3.22, 4.3.23 (as specified therein), 4.3.24.

4.2.2 Pressure Fill and Leak. The assembly shall be filled with dry nitrogen and helium as specified in ND1002290 and Figure 6. It shall then be placed in a vacuum fixture and the fixture exhausted per the ND. The maximum leak rate shall be as specified in the ND.

4.2.2.1 Purge and Fill. The assembly shall be internally dried and maintained, using the following procedure, at the time specified in Figure 6.

a. Evacuate header to 0.5 atmosphere.

b. Fill to atmospheric pressure with dry nitrogen.

c. Repeat Steps 1 and 2, three additional times.

d. The final pressure will be 16 to 17.5 psia using a fill gas mixture which will result in a final mixture with a minimum of 10 percent helium per residue gas from purging and the remaining nitrogen per .

e. Install cap on pressure valve assembly and leak check sealing edges using the sniffer technique. The leak rate shall be less than 1 x 10^{-5} cc/sec at any single point along the sealing surfaces.

4.2.3 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

TABLE VI

SIGNAL AND LOAD CONNECTION LIST

	SIGNAL	IG	MG	OG	SHAFT	TRUN	OTHER	LOAD (Ohms)
RESOLVER								
SIN 16X	Hi	140	142	144	146	148		
	Lo	240	242	244	246	248		
	Shld	340	342	344	346	348		
COS 16X	Hi	440	442	444	446	448		
	Lo	540	542	544	546	548		
	Shld	640	642	644	646	648		
SIN 1X	Hi	141	143	145	147	149		
	Lo	241	243	245	247	249		
	Shld	341	343	345	347	349		
COS 1X	Hi	441	443	445	447	449		
	Lo	541	543	545	547	549		
	Shld	641	643	645	647	649		
POWER SERVO ASSEMBLY								
IMU	Cage	129	429	130				
	OV	229	529	230				
	(F) Shld	329	629	330				
Coarse	Hi	430	131	431				30K±1%
Align	Lo	530	231	531				
Signal	(F) Shld	630	331	631				
D/A AC	Hi	132	432	133	433	134		20K±1%
Signal	Lo	232	532	233	533	234		
	(F) Shld	332	632	333	633	334		
D/A DC	Hi				237	437		20K±1%
Signal	Lo				337	537		
	(F) Shld				137	637		
OSS 28	Hi						228	
V rms 1%	Lo						328	
800 cps	Shld						128	
ISS 28	Hi						428	
V rms 1%	Lo						528	
800 cps	Shld						628	

TABLE VI (Continued)

SIGNAL		IG	MG	OG	SHAFT	TRUN	OTHER	LOAD (Ohms)
POWER SERVO ASSEMBLY								
ISS +28 vdc CDU	Hi						136	
	OV						236	
OSS +28 vdc CDU	Hi						336	
	Lo						436	
CA Relay Drive							138	300±10% to +28 vdc
CDU Common to PSA							238	
Cage Override							338	
COMPUTER								
$+\Delta\theta_C$	Hi	610	609	608	607	606		
	Lo	510	509	508	507	506		
	Shld	410	409	408	407	406		
$-\Delta\theta_C$	Hi	310	309	308	307	306		
	Lo	210	209	208	207	206		
	Shld	110	109	108	107	106		
$+\Delta\theta_G$	Hi	605	604	603	602	601		510±10%
	Lo	505	504	503	502	501		
	Shld	405	404	403	402	401		
$-\Delta\theta_G$	Hi	305	304	303	302	301		510±10%
	Lo	205	204	203	202	201		
	Shld	105	104	103	102	101		
RR CDU Fail							313	10K±20%
IMU CDU Fail							213	10K±20%
IMU Operate							611	10K±20%
ISS CA Enable							113	MODES
ISS EC Enable							612	
ISS CDU Zero							512	
RR D/A Enable							412	
RR CDU Zero							312	
Display Inertial Data							112	
51.2K pps	Hi						311	
	Lo						211	
	Shld						111	

TABLE VI (Continued)

SIGNAL		IG	MG	OG	SHAFT	TRUN	OTHER	LOAD (Ohms)
LEM ABORT GUIDANCE (LAG)								
$+\Delta\theta$	Hi	115	515	316				510±5%
	Lo	215	615	416				
$-\Delta\theta$	Hi	315	116	516				510±5%
	Lo	415	216	616				
CDU Zero	Hi						117	510±5%
	Lo						217	
	Shld						—	
TEST POINTS								
Fine Error		620	221	421	621	222		10.15K ±0.1%
Coarse Error		121	321	521	122	322		10.15K ±0.1%
P_I		219	319	419	519	619		
U_L		120	220	320	420	520		
A_D		323	423	523	123	223		
F_1		623	324	624	325	625		
F_2		124	424	125	425	126		
C_1		224	524	225	525	226		
Test Point Common							119	
+4 vdc							422	
+14 vdc ISS							522	2K to 8K Fail Adjustment
+14 vdc RR							622	
TEMP SENSOR								
TEMP 1	Hi						626	
	Lo						627	
TEMP 2	Hi						127	
	Lo						627	
TEMP 3	Hi						227	
	Lo						627	
TEMP 4	Hi						327	
	Lo						627	
TEMP 5	Hi						427	
	Lo						627	
TEMP 6	Hi						527	
	Lo						627	

4.3 TESTS. The following tests shall be performed on each of the three IMU axes and on each of the two RR axes unless otherwise specified herein.

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 2007222. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, contaminants, encapsulant defects, pin misalignment, and legibility and appearance of marking.

4.3.2 Workmanship-Vibration. The assembly shall be mounted on a vibration fixture in a manner in which it is mounted in the spacecraft and vibrated along the three orthogonal axes. The vibration shall be simple harmonic motion swept from 10 to 2000 cps at a rate of 1 octave per 15 sec. The magnitude of vibration shall be 3.5g rms limited to a 0.3 inch pp constant displacement from 10 cps to the crossover frequency. During vibration the assembly shall be electrically tested as specified in 4.3.2.1.

4.3.2.1 Electrical. During vibration the assembly shall be electrically tested through one complete vibration sweep at each of the resolver settings specified in Table VII. The electrical tests shall be as follows:

a. P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulse lines shall be monitored throughout the sweep cycle and presence of P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulses shall constitute failure.

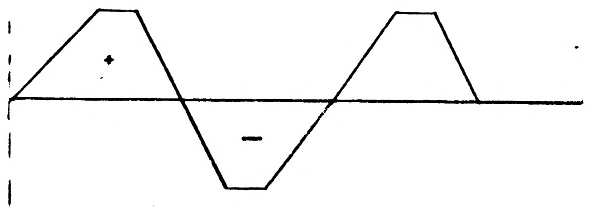
b. With an EC Enable (IMU) or a D/A Enable (RR) applied, a 3200 pps signal in pulse bursts of 1023 pulses per burst applied alternately to the $+\Delta\theta_C$ and $-\Delta\theta_C$ inputs and the 1X and 16X resolvers and read counter at the angles specified in Table VII, the DAC AC and DC Error Signals shall be modulated at 1.56±0.10 cps and shall be as shown in Figure 2 and as specified in Table VII. The DAC DC shall be tested for the RR axis only, and DID shall be moded for the RR axis. A discontinuity of 0.5 msec, or more shall constitute a failure of the dc output. A discontinuity of 0.5 msec or more shall constitute a failure of the ac output.

c. The output discretes specified in Table VIII shall be continuously monitored for state change or pulse presence in accordance with Table VIII.

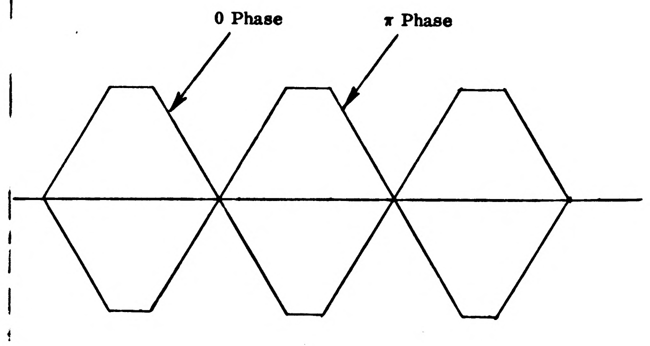
Table VII

DAC AC ERROR OUTPUT

RESOLVER ANGLE		READ COUNTER ANGLE ±1 bit	DAC AC ERROR (V rms) max	DAC DC ERROR (V rms) max
1X (°)	16X (°)			
2.8	45	2^9	4.7 to 5.4	4.7 to 5.4
165	135	$2^9\ 2^{10}\ 2^{12}\ 2^{13}\ 2^{14}$	↑	↑
239	225	$2^9\ 2^{11}\ 2^{13}\ 2^{15}$	↓	↓
334	315	$2^9\ 2^{10}\ 2^{11}\ 2^{13}\ 2^{14}\ 2^{15}$	4.7 to 5.4	4.7 to 5.4



DC OUTPUT


0 Phase
π Phase

AC OUTPUT

DAC OUTPUTS

FIGURE 2.

TABLE VIII

OUTPUT DISCRETES

DISCRETE	DC VOLTAGE LEVEL	PULSE PRESENCE	
		YES	NO
IMU OPER	17±5 vdc max		
RR Fail	5 vdc max		
ISS Fail	5 vdc max		
CA Relay	22±5 vdc		
CDUZ LAG			X

4.3.3 Continuity and DC Resistance. The dc resistance between the points specified in Table V shall be measured in accordance with Method 303 of Standard MIL-STD-202 and shall be as specified in Table V.

4.3.4 Basic Null. With the 1X and 16X resolvers sequentially adjusted to the angles specified in Table III, the $\Delta\theta_G$ pulses shall be generated as specified ±1 bit, and the coarse and fine error TP voltages shall be as specified.

4.3.5 CA Read Counter Lock (IMU). With the 1X and 16X resolvers set to 0 degrees, CDUZ momentarily applied and the 16X resolver angle increased to 11.25 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With CA mode added and the 16X resolver angle increased to 90 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With CA removed, the read counter angle shall change to 90 degrees ±1 bit.

4.3.6 CA Relay Driver (IMU). With a 300 ohm, 10W resistor connected from CA Relay Drive to ISS +28 vdc, the CA Relay Drive voltage shall be ±1 vdc from the ISS power supply voltage. With CA Enable applied, the CA Relay Drive voltage shall decrease to 1.5 vdc max. With the 300 ohm resistor and CA removed and the CA Relay Drive connected to +50 ±3 vdc through a 2.4K ohm resistor, the CA Relay Drive voltage shall be 39±4 vdc. Measure +4 ±.2 vdc and .20V pp max at +4 VDC TP.

4.3.7 CA Rate (IMU). With the 1X resolver set to 0 degrees and the 16X resolver set to 180 degrees, the P_I pulses shall have a pulse width of 3±1 μsec and shall be spaced 78±4 μsec apart. With CA and ECE applied, the P_I pulses shall have a pulse width of 3±1 μsec and shall be spaced 156±8 μsec.

4.3.8 DID READ COUNTER LOCK (RR). With the 1X and 16X resolvers set to 0 degrees and CDUZ momentarily applied, the read counter shall contain an angle of 0 degrees. With the 16X resolver advanced to 11.25 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With DID applied, followed with a CDUZ, and the 16X resolver set to 90 degrees, the read counter shall remain at 11.25 degrees ±1 bit. With CDUZ removed, the read counter shall contain an angle of 90 degrees ±1 bit.

4.3.9 Fine Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 16X resolver adjusted to obtain a Fine Error null, then advanced 0.088 degrees, the Fine Error TP voltage shall be 16±2 mv rms π phase.

4.3.10 Coarse Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 1X resolver adjusted to obtain a Coarse Error null, then advanced 2.8 degrees, the Coarse Error TP voltage shall be 60±7 mv rms, π phase.

4.3.11 Schmitt Trigger Threshold Levels

4.3.11.1 Fine Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until a stable 800 pps pulse train appears at the Fine Ternary Schmitt TP, the Fine Error TP voltage shall be 23.33±3.33 mv rms π phase and the net increase in the 16X resolver angle shall be 0.131±0.020 degrees.

4.3.11.2 High Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until an 800 pps pulse train appears at the High Ternary Schmitt TP, the Fine Error TP voltage shall be 0.40±0.10V rms π phase and the net increase in the 16X resolver angle shall be 2.200±0.440 degrees.

4.3.11.3 Coarse Ternary. With CDUZ applied and the 1X resolver angle increased from a Coarse Error null until an 800 pps pulse train appears at the Coarse Ternary Schmitt TP, the Coarse Error TP voltage shall be 196.0±32.6 mv rms π phase and the coarse error angle shall be 8.4±1.4 degrees.

4.3.11.4 Ambiguity Detect. With CDUZ applied, the 16X resolver set to 0 degrees and the 1X resolver increased from 115 degrees until an 800 pps pulse train appears at the Ambiguity Detect TP, the 1X resolver angle shall be 120±5 degrees. The pulse train shall continue to exist until the 1X resolver angle is increased to 240±5 degrees.

4.3.12 Speed. With the 16X resolver set to 0 degrees, the 1X resolver set to 112.5 degrees and CDUZ applied, the Coarse Schmitt (C1) pulses shall disappear within 4 seconds after CDUZ is removed and the read counter shall contain an angle of 112.5 degrees ±1 bit.

4.3.13 Computer $\pm\Delta\theta_G$ Pulses. With the 1X resolver set to 0 degrees and the 16X resolver set to 180 degrees, the $\pm\Delta\theta_G$ and $\pm\Delta\theta_G$ LAG signals shall have the characteristics specified in Table I, Type VI. With CDUZ added, the CDUZ LAG pulse shall have the characteristics specified in Table I, Type V.

4.3.14 CDU Fail Detection. Unused 16X resolver inputs shall be excited by connecting a 5V rms 0 phase voltage to the unused cos 16X inputs.

4.3.14.1 Fine Error Fail. With the 1X resolver set to 0 degrees, CDUZ applied and the 16X resolver set to 8.000 degrees, no fail signal shall be generated after 7 seconds. With the 16X resolver increased to 12.000 degrees, a fail signal shall be generated within 3 to 7 seconds. With CDUZ removed, the fail signal shall cease within 1 second.

4.3.14.2 Coarse Error Fail. With the 16X resolver set to 0 degrees, the 1X resolver set to 20 degrees and CDUZ applied, no failure signal shall be generated. With the 1X resolver increased to 33 degrees and 16X R.S. set to 180 degrees a fail signal shall be generated within 3 to 7 seconds.

4.3.14.3 14 VDC Fail. With the 1X and 16X resolvers set to 0 degrees and the 14 vdc TP voltage adjusted to 10.0 ±0.1 vdc, no fail signal shall be generated. With the 14 vdc TP voltage adjusted to 8.0 ±0.1 vdc, a fail signal shall be generated within 3 to 7 seconds.

4.3.14.4 Cos $(\phi - \psi)$ Fail. With the 1X and 16X resolvers set to 0 degrees and the excitation to the 16X resolver adjusted to 25V rms, no fail signal shall be generated. With the excitation reduced to 14V rms, a fail signal shall be generated within 3 to 7 seconds.

4.3.14.5 Limit Cycle Fail. With the 1X resolver set to 0 degrees, the 16X resolver set to 355.00 degrees CDUZ applied and a 100 ±1 cps limit cycle input signal applied as shown in figure 5 or equivalent, no failure signal shall be generated. With the limit cycle increased to 200 ±2 cps, a fail signal shall be generated within 3 to 7 seconds.

4.3.15 D/A Converter. With an EC Enable (for IMU) or a D/A Enable (for RR) applied and the read counter counted up and down in accordance with Table II, the ac and dc DAC outputs shall be as specified therein except that a dc output shall not be present for IMU axes and that a dc output shall not be present for RR axes until DID is applied.

4.3.16 A/D to D/A Feedback Loop.

4.3.16.1 IMU Axes. With the 1X and 16X resolvers set to 0 degrees, CDUZ momentarily applied, CA Enable and Error Counter Enable applied and the 16X resolver adjusted to produce a read counter reading of 8 bits, the D/A AC Error voltage shall be 0.013 ±0.002V rms π phase. With the 16X resolver adjusted to produce a read counter reading of 16 bits, the D/A AC Error voltage shall be 0.026 ±0.004V rms π phase. With the 16X resolver adjusted near 358.5 degrees to produce a read counter reading of -16 bits, the D/A AC Error voltage shall be 0.026 ±0.004V rms, 0 phase. Repeat tests without CA Enable applied. The D/A AC Error shall be 10 mv rms max.

4.3.16.2 RR Axes. With the 16X resolver set to 0 degrees and a D/A Enable applied, the D/A AC Error output shall be 10 mv rms max. With the 16X resolver adjusted to produce a read counter reading of 8 bits, the D/A AC Error output shall be 10 mv rms max. With the 16X resolver set to 90 degrees, the D/A AC Error output shall be 10 mv rms max.

4.3.17 Coarse Align Amplifier (IMU)

4.3.17.1 Fine Error Gain. With the 1X resolver set to 0 degrees and the CA mode applied, the 16X resolver shall be adjusted to produce a minimum null at the Fine Error TP. With the 16X resolver angle increased 1.760 degrees from the 16X null angle, the CA Error output voltage shall be 48±5 mv rms, 0 phase.

4.3.17.2 DAC Gain.

a. With the 1X resolver set to 0 degrees, and the CDUZ mode applied, the 16X resolver shall be adjusted to produce a Fine Error TP null. With the CDUZ mode removed, the D/A AC Error output shall be 10 mv rms max.

b. With an Error Counter Enable and 10+ $\Delta\theta_C$ pulses applied, the D/A AC Error output shall be 132.0 ±13.2 mv rms 0 phase. The CA Error output shall be 36±8 mv rms π phase. With the Error Counter Enable removed, the CA Error output shall be 10 mv rms max.

c. Repeat b. using 10 $-\Delta\theta_C$ pulses. D/A AC Error and CA Error phases shall change by 180 degrees.

4.3.17.3 DAC Saturation. With an Error Counter Enable and 256 $+\Delta\theta_C$ pulses applied, the CA Error output shall be 165 ±45 mv rms, π phase. With 256 $-\Delta\theta_C$ pulses, applied, the CA Error output shall be 165 ±45 mv rms, 0 phase.

4.3.17.4 Coarse Error Gain. With the 1X resolver set to 0 degrees, the 16X resolver set to obtain a Fine Error null with the read counter at zero, and the CDUZ mode applied and then removed, the CA Error output shall be less than 5 mv rms. With the CDUZ mode applied and the 1X resolver adjusted for a Coarse Error TP voltage of 150 mv rms, π phase, the CA Error TP voltage shall be 1.30 ±0.25V rms, 0 phase.

4.3.18 Ambiguity

4.3.18.1 Override. With the 1X resolver set to 225 degrees, the 16X resolver set to 0 degrees and CDUZ applied, the Fine Error TP null shall be less than 16.66 mv rms and the Coarse Error TP null voltage shall be less than 100 mv rms. With CDUZ subsequently removed, the read counter shall read .225 degrees ±1 bit.

4.3.18.2 Turn-On (IMU). With the 16X resolver set to 0 degrees, the 1X resolver set to 225 degrees, and CDUZ and CA Enable applied, the Coarse Error TP voltage shall be 1.660±0.083V rms π phase and the CA Error TP voltage shall be 11±3V rms 0 phase. With the 1X resolver increased to 245 degrees, the CA Error TP voltage shall be 3.3±0.3V rms, π phase.

4.3.19 Cage Voltage (IMU). With the 16X resolver set to 0 degrees and the 1X resolver set to 0 degrees, the IMU Cage voltage shall be less than 10 mv rms. With the 1X resolver adjusted to 1 degree, the IMU Cage voltage shall be 0.45±0.02V rms. With the 1X resolver set to 90 degrees, the IMU Cage voltage shall be 26±1V rms.

4.3.20 Cage Override (IMU). With a 300 ohm 10W resistor connected between ISS +28 vdc and CA Relay Drive, the CA Relay Drive voltage shall be 28±3 vdc. With a "CDU Common to PSA" applied to Cage Override, the CA Relay Drive voltage shall be 1.5 vdc max. With the 300 ohm resistor removed, an Error Counter Enable applied and 15 $+\Delta\theta_C$ pulses applied, the D/A AC Signal shall be 198±12 mv rms. With a Cage Override applied, the D/A AC Signal shall be less than 10 mv rms.

4.3.21 Switch and System Error

a. With the 1X and 16X resolvers adjusted to obtain the read counter bits specified in Table 1X, the read counter locked by applying a CA Enable (IMU Axis) or a DID followed by CDUZ (RR Axis), and the 16X resolver readjusted to obtain a Fine Error TP null, the angular difference between the 16X resolver angle specified in Table 1X and the final 16X resolver angle shall be calculated to be between +0.075 and -0.035 degrees. The read counter shall be unlocked by removing the CA Enable (IMU Axis) or CDUZ (RR Axis).

b. The requirements specified in a. shall be met for each fine system angle specified in Table IX.

c. With the 1X and 16X resolvers adjusted to obtain the read counter bits of the coarse system specified in Table IX, then readjusted to obtain a null at the Coarse Error TP, the angular difference between the final 1X resolver setting and the 1X resolver angle specified in Table IX shall be calculated to be less than 0.5 degrees.

d. The test requirements specified in c. shall be met for each coarse system angle specified in Table IX.

4.3.22 General Null. With the 1X and 16X resolvers sequentially adjusted to the angles specified in Table III, the $\Delta\theta_G$ pulses shall be generated as specified, ±1 bit, and the Coarse and Fine Error TP voltages shall be as specified.

4.3.23 Coarse and Fine Amplitude and Phase Variation. With the 1X and 16X resolver input angle, excitation and phase shift adjusted as specified in Table IV, the CDU Read Loop shall not oscillate. Oscillation in the coarse system shall be tested by adjusting the 1X resolver angle plus and minus 0.1 degree from the angle specified in Table IV. Oscillation in the fine system shall be tested by adjusting the 16X resolver angle from 0 degree to 90 degrees then back to 0 degree. The coarse system shall be tested first at a 22.0±0.5 vdc supply voltage, then retested at a 33.0±0.5 vdc supply voltage. The fine system shall be tested at 28±3 vdc supply voltage.

TABLE IX (Continued)

1X RS COARSE CTR ANGLE	16X RS FINE CTR ANGLE	READ COUNTER BITS															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FINE SYSTEM																	
5.6°	146.162	1	1	1	1	1	1	1			1	1					
↑	146.250								1		1	1					
	151.875							1	1		1	1					
	157.412	1	1	1	1	1	1	1	1		1	1					
	157.500									1	1	1					
	163.125							1		1	1	1					
	168.662	1	1	1	1	1	1	1		1	1	1					
	168.750								1	1	1	1					
↓	174.375							1	1	1	1	1					
5.6°	179.912	1	1	1	1	1	1	1	1	1	1	1					
11.2	180.000*												1				
11.2	225.000										1		1				
16.8	270.000											1	1				
16.8	315.000										1	1	1				
22.5	360.000																
COARSE SYSTEM																	
2.8	67.500									1	1						
5.6	90.000											1					
11.2	180.000												1				
19.6	270.000										1	1	1				
22.5	000.000													1			
45.0	000.000														1		
67.5	000.000													1	1		
90.0	000.000															1	
157.5	000.000*													1	1	1	
180.0	000.000																1
247.5	000.000*													1	1		1
270.0	000.000															1	1
337.5	000.000*													1	1	1	1

*Angles to be tested with the +28 vdc supply voltage adjusted first to 22.0±0.5 vdc and then retested at a supply voltage of 33.0±0.5 vdc.

4.3.24 Thermal Stability. The assembly shall be mounted on a cold plate. The cold plate - CDU interface temperature shall be monitored by four interface sensors mounted as shown in Figure 3. The coldplate temperature shall be adjusted until any one interface sensor reaches $50^\circ \pm 3^\circ$F and maintained there during the cold soak and test period shown in Figure 4. The coldplate temperature shall be adjusted until any one interface sensor reaches $110 \pm 3^\circ$F and maintained there during the hot soak and test period shown in Figure 4.

The four interface sensors and six internal sensors shall be monitored continuously through soaking and testing. The interface temperatures must be within 47 to 113°F and the internal temperatures must be between 41 to 130°F throughout soaking and testing. All the interface sensor temperatures shall be within 10°F of each other.

Power shall be applied continuously through soaking and testing.

The CDU assembly shall be covered by an insulating box (lined with 1 inch thick polyurethane foam or equivalent).

4.3.24.1 Electrical Test. The electrical tests shall be performed with the dc supply voltage adjusted to 22.0 ± 0.5 vdc when the temperature is $50 \pm 5^\circ$F and 33.0 ± 0.5 vdc when the temperature is $110^\circ \pm 5^\circ$F. The electrical tests shall consist of the following tests performed during the intervals shown in Figure 4.

a. Basic Null (4.3.4.)
b. Fine Ternary Schmitt Trigger Level (4.3.11.1)
c. D/A Converter (4.3.15). Use Table X instead of Table II. Use D/A DC output for RR.
d. Computer $\pm\Delta\theta_G$ Pulses (4.3.13)
e. Coarse and Fine Amplitude and Phase Variation (4.3.23)

TABLE X

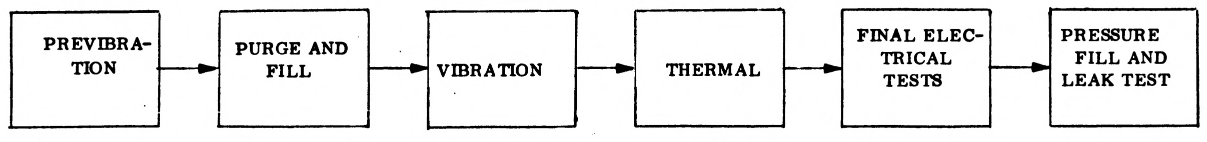
D/A OUTPUT

COUNTER CONDITION	PULSES APPLIED	D/A AC OUTPUT (V rms) (0 or π Phase)	
		Min	Max
Null	0	0	0.0125
2^0	1	0.0116	0.0148
$2^7.2^8$	384	4.856	5.368
$2^0.2^1.2^2.2^4$	23	0.288	0.318

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.


PREVIBRA-TION
PURGE AND FILL
VIBRATION
THERMAL
FINAL ELECTRICAL TESTS
PRESSURE FILL AND LEAK TEST

TEST FLOWGRAM

FIGURE 6

APOLLO G&N Specification
PS2016142 REV B
Original Issue Date: 7 DEC 1965
Release Authority: TDRR 24634
Class A Release
CODE IDENT NO. 80230

PROCUR. NT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

DRAWING NO. 2007222

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
Ⓜ 4/20/66	A	28179	3-6, 8, 9, 12-23, 24, 25, 26,	WK	TM
			28, 29 RD7AC		
6/7/66	B	29466	3, 4, 5, 7,, 8, 12, 17, 19, 21, 22, 23,	MGM	---
			25, 26 RD6/AC		

This specification consists of page 1 to 29 inclusive.

APPROVALS	C. METZGER NASA/MSC	12/7/65 12/7/65 W. MIT/IL 12/7/65	M. W. Smith | R Mura ACSP

3. REQUIREMENTS

3.1 PERFORMANCE. The following performance characteristics are applicable to each of 5 CDU channels (3 IMU Axes and 2 RR Axes) unless otherwise specified herein. The Fine Align mode of operation is implied unless otherwise specified.

3.1.1 Basic Null. The $\Delta\theta$G pulses and error T.P. voltages shall be generated as specified in Table III when the 1X and 16X resolvers are adjusted to the angles specified.

3.1.2 Coarse Align Read Counter Lock (IMU). The read counter shall become locked to the last resolver angle being received ±1 bit by the application of a CA Enable and shall not count any new resolver angles being received. The read counter shall resume counting the new resolver angles when the CA Enable is removed.

3.1.3 C/A Relay Drive Voltage. The CA relay drive voltage shall be 22.0±0.5 vdc when the dc supply voltage is 22.0±0.5 vdc or 34.0±0.5 vdc when the dc supply voltage is 34.0±0.5 vdc, when the CDU is in the Fine Align mode. The drive voltage shall be 1.5 vdc maximum when a CA Enable signal is applied.

3.1.4 Coarse Align Rate (IMU). The P_I pulse characteristics shall be as specified in Table I, Type IV and Figure 1 when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180 degrees to cause read loop oscillation. When the CA Enable and EC Enable modes are applied the P_I pulse characteristics shall be as specified in Table I, Type III.

3.1.5 DID Read Counter Lock (RR). The read counter shall become locked to the last resolver angle received by the application of a DID signal followed by a CDU Z signal. Further changes in resolver angles shall have no effect until the CDU Z signal is removed, then the read counter shall resume counting and contain the last resolver angle received.

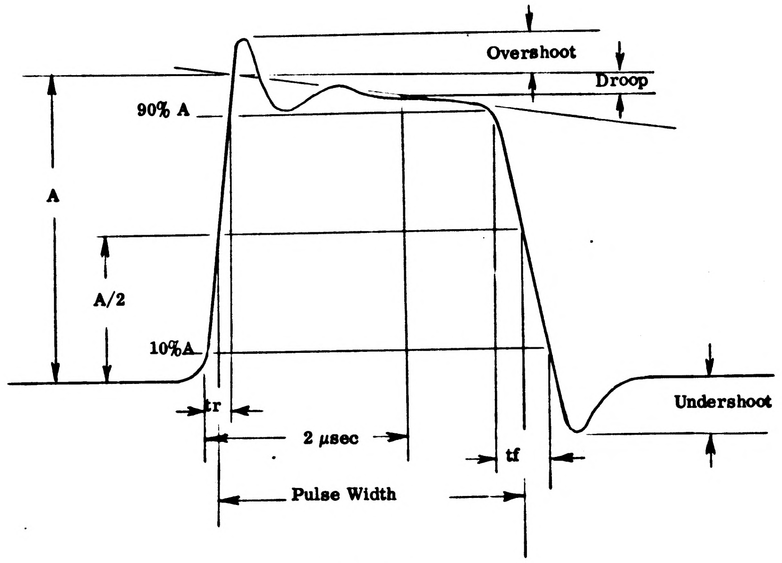
3.1.6 Fine Bit Size. The in-phase component of the Fine Error signal appearing at the Fine Error TP shall be 16±2 mv rms, π phase when the 16X resolver input angle is increased 0.088 degrees from the fine read system null condition.

3.1.7 Coarse Bit Size. The in-phase component of the Coarse Error signal appearing at the Coarse Error TP shall be 60±7 mv rms, π phase when the 1X resolver input angle is increased 2.8 degrees from the coarse read system null condition.

3.1.8 Schmitt Trigger Threshold Levels

3.1.8.1 Fine Ternary. The Fine Ternary Schmitt Trigger shall have an 800 pps output when the 16X resolver is set to 0.131±0.020 degrees and the fine error output shall be 23.33±3.33 mv rms, π phase.

3.1.8.2 High Ternary. The High Ternary Schmitt Trigger shall have an 800 pps output when the 16X resolver is set to 2.20±0.44 degrees and the fine error output shall be 0.40±0.10V rms, π phase.


Overshoot
Droop
90% A
A
A/2
10%A
tr
2 μsec
tf
Pulse Width
Undershoot

WAVEFORM

FIGURE 1

TABLE I

PULSE TRAIN CHARACTERISTICS

PARAMETER	TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V	TYPE VI
PRF	51.2K pps	3.2K pps	6.4K pps	12.8K pps	51.2K pps	6.4K pps
Amplitude (A)	4.5±0.5V p	4.5±0.5V p	3.5±1V p	3.5±1V p	7±3V p	7±3 V p
Width (at 1/2 A)	3.0±0.5 μsec	3.0±0.5 μsec	3±1 μsec	3±1 μsec	3±1 μsec	3±1 μsec
Droop at 2 μsec	<20% A	<20% A	<20% A	<20% A	<20% A	<20% A
Overshoot	<30% A	<30% A	<30% A	<30% A	<30% A	<30% A
Undershoot	<30% A	<30% A	<30% A	<30% A	<30% A	<30% A
Risetime (tr)	≤0.2 μsec	≤0.2 μsec	≤1.0 μsec	≤0.2 μsec	≤0.2 μsec	≤0.2 μsec
Falltime (tf)	≤1.0 μsec	≤1.0 μsec	≤1.0 μsec	≤1.0 μsec	≤1.0 μsec	≤ 1 μsec

3.1.8.3 Coarse Ternary. The Coarse Ternary Schmitt Trigger shall have an 800 pps output when the 1X resolver is set to 8.40±1.40 degrees and the coarse error output shall be 196.0±32.6 mv rms, π phase.

3.1.8.4 Ambiguity Detect. The Ambiguity Detect Schmitt shall have an 800 pps output when the 1X resolver angle lies between 120±5 degrees and 240±5 degrees.

3.1.9 Speed. The digitizing loop shall settle to a null and the read counter shall contain an angular change of 112.5 degrees within 4.0 seconds maximum when a step change of 112.5 degrees in 1X resolver input angle is applied.

3.1.10 Computer $\pm\Delta\theta_G$ Pulse. The $\pm\Delta\theta_G$ pulse shall have the characteristics specified in Table I, Type VI when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180 degrees to cause read system oscillation. The CDU Z LAG pulse shall have the characteristics specified in Table I, Type V when the CDU Z signal is also applied.

3.1.11 CDU Fail Detection. The CDU failure circuit shall indicate a failure or no failure as specified when any of the following conditions exist for a period greater than 7 seconds.

a. Fine Error Fail shall not occur when the 16X resolver angle is 8.0 degrees, the 1X resolver angle is 0 degrees and the system is in the CDU Z mode. A Fine Error Fail shall occur when the 16X resolver angle is changed to 12.0 degrees.

b. Coarse Error Fail shall not occur when the 1X resolver angle is 20 degrees, the 16X resolver angle is 0 degrees and the system is in the CDU Z mode. A Coarse Error Fail shall occur when the 1X resolver angle is increased to 33 degrees, and the 16X R.S. is increased to 180 degrees.

c. Cos $(\theta - \psi)$ Fail shall not occur when the 16X resolver excitation is reduced to 25±1V rms while the 1X and 16X resolver angles are at 0 degrees. A Cos $(\theta - \psi)$ Fail shall occur when the 16X resolver excitation is reduced to 9±1V rms..

d. Limit Cycle Fail shall not occur when the digitizing loop is in a limit cycle condition at a rate of 100±1 cps. Limit Cycle Fail shall occur when the limit cycle rate is 200±2 cps.

e. 14 VDC Fail shall not occur when the input of 4.2.1.5.a is 28.0±1.0 vdc. A 14 VDC Fail shall occur when the 14 vdc IMU or RR supply voltage is 8.0±0.1 vdc.

3.1.12 D/A Converter. The DAC output shall be as specified in Table II when the error counter is counted up or down.

3.1.13.2 RR Axes. The DAC AC Error output shall be 10mv rms max 0 or π phase when a D/A Enable is applied and the 16X resolver is adjusted to produce read counter angles of 0.703 and 90 degrees.

3.1.14 Coarse Align Amplifier (IMU)

3.1.14.1 Fine Error Gain. The CA Error output shall be 48±5 mv rms 0 phase when the 16X resolver is adjusted 1.76 degrees from the fine error null while in the CA mode and with the 1X resolver at 0 degrees.

3.1.14.2 DAC Gain. The DAC AC output and CA error output shall be as follows when the following inputs are applied.

a. The DAC AC output shall be 132.0± 7.0 mv rms 0 phase and the CA Error output shall be 38.0±6.0 mv rms π phase when 10 $+\Delta\theta_C$ pulses and an EC Enable are applied. The CA error output shall be 10 mv rms max when the EC Enable is removed.

b. The DAC AC output shall be 132.0±7.0 mv rms π phase and the CA Error output shall be 38.0±6.0 mv rms 0 phase when 10 $-\Delta\theta_C$ pulses and an EC Enable are applied. The CA Error output shall be 10 mv rms max when the EC Enable is removed.

c. The CA Error output shall be 165.0±45.0 mv rms total,π phase when 256 $+\Delta\theta_C$ pulses and an EC Enable are applied. .

d. The CA Error output shall be 165.0±45.0 mv rms total,0 phase when 256 $-\Delta\theta_C$ pulses and an EC Enable are applied.

3.1.14.3 Coarse ~~Error~~ Gain. The CA Error signal shall be 1.30±0.25V rms 0 phase when the 16X resolver is adjusted to produce a fine error null and the 1X resolver is adjusted to produce a coarse error of 150 mv rms π phase.

3.1.15 Ambiguity

3.1.15.1 Override. The read counter shall contain an angle of 225 degrees ±1 bit when the 1X resolver is set to an ambiguity condition (1X = 225°, 16X = 0°).

3.1.15.2 Turn-on (IMU). The CA Error signal shall be 11±3V rms 0 phase and the coarse error signal shall be 1.660±0.083V rms π phase when the resolvers are set to an ambiguity condition (1X = 225°, 16X = 0°) in the Turn-on mode. The CA Error signal shall be 3.3±0.3V rms π phase when the 1X resolver is increased to 245 degrees.

3.1.16 Cage Voltage (IMU). The cage voltage shall be 10 mv rms max for a 1X resolver angle of 0 degrees, 0.45±0.02V rms for a 1X resolver angle of 1.0 degree, and 26±1V rms for a 1X resolver angle of 90 degrees.

3.1.17 Cage Override (IMU). The DAC AC Error output shall be 198±12 mv rms and the CA relay drive voltage shall be 28±3 vdc when an Error Counter Enable and 15 $+\Delta\theta_C$ pulses are applied. The CA relay drive voltage shall be 1.5 vdc max and the DAC AC Error output shall be 10 mv rms max when a Cage Override is applied in addition to the Error Counter Enable and 15 $+\Delta\theta_C$ pulses.

3.1.18 Switch and System Error. The system digitizing error shall be within +0.075 and -0.035 degrees for the 16X resolver system and ±0.6 degrees max for the 1X resolver system.

3.1.19 General Null. The $\Delta\theta_G$ pulses and error T.P. voltages shall be generated as specified in Table III when the 1X and 16X resolvers are adjusted to the angles specified.

3.1.20 Coarse and Fine Amplitude and Phase Variation. The CDU Read Loop shall not oscillate under the conditions specified in Table IV.

3.1.21 Thermal Stability. The assembly shall meet the requirements of 3.1.1, 3.1.8.1, 3.1.10, 3.1.12, and 3.1.20 with the assembly mounted on a cold plate and the interface temperatures maintained at 50° ±3°F and 110° ±3°F.

TABLE III

GENERAL NULL

INPUT RESOLVER (Degrees)		OUTPUT ERROR VOLTAGE		PULSE TOTAL $[(+\Delta\theta_G) - (-\Delta\theta_G)]$
		Fine	Coarse	
1X	16X	Max	Max	
0	0	75MV P-P	0.650V P-P	0
75.9	135	↑	↑	6912
2.8	45			256
168.7	180			15,360
5.6	90			512
239	225			21,760
19.7	315			1,792
331.8	270	↓	↓	30,208
0	0	75MV P-P	0.650V P-P	0

4.2.1.3 Previbration Tests. Previbration testing shall include 3.1.1, 3.2.1, and 3.2.2.1.

4.2.1.4 Final Electrical Tests. All the tests specified in 4.1 except 3.1.21, 3.2.1, 3.2.2.1 shall be performed as final electrical tests.

4.2.1.5 Inputs. Unless otherwise specified, the assembly shall be tested using the following inputs.

a. 28±1 vdc, 3 amps maximum, 34.0±0.5 vdc enhanced, 22.0±0.5 vdc degraded. (See 4.2.1.5.1).

b. 50±3 vdc.

c. 28.00±0.28V rms, 800.0±1.0 cps System Reference, synchronized to 51.2 Kpps.

d. Simulated resolver systems consisting of the following:

   (1) 1X Resolver, 26±.26V rms output, 0±2° phase
   (2) 16X Resolver, 5±.05V rms output, 0±2° phase

e. Clock pulses as specified in Table I, Type I.

f. $\pm\Delta\theta_C$ pulses as specified in Table I, Type II, gated in non-repetitive pulse bursts of 1, 2, 4, 8, 16, 23, 32, 64, 128, 256, 383, 384, 385, and 768 pulses per burst.

g. All mode inputs shall be OVDC thru 2K±10 percent except CAGE OVERRIDE which shall be 0 VDC (ON) and thru 1 Meg (OFF).

4.2.1.5.1 DC Stability. Each of the following tests shall be run with the +28 vdc supply voltage adjusted to 22.0±0.5 vdc and then repeated with the voltage adjusted to 34.0±0.5 vdc, except 4.3.15 and 4.3.24.1.c which shall be tested at 24.0±0.5 and 34.0±0.5 vdc. All other tests shall be run with a 28.0±1.0 vdc supply voltage, except 4.3.2.1 which shall be run at 22.0±0.5 vdc.

4.3.4, 4.3.6, 4.3.9, 4.3.10, 4.3.11, 4.3.14.1, 4.3.17, 4.3.21 (as specified therein), 4.3.22, 4.3.23 (as specified therein), 4.3.24.

4.3 TESTS. The following tests shall be performed on each of the three IMU axes and on each of the two RR axes unless otherwise specified herein.

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 2007222. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, contaminants, encapsulant defects, pin misalignment, and legibility and appearance of marking. Following completion of the final Pressure Fill and Leak test as specified in 4.2.2, the assembly shall be externally visually inspected for scratches, dents, nicks, and legibility of marking.

4.3.2 Workmanship-Vibration. The assembly shall be mounted on a vibration fixture in a manner in which it is mounted in the spacecraft and vibrated along the three orthogonal axes. The vibration shall be simple harmonic motion swept from 10 to 2000 cps at a rate of 1 octave per 15 sec. The magnitude of vibration shall be 3.5g rms limited to a 0.3 inch pp constant displacement from 10 cps to the crossover frequency. During vibration the assembly shall be electrically tested as specified in 4.3.2.1.

4.3.2.1 Electrical. During vibration the assembly shall be electrically tested through one complete vibration sweep at each of the resolver settings specified in Table VII. The electrical tests shall be as follows:

a. P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulse lines shall be monitored throughout the sweep cycle and presence of P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulses shall constitute failure.

b. With an EC Enable (IMU) or a D/A Enable (RR) applied, a 3200 pps signal in pulse bursts of 1023 pulses per burst applied alternately to the $+\Delta\theta_C$ and $-\Delta\theta_C$ inputs and the 1X and 16X resolvers and read counter at the angles specified in Table VII, the DAC AC and DC Error Signals shall be modulated at 1.56±0.10 cps and shall be as shown in Figure 2 and as specified in Table VII. The DAC DC shall be tested for the RR axis only, and DID shall be moded for the RR axis. A discontinuity of 0.5 msec, or more shall constitute a failure of the dc output. A discontinuity of 0.5 msec or more shall constitute a failure of the ac output. The ISS and OSS 28V rms, 800 cps excitation shall be maintained as close to nominal value as possible during this test.

c. The output discretes specified in Table VIII shall be continuously monitored for state change or pulse presence in accordance with Table VIII.

TABLE VII
DAC ERROR OUTPUT

RESOLVER ANGLE		READ COUNTER ANGLE(±1 bit)	DAC AC ERROR (V rms)	DAC DC ERROR (vdc)
1X (°)	16X (°)			
2.8	45	2^9	4.7 to 5.4	4.7 to 5.4
165	135	$2^9\ 2^{10}\ 2^{12}\ 2^{13}\ 2^{14}$	↕	↕
239	225	$2^9\ 2^{11}\ 2^{13}\ 2^{15}$		
334	315	$2^9\ 2^{10}\ 2^{11}\ 2^{13}\ 2^{14}\ 2^{15}$	4.7 to 5.4	4.7 to 5.4

4.3.14 CDU Fail Detection. Unused 16X resolver inputs shall be excited by connecting a 5V rms 0 phase voltage to the unused cos 16X inputs.

4.3.14.1 Fine Error Fail. With the 1X resolver set to 0 degrees, CDUZ applied and the 16X resolver set to 8.000 degrees, no fail signal shall be generated after 7 seconds. With the 16X resolver increased to 12.000 degrees, a fail signal shall be generated within 3 to 7 seconds. With CDUZ removed, the fail signal shall cease within 1 second. (1.5 seconds at 34.0±0.5 vdc applied as specified in 4.2.1.5.a).

4.3.14.2 Coarse Error Fail. With the 16X resolver set to 0 degrees, the 1X resolver set to 20 degrees and CDUZ applied, no failure signal shall be generated. With the 1X resolver increased to 33 degrees and 16X R.S. set to 180 degrees a fail signal shall be generated within 3 to 7 seconds.

4.3.14.3 14 VDC Fail. With the 1X and 16X resolvers set to 0 degrees, no fail signal shall be generated. With the 14 vdc TP voltage adjusted to 8.0±0.1 vdc, a fail signal shall be generated within 3 to 7 seconds.

4.3.14.4 Cos ($\phi - \psi$) Fail. With the 1X and 16X resolvers set to 0 degrees and the excitation to the 16X resolver adjusted to 25.0±1.0V rms, no fail signal shall be generated. With the excitation reduced to 9.0±1.0V rms, a fail signal shall be generated within 3 to 7 seconds.

4.3.14.5 Limit Cycle Fail. With the 1X resolver set to 0 degrees, the 16X resolver set to 355.00 degrees CDUZ applied and a 100 ±1 cps limit cycle input signal applied as shown in figure 5 or equivalent, no failure signal shall be generated. With the limit cycle increased to 200 ±2 cps, a fail signal shall be generated within 3 to 7 seconds.

4.3.15 D/A Converter. With an EC Enable (for IMU) or a D/A Enable (for RR) applied and the read counter counted up and down in accordance with Table II, the ac and dc DAC outputs shall be as specified therein except that a dc output shall not be present for IMU axes and that a dc output shall not be present for RR axes until DID is applied. ISS and OSS 28.0V rms, 800 cps excitation shall be maintained as close to the nominal value as possible during the test.

4.3.16 A/D to D/A Feedback Loop.

4.3.16.1 IMU Axes. With the 1X and 16X resolvers set to 0 degrees, CDUZ momentarily applied, CA Enable and Error Counter Enable applied and the 16X resolver adjusted to produce a read counter reading of 8 bits, the D/A AC Error voltage shall be 0.013 ±0.002V rms π phase. With the 16X resolver adjusted to produce a read counter reading of 16 bits, the D/A AC Error voltage shall be 0.026 ±0.004V rms π phase. With the 16X resolver adjusted near 358.5 degrees to produce a read counter reading of -16 bits, the D/A AC Error voltage shall be 0.026 ±0.004V rms, 0 phase. Repeat tests without CA Enable applied. The D/A AC Error shall be 10 mv rms max.

4.3.16.2 RR Axes. With the 16X resolver set to 0 degrees and a D/A Enable applied, the D/A AC Error output shall be 10 mv rms max. With the 16X resolver adjusted to produce a read counter reading of 8 bits, the D/A AC Error output shall be 10 mv rms max. With the 16X resolver set to 90 degrees, the D/A AC Error output shall be 10 mv rms max.

4.3.17 Coarse Align Amplifier (IMU)

4.3.17.1 Fine Error Gain. With the 1X resolver set to 0 degrees and the CA mode applied, the 16X resolver shall be adjusted to produce a minimum null at the Fine Error TP. With the 16X resolver angle increased 1.760 degrees from the 16X null angle, the CA Error output voltage shall be 48±5 mv rms, 0 phase.

4.3.17.2 DAC Gain.

a. With the 1X resolver set to 0 degrees, and the CDUZ mode applied, the 16X resolver shall be adjusted to produce a Fine Error TP null. With the CDUZ mode removed, the D/A AC Error output shall be 10 mv rms max.

b. With an Error Counter Enable and 10+ $\Delta\theta_C$ pulses applied, the D/A AC Error output shall be 132.0 ±7.0 mv rms 0 phase. The CA Error output shall be 38.0±6.0 mv rms π phase. With the Error Counter Enable removed, the CA Error output shall be 10 mv rms max.

c. Repeat b. using 10 $-\Delta\theta_C$ pulses. D/A AC Error and CA Error phases shall change by 180 degrees.

4.3.17.3 DAC Saturation. With an Error Counter Enable and 256 $+\Delta\theta_C$ pulses applied, the CA Error output shall be 165.0±45 mv rms total, π phase. With 256 $-\Delta\theta_C$ pulses, applied, the CA Error output shall be 165.0±45 mv rms total, 0 phase.

4.3.17.4 Coarse Error Gain. With the 1X resolver set to 0 degrees, the 16X resolver set to obtain a Fine Error null with the read counter at zero, and the CDUZ mode applied and then removed, the CA Error output shall be less than 5 mv rms. With the CDUZ mode applied and the 1X resolver adjusted for a Coarse Error TP voltage of 150 mv rms, π phase, the CA Error TP voltage shall be 1.30 ±0.25V rms, 0 phase.

4.3.18 Ambiguity

4.3.18.1 Override. With the 1X resolver set to 225 degrees, the 16X resolver set to 0 degrees and CDUZ applied, the Fine Error TP null shall be less than 16.66 mv rms and the Coarse Error TP null voltage shall be less than 100 mv rms. With CDUZ subsequently removed, the read counter shall read 225 degrees ±1 bit.

4.3.18.2 Turn-On (IMU). With the 16X resolver set to 0 degrees, the 1X resolver set to 225 degrees, and CDUZ and CA Enable applied, the Coarse Error TP voltage shall be 1.660±0.083V rms π phase and the CA Error TP voltage shall be 11±3V rms 0 phase. With the 1X resolver increased to 245 degrees, the CA Error TP voltage shall be 3.3±0.3V rms, π phase.

4.3.19 Cage Voltage (IMU). With the 16X resolver set to 0 degrees and the 1X resolver set to 0 degrees, the IMU Cage voltage shall be less than 10 mv rms. With the 1X resolver adjusted to 1 degree, the IMU Cage voltage shall be 0.45±0.02V rms. With the 1X resolver set to 90 degrees, the IMU Cage voltage shall be 26±1V rms.

4.3.20 Cage Override (IMU). With a 300 ohm 10W resistor connected between ISS +28 vdc and CA Relay Drive, the CA Relay Drive voltage shall be 28±3 vdc. With a "CDU Common to PSA" applied to Cage Override, the CA Relay Drive voltage shall be 1.5 vdc max. With the 300 ohm resistor removed, an Error Counter Enable applied and 15 $+\Delta\theta_G$ pulses applied, the D/A AC Signal shall be 198±12 mv rms. With a Cage Override applied, the D/A AC Signal shall be 10 mv rms.max.

4.3.21 Switch and System Error

a. With the 1X and 16X resolvers adjusted to obtain the read counter bits specified in Table 1X, the read counter locked by applying a CA Enable (IMU Axis) or a DID followed by CDUZ (RR Axis), and the 16X resolver readjusted to obtain a Fine Error TP null, the angular.difference between the 16X resolver angle specified in Table 1X and the final 16X resolver angle shall be calculated to be between +0.075 and -0.035 degrees. The read counter shall be unlocked by removing the CA Enable (IMU Axis) or CDUZ (RR Axis).

b. The requirements specified in a. shall be met for each fine system angle specified in Table IX.

c. With the 1X and 16X resolvers adjusted to obtain the read counter bits of the coarse system specified in Table IX, then readjusted to obtain a null at the Coarse Error TP, the angular difference between the final 1X resolver setting and the 1X resolver angle specified in Table IX shall be calculated to be $\leq$0.6 degrees.

d. The test requirements specified in c. shall be met for each coarse system angle specified in Table IX.

4.3.22 General Null. With the 1X and 16X resolvers sequentially adjusted to the angles specified in Table III, the $\Delta\theta_G$ pulses shall be generated as specified, ±1 bit, and the Coarse and Fine Error TP voltages shall be as specified.

4.3.23 Coarse and Fine Amplitude and Phase Variation. With the 1X and 16X resolver input angle, excitation and phase shift adjusted as specified in Table IV, the CDU Read Loop shall not oscillate. Oscillation in the coarse system shall be tested by adjusting the 1X resolver angle plus and minus 0.1 degree from the angle specified in Table IV. Oscillation in the fine system shall be tested by adjusting the 16X resolver angle from 0 degree to 90 degrees then back to 0 degree. The coarse system shall be tested first at a 22.0±0.5 vdc supply voltage, then retested at a 34.0±0.5 vdc supply voltage. The fine system shall be tested at 28.0±1.0 vdc supply voltage.

4.3.24 Thermal Stability. The assembly shall be mounted on a cold plate. The cold plate –CDU interface temperature shall be monitored by four interface sensors mounted as shown in Figure 3. The coldplate temperature shall be adjusted until any one interface sensor reaches 50° ±3°F and maintained there during the cold soak and test period shown in Figure 4. The coldplate temperature shall be adjusted until any one interface sensor reaches 110±3°F and maintained there during the hot soak and test period shown in Figure 4.

The four interface sensors and six internal sensors shall be monitored continuously through soaking and testing. The interface temperatures must be within 47 to 113°F and the internal temperatures must be between 41 to 130°F throughout soaking and testing. All the interface sensor temperatures shall be within 10°F of each other.

Power shall be applied continuously through soaking and testing.

The CDU assembly shall be covered by an insulating box (lined with 1 inch thick polyurethane foam or equivalent).

4.3.24.1 Electrical Test. The electrical tests shall be performed with the dc supply voltage adjusted to 22.0±0.5 vdc when the temperature is 50° ±5°F and 34.0±0.5 vdc when the temperature is 110° ±5°F. The electrical tests shall consist of the following tests performed during the intervals shown in Figure 4.

a. Basic Null (4.3.4)
b. Fine Ternary Schmitt Trigger Level (4.3.11.1) (at 110°F, the tolerance on the 16X resolver angle shall be ±0.030 degree.)
c. D/A Converter (4.3.15). Use Table X instead of Table II. Use D/A DC output for PR. The ISS and OSS 28.0V rms, 800 cps excitation shall be maintained as close to the nominal value as possible during this test.
d. Computer $\pm\Delta\theta_G$ Pulses (4.3.13)
e. Coarse and Fine Amplitude and Phase Variation (4.3.23)

TABLE X

D/A OUTPUT

COUNTER CONDITION	PULSES APPLIED	D/A AC OUTPUT (V rms) (0 or π Phase)	
		Min	Max
Null	0	0	0.0125
2^0	1	0.0116	0.0148
$2^7 \cdot 2^8$	384	4.856	5.368
$2^0 \cdot 2^1 \cdot 2^2 \cdot 2^4$	23	0.288	0.318

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

DRAWING NO. 2007222

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
4/29/66	A	28179	3-6, 8, 9, 12-23, 24, 25, 26,	WK	TM
			28, 29		
6/7/66	B	29466	3, 4, 5, 7, 8, 12, 17, 19, 21, 22, 23	MGM	--
			25, 26		
6/10/66	C	30554	5, 6, 8, 9, 12, 20, 21, 23, 26 was	EA	--
			29 pages now 30.		

This specification consists of page 1 to 30 inclusive.

APPROVALS	E. C. METZGER NASA/MSC	12/7/65 12/7/65 MIT/IL 12/7/65	ACSP

3.1.8.3 Coarse Ternary. The Coarse Ternary Schmitt Trigger shall have an 800 pps output when the 1X resolver is set to 8.40±1.40 degrees and the coarse error output shall be 196.0±32.6 mv.rms, ∇ phase.

3.1.8.4 Ambiguity Detect. The Ambiguity Detect Schmitt shall have an 800 pps output when the 1X resolver angle lies between 120±5 degrees and 240±5 degrees.

3.1.9 Speed. The digitizing loop shall settle to a null and the read counter shall contain an angular change of 112.5 degrees within 4.0 seconds maximum when a step change of 112.5 degrees in 1X resolver input angle is applied.

3.1.10 Computer $\pm\Delta\theta_G$ Pulse. The $\pm\Delta\theta_G$ pulse shall have the characteristics specified in Table I, Type VI when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180° ±5° to cause read system oscillation . The CDU Z LAG pulse shall have the characteristics specified in Table I, Type V when the CDU Z signal is also applied.

3.1.11 CDU Fail Detection. The CDU failure circuit shall indicate a failure or no failure as specified when any of the following conditions exist for a period greater than 7 seconds.

a. Fine Error Fail shall not occur when the 16X resolver angle is 8.0 degrees, the 1X resolver angle is 0 degrees and the system is in the CDU Z mode. A Fine Error Fail shall occur when the 16X resolver angle is changed to 12.0 degrees.

b. Coarse Error Fail shall not occur when the 1X resolver angle is 20 degrees, the 16X resolver angle is 0 degrees and the system is in the CDU Z mode. A Coarse Error Fail shall occur when the 1X resolver angle is increased to 33 degrees, and the 16X R.S. is increased to 180 degrees.

c. Cos $(\theta - \psi)$ Fail shall not occur when the 16X resolver excitation is reduced to 25±1V rms while the 1X and 16X resolver angles are at 0 degrees. A Cos $(\theta - \psi)$ Fail shall occur when the 16X resolver excitation is reduced to 9±1V rms..

d. Limit Cycle Fail shall not occur when the digitizing loop is in a limit cycle condition at a rate of 100±1 cps. Limit Cycle Fail shall occur when the limit cycle rate is 200±2 cps.

e. 14 VDC Fail shall not occur when the input of 4.2.1.8.a is 28.0±2.0 vdc. A 14 VDC Fail shall occur when the 14 vdc IMU or RR Test Point voltage is 8.0±0.1 vdc.

3.1.12 D/A Converter. The DAC output shall be as specified in Table II when the error counter is counted up or down.

TABLE II

DAC OUTPUT

EC&L COUNTER CONDITION	PULSES APPLIED	+ DC OUTPUT -DC VOLTS	AC OUTPUT 0 OR π V RMS
Null	0	0.0000±5 mv	0.0000±5 mv
2^0	1	0.0132±11%	0.0133±12%
2^1	2	0.0264±6%	0.0266±7%
2^2	4	0.0527±6%	0.0532±7%
2^3	8	0.1055±3%	0.1065±5%
2^4	16	0.2110	0.2130
2^5	32	0.4220	0.4260
2^6	64	0.8440	0.8520
2^7	128	1.6880±3%	1.704±5%
$2^5.2^7$	160	2.1100±1.5%	2.130±2%
2^8	256	3.3760±3%	3.408±5%
$2^7.2^8$	384	5.064	5.112
$2^0.2^7.2^8$	385*1	5.064	5.112
$2^0.2^1.2^2.2^3$ $2^4.2^5.2^6.2^8$	-1*2	5.0508±3%	5.0987±5%

*1 Reading shall be within ±3 mv of the previous reading at 384 pulses.

*2 Apply one pulse in the opposite direction to obtain this condition. The null voltage of the dc output shall be added to (if minus) or subtracted (if plus) from the dc output.

3.1.13 A/D to D/A Feedback Loop

3.1.13.1 IMU Axes. The D/A AC output shall be as follows when the CDU is in the Coarse Align Mode (CA Enable and EC Enable applied) and the 16X resolver is adjusted to the following read counter angles:

a. The D/A AC Error output shall be 13.3±1.6 mv rms π phase when the read counter angle is 0.703 degrees.

b. The D/A AC Error output shall be 26.6±1.9 mv rms π phase when the read counter angle is 1.4 degrees. With CA Enable removed, the D/A AC error shall be 10 mv rms maximum.

c. The D/A AC Error output shall be 26.6±1.9 mv rms 0 phase when the read counter angle is 358.6 degrees.

3.1.17 Cage Override (IMU). The DAC AC Error output shall be 198±12 mv rms and the CA relay drive voltage shall be 28±3 vdc when an Error Counter Enable and 15 $+\Delta\theta_C$ pulses are applied. The CA relay drive voltage shall be 1.5 vdc max and the DAC AC Error output shall be 10 mv rms max when a Cage Override is applied in addition to the Error Counter Enable and 15 $+\Delta\theta_C$ pulses.

3.1.18 Switch and System Error. The system digitizing error shall be within +0.075 and -0.040 degrees for the 16X resolver system and ±0.6 degrees max for the 1X resolver system.

3.1.19 General Null. The $\Delta\theta_G$ pulses and error T.P. voltages shall be generated as specified in Table III when the 1X and 16X resolvers are adjusted to the angles specified.

3.1.20 Coarse and Fine Amplitude and Phase Variation. The CDU Read Loop shall not oscillate under the conditions specified in Table IV.

3.1.21 Thermal Stability. The assembly shall meet the requirements of 3.1.1, 3.1.8.1, 3.1.10, 3.1.12, and 3.1.20 with the assembly mounted on a cold plate and the interface temperatures maintained at 50° ±3°F and 110° ±3°F.

TABLE III

GENERAL NULL

INPUT RESOLVER (Degrees)		OUTPUT ERROR VOLTAGE		PULSE TOTAL $[(+\Delta\theta_G) - (-\Delta\theta_G)]$
		Fine	Coarse	
1X	16X	Max	Max	
0	0	75MV P-P	0.650V P-P	0
75.9	135	↑	↑	6912
2.8	45			256
168.7	180			15,360
5.6	90			512
239	225			21,760
19.7	315			1,792
331.8	270	↓	↓	30,208
0	0	75MV P-P	0.650V P-P	0

TABLE IV

OSCILLATION OF CDU READ LOOP

CONDITIONS					
Carrier ϕ (°)		Resolver (°)		Resolver Excit (V rms)	
1X	16X	1X	16X	1X	16X
COARSE SYSTEM					
0	0	45	0	30	28
-15	↕	45	0	32	↕
+15	↕	45	0	28	↕
0	↕	47.8	45	23	↕
-15	↕	47.8	45	23	↕
+15	0	47.8	45	23	28
FINE SYSTEM					
0	+20	0	0	28	32
0	+20	0	0	28	24
0	-20	0	0	28	32
0	-20	0	0	28	24

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 2007222-021 and all drawings and engineering data referenced thereon.

3.2.2 Standards of Manufacturing, Manufacturing Process and Production

3.2.2.1 Continuity and DC Resistance. The resistance between the pins specified in Table V shall be as specified therein, when the resistance is measured on a Millivac ohmmeter type MV 279C or equivalent.

3.2.3 Weight. The maximum weight of the assembly shall be as specified in Table XI.

4.2.1.3 Previbration Tests. Previbration testing shall include 3.1.1, 3.2.1, and 3.2.2.1.

4.2.1.4 Final Electrical Tests. All the tests specified in 4.1 except 3.1.21, 3.2.1, shall be performed as final electrical tests.

4.2.1.5 Inputs. Unless otherwise specified, the assembly shall be tested using the following inputs.

a. 28±1 vdc, 3 amps maximum, 34.0±0.5 vdc enhanced, 22.0±0.5 vdc degraded. (See 4.2.1.5.1).

b. 50±3 vdc.

c. 28.00±0.28V rms, 800.0±1.0 cps System Reference, synchronized to 51.2 Kpps.

d. Simulated resolver systems consisting of the following:

(1) 1X Resolver, 26±.26V rms output, 0±2° phase
(2) 16X Resolver, 5±.05V rms output, 0±2° phase

e. Clock pulses as specified in Table I, Type I.

f. $\pm\Delta\theta_C$ pulses as specified in Table I, Type II, gated in non-repetitive pulse bursts of 1, 2, 4, 8, 16, 23, 32, 64, 128, 256, 383, 384, 385, and 768 pulses per burst.

g. All mode inputs shall be OVDC thru 2K±10 percent except CAGE OVERRIDE which shall be 0 VDC (ON) and thru 1 Meg (OFF).

4.2.1.5.1 DC Stability. Each of the following tests shall be run with the +28 vdc supply voltage adjusted to 22.0±0.5 vdc and then repeated with the voltage adjusted to 34.0±0.5 vdc, except 4.3.15 and 4.3.24.1.c which shall be tested at 24.0±0.5 and 34.0±0.5 vdc. All other tests shall be run with a 28.0±1.0 vdc supply voltage, except 4.3.2.1 which shall be run at 22.0±0.5 vdc.

4.3.4, 4.3.6, 4.3.9, 4.3.10, 4.3.11, 4.3.14.1, 4.3.17, 4.3.21 (as specified therein), 4.3.22, 4.3.23 (as specified therein), 4.3.24.

4.3.8 DID READ COUNTER LOCK (RR). With the 1X and 16X resolvers set to 0 degrees and CDUZ momentarily applied, the read counter shall contain an angle of 0 degrees. With the 16X resolver advanced to 11.25 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With DID applied, followed with a CDUZ, and the 16X resolver set to 90 degrees, the read counter shall remain at 11.25 degrees ±1 bit. With CDUZ removed, the read counter shall contain an angle of 90 degrees ±1 bit.

4.3.9 Fine Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 16X resolver adjusted to obtain a Fine Error null, then advanced 0.088 degrees, the Fine Error TP voltage shall be 16±2 mv rms π phase.

4.3.10 Coarse Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 1X resolver adjusted to obtain a Coarse Error null, then advanced 2.8 degrees, the Coarse Error TP voltage shall be 60±7 mv rms, π phase.

4.3.11 Schmitt Trigger Threshold Levels

4.3.11.1 Fine Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until a stable 800 pps pulse train appears at the Fine Ternary Schmitt TP, the Fine Error TP voltage shall be 23.33±3.33 mv rms π phase and the net increase in the 16X resolver angle shall be 0.131±0.020 degrees.

4.3.11.2 High Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until an 800 pps pulse train appears at the High Ternary Schmitt TP, the Fine Error TP voltage shall be 0.40±0.10V rms π phase and the net increase in the 16X resolver angle shall be 2.200±0.440 degrees.

4.3.11.3 Coarse Ternary. With CDUZ applied and the 1X resolver angle increased from a Coarse Error null until an 800 pps pulse train appears at the Coarse Ternary Schmitt TP, the Coarse Error TP voltage shall be 196.0±32.6 mv rms π phase and the coarse error angle shall be 8.4±1.4 degrees.

4.3.11.4 Ambiguity Detect. With CDUZ applied, the 16X resolver set to 0 degrees and the 1X resolver increased from 115 degrees until an 800 pps pulse train appears at the Ambiguity Detect TP, the 1X resolver angle shall be 120±5 degrees. The pulse train shall continue to exist until the 1X resolver angle is increased to 240±5 degrees.

4.3.12 Speed. With the 16X resolver set to 0 degrees, the 1X resolver set to 112.5 degrees and CDUZ applied, the Coarse Schmitt (C1) pulses shall disappear within 4 seconds after CDUZ is removed and the read counter shall contain an angle of 112.5 degrees ±1 bit.

4.3.13 Computer $\pm\Delta\theta_G$ Pulses. With the 1X resolver set to 0 degrees and the 16X resolver set to 180° ±6°, , the $\pm\Delta\theta_G$ and $\pm\Delta\theta_G$ LAG signals shall have the characteristics specified in Table I, Type VI. With CDUZ added, the CDUZ LAG pulse shall have the characteristics specified in Table I, Type V.

4.3.14 CDU Fail Detection. Unused 16X resolver inputs shall be excited by connecting a 5V rms 0 phase voltage to the unused cos 16X inputs.

4.3.14.1 Fine Error Fail. With the 1X resolver set to 0 degrees, CDUZ applied and the 16X resolver set to 8.000 degrees, no fail signal shall be generated after 7 seconds. With the 16X resolver increased to 12.000 degrees, a fail signal shall be generated within 3 to 7 seconds. With CDUZ removed, the fail signal shall cease within 1 second. (1.5 seconds at 34.0±0.5 vdc applied as specified in 4.2.1.5.a).

4.3.14.2 Coarse Error Fail. With the 16X resolver set to 0 degrees, the 1X resolver set to 20 degrees and CDUZ applied, no failure signal shall be generated. With the 1X resolver increased to 33 degrees and 16X R.S. set to 180 degrees a fail signal shall be generated within 3 to 7 seconds.

4.3.14.3 14 VDC Fail. With the 1X and 16X resolvers set to 0 degrees, no fail signal shall be generated. With the 14 vdc TP voltage adjusted to 8.0±0.1 vdc, a fail signal shall be generated within 3 to 7 seconds.

4.3.14.4 Cos ($\phi - \psi$) Fail. With the 1X and 16X resolvers set to 0 degrees and the excitation to the 16X resolver adjusted to 25.0±1.0V rms, no fail signal shall be generated. With the excitation reduced to 9.0±1.0V rms, a fail signal shall be generated within 3 to 7 seconds.

4.3.14.5 Limit Cycle Fail. With the 1X resolver set to 0 degrees, the 16X resolver set to 355.00 degrees CDUZ applied and a 100 ±1 cps limit cycle input signal applied as shown in figure 5 or equivalent, no failure signal shall be generated. With the limit cycle increased to 200 ±2 cps, a fail signal shall be generated within 3 to 7 seconds.

4.3.15 D/A Converter. With an EC Enable (for IMU) or a D/A Enable (for RR) applied and the read counter counted up and down in accordance with Table II, the ac and dc DAC outputs shall be as specified therein except that a dc output shall not be present for IMU axes and that a dc output shall not be present for RR axes until DID is applied. ISS and OSS 28.0V rms, 800 cps excitation shall be maintained as close to the nominal value as possible during the test.

4.3.16 A/D to D/A Feedback Loop.

4.3.16.1 IMU Axes. With the 1X and 16X resolvers set to 0 degrees, CDUZ momentarily applied, CA Enable and Error Counter Enable applied and the 16X resolver adjusted to produce a read counter reading of 8 bits, the D/A AC Error voltage shall be 0.0133±0.0016V rms π phase. With the 16X resolver adjusted to produce a read counter reading of 16 bits, the D/A AC Error voltage shall be 0.0266±0.0019V rms π phase. With the 16X resolver adjusted near 358.5 degrees to produce a read counter reading of -16 bits, the D/A AC Error voltage shall be 0.0266±0.0019V rms, 0 phase. Repeat tests without CA Enable applied. The D/A AC Error shall be 10 mv rms max.

4.3.18.2 Turn-On (IMU). With the 16X resolver set to 0 degrees, the 1X resolver set to 225 degrees, and CDUZ and CA Enable applied, the Coarse Error TP voltage shall be 1.660±0.083V rms π phase and the CA Error TP voltage shall be 11±3V rms 0 phase. With the 1X resolver increased to 245 degrees, the CA Error TP voltage shall be 3.3±0.3V rms, π phase.

4.3.19 Cage Voltage (IMU). With the 16X resolver set to 0 degrees and the 1X resolver set to 0 degrees, the IMU Cage voltage shall be less than 10 mv rms. With the 1X resolver adjusted to 1 degree, the IMU Cage voltage shall be 0.45±0.02V rms. With the 1X resolver set to 90 degrees, the IMU Cage voltage shall be 26±1V rms.

4.3.20 Cage Override (IMU). With a 300 ohm 10W resistor connected between ISS +28 vdc and CA Relay Drive, the CA Relay Drive voltage shall be 28±3 vdc. With a "CDU Common to PSA" applied to Cage Override, the CA Relay Drive voltage shall be 1.5 vdc max. With the 300 ohm resistor removed, an Error Counter Enable applied and 15 $+\Delta\theta_G$ pulses applied, the D/A AC Signal shall be 198±12 mv rms. With a Cage Override applied, the D/A AC Signal shall be 10 mv rms max.

4.3.21 Switch and System Error

a. With the 1X and 16X resolvers adjusted to obtain the read counter bits specified in Table 1X, the read counter locked by applying a CA Enable (IMU Axis) or a DID followed by CDUZ (RR Axis), and the 16X resolver readjusted to obtain a Fine Error TP null, the angular difference between the 16X resolver angle specified in Table 1X and the final 16X resolver angle shall be calculated to be between +0.075 and -0.040 degrees. The read counter shall be unlocked by removing the CA Enable (IMU Axis) or CDUZ (RR Axis).

b. The requirements specified in a. shall be met for each fine system angle specified in Table IX.

c. With the 1X and 16X resolvers adjusted to obtain the read counter bits of the coarse system specified in Table IX, then readjusted to obtain a null at the Coarse Error TP, the angular difference between the final 1X resolver setting and the 1X resolver angle specified in Table IX shall be calculated to be ≤ 0.6 degrees.

d. The test requirements specified in c. shall be met for each coarse system angle specified in Table IX.

4.3.22 General Null. With the 1X and 16X resolvers sequentially adjusted to the angles specified in Table III, the $\Delta\theta_G$ pulses shall be generated as specified, ±1 bit, and the Coarse and Fine Error TP voltages shall be as specified.

4.3.23 Coarse and Fine Amplitude and Phase Variation. With the 1X and 16X resolver input angle, excitation and phase shift adjusted as specified in Table IV, the CDU Read Loop shall not oscillate. Oscillation in the coarse system shall be tested by adjusting the 1X resolver angle plus and minus 0.1 degree from the angle specified in Table IV. Oscillation in the fine system shall be tested by adjusting the 16X resolver angle from 0 degree to 90 degrees then back to 0 degree. The coarse system shall be tested first at a 22.0±0.5 vdc supply voltage, then retested at a 34.0±0.5 vdc supply voltage. The fine system shall be tested at 28.0±1.0 vdc supply voltage.

4.3.24 Thermal Stability. The assembly shall be mounted on a cold plate. The cold plate -CDU interface temperature shall be monitored by four interface sensors mounted as shown in Figure 3. The coldplate temperature shall be adjusted until any one interface sensor reaches 50° ±3°F and maintained there during the cold soak and test period shown in Figure 4. The coldplate temperature shall be adjusted until any one interface sensor reaches 110±3°F and maintained there during the hot soak and test period shown in Figure 4.

The four interface sensors and six internal sensors shall be monitored continuously through soaking and testing. The interface temperatures must be within 47 to 113°F and the internal temperatures must be between 41 to 130°F throughout soaking and testing. All the interface sensor temperatures shall be within 10°F of each other.

Power shall be applied continuously through soaking and testing.

The CDU assembly shall be covered by an insulating box (lined with 1 inch thick polyurethane foam or equivalent).

4.3.24.1 Electrical Test. The electrical tests shall be performed with the dc supply voltage adjusted to 22.0±0.5 vdc when the temperature is 50° ±5°F and 34.0±0.5 vdc when the temperature is 110° ±5°F. The electrical tests shall consist of the following tests performed during the intervals shown in Figure 4.

a. Basic Null (4.3.4)
b. Fine Ternary Schmitt Trigger Level (4.3.11.1) at 110°F, the tolerance on the 16X Resolver angle shall be ±0.040°.)
c. D/A Converter (4.3.15). Use Table X instead of Table II. Use D/A DC output for PR. The ISS and OSS 28.0V rms, 800 cps excitation shall be maintained as close to the nominal value as possible during this test.
d. Computer $\pm\Delta\theta_G$ Pulses (4.3.13)
e. Coarse and Fine Amplitude and Phase Variation (4.3.23)

TABLE X

D/A OUTPUT

COUNTER CONDITION	PULSES APPLIED	D/A AC OUTPUT (V rms) (0 or π Phase)		D/A ±DC OUTPUT Volts	
		Min	Max	Min	Max
Null	0	0	0.0125	0	0.0125
2^0	1	0.0116	0.0148	0.0117	0.0147
$2^7 \cdot 2^8$	384	4.856	5.368	4.912	5.216
$2^0 \cdot 2^1 \cdot 2^2 \cdot 2^4$	23	0.288	0.318	0.294	0.316

4.3.25 Weight. The assembly shall be weighed to determine that the maximum weight of the assembly shall be as specified in Table XI.

TABLE XI

PART NO.	WEIGHT (lbs)
2007222-021	42.5
2007222-041	42.5
2007222-061	37.5
2007222-081	37.5

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

DRAWING NO. 2007222

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
Ⓜ 4/20/66	A	28179	3-6, 8, 9, 12-23, 24, 25, 26,	WK	TM
			28, 29		
Ⓜ 6/7/66	B	29466	3, 4, 5, 7, 8, 12, 17, 19, 21, 22, 23,	MGM	---
			25, 26		
Ⓜ 8/10/66	C	30554	5, 6, 8, 9, 12, 20, 21, 23, 26 was	EA	--
			29 pages now 30.		
8/10/66	D	30557	13, 29	EA	--

This specification consists of page 1 to 30 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	12/7/65 12/7/65 MIT/IL 12/7/65	M.W. Smith ACSP

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8/10/66	D	30557	13, 29	EA	--
9/1/66	E	30901	2, 9	JP GR	--

This specification consists of page 1 to 35 inclusive.

APPROVALS	A. C. METZGER **NASA/MSC**	12/7/65 12/7/65 **MIT/IL** 12/7/65	M. W. Smith **ACSP**

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Coupling Data Unit, Part Number 2007222-021, -041, -061, and -081 hereafter called the CDU.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
ND1002290	Process Specification for Helium Leak Test

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Components Parts

DRAWINGS

APOLLO G&N

2007222	Coupling Data Unit

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

TABLE IV

OSCILLATION OF CDU READ LOOP

CONDITIONS					
Carrier ∠φ (°)		Resolver (°)		Resolver Excit (V rms)	
1X	16X	1X	16X	1X	16X
COARSE SYSTEM					
0	0	45	0	30	28
-15	↑	45	0	32	↑
+15		45	0	28	
0		47.8	45	23	
-15	↓	47.8	45	23	↓
+15	0	47.8	45	23	28
FINE SYSTEM					
0	+20	0	0	28	32
0	+20	0	0	28	24
0	-20	0	0	28	32
0	-20	0	0	28	24

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 2007222 and all drawings and engineering data referenced thereon.

3.2.2 Standards of Manufacturing, Manufacturing Process and Production

3.2.2.1 Continuity and DC Resistance. The resistance between the pins specified in Table V shall be as specified therein, when the resistance is measured on a Millivac ohmmeter type MV 279C or equivalent.

3.2.3 Weight. The maximum weight of the assembly shall be as specified in Table XI.

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			25, 26		
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This specification consists of page 1 to 30 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	12/7/65 12/7/65 MIT/IL 12/7/65	M.W. Smith | R ACSP

TABLE II

DAC OUTPUT

EC&L COUNTER CONDITION	PULSES APPLIED	+ DC OUTPUT -DC VOLTS	AC OUTPUT 0 OR π V RMS
Null	0	0.0000±5 mv	0.0000±5 mv
2^0	1	0.0132±12%	0.0133±12%
2^1	2	0.0264±6.5%	0.0266±7%
2^2	4	0.0527±6.5%	0.0532±7%
2^3	8	0.1055±3.5%	0.1065±5.5%
2^4	16	0.2110±3.5%	0.2130±5.5°
2^5	32	0.4220±3.5%	0.4260±5.5%
2^6	64	0.8440±3.5%	0.8520±5.5%
2^7	128	1.6880±3.5%	1.7040±5.5%
$2^5 . 2^7$	160	2.1100±1.5%	2.130±2%, ±5°
2^8	256	3.3760±3.5%	3.408±5.5%
$2^7 . 2^8$	384	5.064±3.5%	5.112±5.5%
$2^7 . 2^8 .$	385[*1]	5.064±3.5%	5.112±5.5%
$2^0 . 2^1 . 2^2 . 2^3 . 2^4$ $2^5 . 2^6 . 2^8 .$	-1[*2]	5.0508±4%	5.102±6%

[*1] Reading shall be within ±3 mv of the previous reading at 384 pulses.

[*2] Apply one pulse in the opposite direction to obtain this condition. The null voltage of the dc output shall be added to (if minus) or subtracted (if plus) from the dc output.

3.1.13 A/D to D/A Feedback Loop

3.1.13.1 IMU Axes. The D/A AC output shall be as follows when the CDU is in the Coarse Align Mode (CA Enable and EC Enable applied) and the 16X resolver is adjusted to the following read counter angles:

a. The D/A AC Error output shall be 13.3±1.6 mv rms π phase when the read counter angle is 0.703 degrees.

b. The D/A AC Error output shall be 26.6±1.9 mv rms π phase when the read counter angle is 1.4 degrees. With CA Enable removed, the D/A AC error shall be 10 mv rms maximum.

c. The D/A AC Error output shall be 26.6±1.9 mv rms 0 phase when the read counter angle is 358.6 degrees.

3.1.13.2 RR Axes. The DAC AC Error output shall be 10mv rms max 0 or π phase when a D/A Enable is applied and the 16X resolver is adjusted to produce read counter angles of 0.703 and 90 degrees.

3.1.14 Coarse Align Amplifier (IMU)

3.1.14.1 Fine Error Gain. The CA Error output shall be 48±5 mv rms 0 phase when the 16X resolver is adjusted 1.76 degrees from the fine error null while in the CA mode and with the 1X resolver at 0 degrees.

3.1.14.2 DAC Gain. The DAC AC output and CA error output shall be as follows when the following inputs are applied.

a. The DAC AC output shall be 132.0± 7.0 mv rms 0 phase and the CA Error output shall be 38.0±6.0 mv rms π phase when 10 $+\Delta\theta_C$ pulses and an EC Enable are applied. The CA error output shall be 10 mv rms max when the EC Enable is removed.

b. The DAC AC output shall be 132.0±7.0 mv rms π phase and the CA Error output shall be 38.0±6.0 mv rms 0 phase when 10 $-\Delta\theta_C$ pulses and an EC Enable are applied. The CA Error output shall be 10 mv rms max when the EC Enable is removed.

c. The CA Error output shall be 165.0±45.0 mv rms total, π phase when 256 $+\Delta\theta_C$ pulses and an EC Enable are applied.

d. The CA Error output shall be 165.0±45.0 mv rms total, 0 phase when 256 $-\Delta\theta_C$ pulses and an EC Enable are applied.

3.1.14.3 Coarse Error Gain. The CA Error signal shall be 1.30±0.25V rms 0 phase when the 16X resolver is adjusted to produce a fine error null and the 1X resolver is adjusted to produce a coarse error of 150 mv rms π phase.

3.1.15 Ambiguity

3.1.15.1 Override. The read counter shall contain an angle of 225 degrees ±1 bit when the 1X resolver is set to an ambiguity condition (1X = 225°, 16X = 0°).

3.1.15.2 Turn-on (IMU). The CA Error signal shall be 11±3V rms 0 phase and the coarse error signal shall be 1.660±0.083V rms π phase when the resolvers are set to an ambiguity condition (1X = 225°, 16X = 0°) in the Turn-on mode. The CA Error signal shall be 3.2±0.4V rms π phase when the 1X resolver is increased to 245 degrees.

3.1.16 Cage Voltage (IMU). The cage voltage shall be 10 mv rms max for a 1X resolver angle of 0 degrees, 0.45±0.02V rms for a 1X resolver angle of 1.0 degree, and 26±1V rms for a 1X resolver angle of 90 degrees.

4.3 TESTS. The following tests shall be performed on each of the three IMU axes and on each of the two RR axes unless otherwise specified herein.

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 2007222. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, contaminants, encapsulant defects, pin misalignment, and legibility and appearance of marking. Following completion of the final Pressure Fill and Leak test as specified on 2007222, the assembly shall be externally visually inspected for scratches, dents, nicks, and legibility of marking.

4.3.2 Workmanship-Vibration. The assembly shall be mounted on a vibration fixture in a manner in which it is mounted in the spacecraft and vibrated along the three orthogonal axes. The vibration shall be simple harmonic motion swept from 10 to 2000 cps at a rate of 1 octave per 15 sec. The magnitude of vibration shall be 3.5g rms limited to a 0.3 inch pp constant displacement from 10 cps to the crossover frequency. During vibration the assembly shall be electrically tested as specified in 4.3.2.1.

4.3.2.1 Electrical. During vibration the assembly shall be electrically tested through one complete vibration sweep at each of the resolver settings specified in Table VII. The electrical tests shall be as follows:

a. P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulse lines shall be monitored throughout the sweep cycle and presence of P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulses shall constitute failure.

b. With an EC Enable (IMU) or a D/A Enable (RR) applied, a 3200 pps signal in pulse bursts of 1023 pulses per burst applied alternately to the $+\Delta\theta_C$ and $-\Delta\theta_C$ inputs and the 1X and 16X resolvers and read counter at the angles specified in Table VII, the DAC AC and DC Error Signals shall be modulated at 1.56±0.10 cps and shall be as shown in Figure 2 and as specified in Table VII. The DAC DC shall be tested for the RR axis only, and DID shall be moded for the RR axis. A discontinuity of 0.5 msec, or more shall constitute a failure of the dc output. A discontinuity of 0.5 msec or more shall constitute a failure of the ac output. The ISS and OSS 28V rms, 800 cps excitation shall be maintained as close to nominal value as possible during this test.

c. The output discretes specified in Table VIII shall be continuously monitored for state change or pulse presence in accordance with Table VIII.

TABLE VII
DAC ERROR OUTPUT

RESOLVER ANGLE		READ COUNTER ANGLE(±1 bit)	DAC AC ERROR (V rms)	DAC DC ERROR (vdc)
1X (°)	16X (°)			
2.8	45	2^9	4.7 to 5.4	4.7 to 5.4
165	135	$2^9\ 2^{10}\ 2^{12}\ 2^{13}\ 2^{14}$	↕	↕
239	225	$2^9\ 2^{11}\ 2^{13}\ 2^{15}$		
334	315	$2^9\ 2^{10}\ 2^{11}\ 2^{13}\ 2^{14}\ 2^{15}$	4.7 to 5.4	4.7 to 5.4

4.3.18.2 Turn-On (IMU). With the 16X resolver set to 0 degrees, the 1X resolver set to 225 degrees, and CDUZ and CA Enable applied, the Coarse Error TP voltage shall be 1.660±0.083V rms π phase and the CA Error TP voltage shall be 11±3V rms 0 phase. With the 1X resolver increased to 245 degrees, the CA Error TP voltage shall be 3.2±0.4V rms, π phase.

4.3.19 Cage Voltage (IMU). With the 16X resolver set to 0 degrees and the 1X resolver set to 0 degrees, the IMU Cage voltage shall be less than 10 mv rms. With the 1X resolver adjusted to 1 degree, the IMU Cage voltage shall be 0.45±0.02V rms. With the 1X resolver set to 90 degrees, the IMU Cage voltage shall be 26±1V rms.

4.3.20 Cage Override (IMU). With a 300 ohm 10W resistor connected between ISS +28 vdc and CA Relay Drive, the CA Relay Drive voltage shall be 28±3 vdc. With a "CDU Common to PSA" applied to Cage Override, the CA Relay Drive voltage shall be 1.5 vdc max. With the 300 ohm resistor removed, an Error Counter Enable applied and 15 $+\Delta\theta_C$ pulses applied, the D/A AC Signal shall be 198±12 mv rms. With a Cage Override applied, the D/A AC Signal shall be 10 mv rms.max.

4.3.21 Switch and System Error

a. With the 1X and 16X resolvers adjusted to obtain the read counter bits specified in Table 1X, the read counter locked by applying a CA Enable (IMU Axis) or a DID followed by CDUZ (RR Axis), and the 16X resolver readjusted to obtain a Fine Error TP null, the angular difference between the 16X resolver angle specified in Table 1X and the final 16X resolver angle shall be calculated to be between +0.075 and -0.040 degrees. The read counter shall be unlocked by removing the CA Enable (IMU Axis) or CDUZ (RR Axis).

b. The requirements specified in a. shall be met for each fine system angle specified in Table IX.

c. With the 1X and 16X resolvers adjusted to obtain the read counter bits of the coarse system specified in Table IX, then readjusted to obtain a null at the Coarse Error TP, the angular difference between the final 1X resolver setting and the 1X resolver angle specified in Table IX shall be calculated to be ≤0.6 degrees.

d. The test requirements specified in c. shall be met for each coarse system angle specified in Table IX.

4.3.22 General Null. With the 1X and 16X resolvers sequentially adjusted to the angles specified in Table III, the $\Delta\theta_G$ pulses shall be generated as specified, ±1 bit, and the Coarse and Fine Error TP voltages shall be as specified.

4.3.23 Coarse and Fine Amplitude and Phase Variation. With the 1X and 16X resolver input angle, excitation and phase shift adjusted as specified in Table IV, the CDU Read Loop shall not oscillate. Oscillation in the coarse system shall be tested by adjusting the 1X resolver angle plus and minus 0.1 degree from the angle specified in Table IV. Oscillation in the fine system shall be tested by adjusting the 16X resolver angle from 0 degree to 90 degrees then back to 0 degree. The coarse system shall be tested first at a 22.0±0.5 vdc supply voltage, then retested at a 34.0±0.5 vdc supply voltage. The fine system shall be tested at 28.0±1.0 vdc supply voltage.

4.3.24 Thermal Stability. The assembly shall be mounted on a cold plate. The cold plate -CDU interface temperature shall be monitored by four interface sensors mounted as shown in Figure 3. The coldplate temperature shall be adjusted until any one interface sensor reaches 50° ±3°F and maintained there during the cold soak and test period shown in Figure 4. The coldplate temperature shall be adjusted until any one interface sensor reaches 110±3°F and maintained there during the hot soak and test period shown in Figure 4.

The four interface sensors and six internal sensors shall be monitored continuously through soaking and testing. The interface temperatures must be within 47 to 113°F and the internal temperatures must be between 41 to 130°F throughout soaking and testing. All the interface sensor temperatures shall be within 10°F of each other.

Power shall be applied continuously through soaking and testing.

The CDU assembly shall be covered by an insulating box (lined with 1 inch thick polyurethane foam or equivalent).

4.3.24.1 Electrical Test. The electrical tests shall be performed with the dc supply voltage adjusted to 22.0±0.5 vdc (24.0±0.5 vdc for 4.3.24.1.c) when the temperature is 50° ±5° F and 34.0±0.5 vdc when the temperature is 110° ±5°F. The electrical tests shall consist of the following tests performed during the intervals shown in Figure 4.

a. Basic Null (4.3.4)
b. Fine Ternary Schmitt Trigger Level (4.3.11.1) at 110°F, the tolerance on the 16X Resolver angle shall be ±0.040°.)
c. D/A Converter (4.3.15). Use Table X instead of Table II. Use D/A DC output for PR. The ISS and OSS 28.0V rms, 800 cps excitation shall be maintained as close to the nominal value as possible during this test.
d. Computer $\pm\Delta\theta_G$ Pulses (4.3.13)
e. Coarse and Fine Amplitude and Phase Variation (4.3.23)

TABLE X

D/A OUTPUT

COUNTER CONDITION	PULSES APPLIED	D/A AC OUTPUT (V rms) (0 or π Phase)		D/A ±DC OUTPUT Volts	
		Min	Max	Min	Max
Null	0	0	0.0125	0	0.0125
2^0	1	0.0116	0.0148	0.0117	0.0147
$2^7 \cdot 2^8$	384	4.856	5.368	4.912	5.216
$2^0 \cdot 2^1 \cdot 2^2 \cdot 2^4$	23	0.288	0.318	0.294	0.316

4.3.25 Weight. The assembly shall be weighed to determine that the maximum weight of the assembly shall be as specified in Table XI.

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			25, 26 RDG/AC		
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10/13/66	F	31525	6, 7, 12, 17, 23, 26 RDG/AC	MGM EA	--
11/3/66	G	31786	7, 22 RDG/AC	MGM EA	--

This specification consists of page 1 to 30 inclusive.

APPROVALS	C. METZGER NASA/MSC	12/7/65 12/7/65 MIT/IL 12/7/65	M.W. Smith | R [illegible] ACSP

3.1.13.2 RR Axes. The DAC AC Error output shall be 10mv rms max 0 or π phase when a D/A Enable is applied and the 16X resolver is adjusted to produce read counter angles of 0.703 and 90 degrees.

3.1.14 Coarse Align Amplifier (IMU)

3.1.14.1 Fine Error Gain. The CA Error output shall be 45±5 mv rms 0 phase when the 16X resolver is adjusted 1.76 degrees from the fine error null while in the CA mode and with the 1X resolver at 0 degrees.

3.1.14.2 DAC Gain. The DAC AC output and CA error output shall be as follows when the following inputs are applied.

a. The DAC AC output shall be 132.0± 7.0 mv rms 0 phase and the CA Error output shall be 35.0±6.0 mv rms π phase when 16 $+\Delta\theta_C$ pulses and an EC Enable are applied. The CA error output shall be 10 mv rms max when the EC Enable is removed.

b. The DAC AC output shall be 132.0±7.0 mv rms π phase and the CA Error output shall be 35.0±6.0 mv rms 0 phase when 16 $-\Delta\theta_C$ pulses and an EC Enable are applied. The CA Error output shall be 10 mv rms max when the EC Enable is removed.

c. The CA Error output shall be 124.0±30.0 mv rms total, π phase when 384 $+\Delta\theta_C$ pulses and an EC Enable are applied.

d. The CA Error output shall be 124.0±30.0 mv rms total, 0 phase when 384 $-\Delta\theta_C$ pulses and an EC Enable are applied.

3.1.14.3 Coarse Error Gain. The CA Error signal shall be 1.30±0.25V rms 0 phase when the 16X resolver is adjusted to produce a fine error null and the 1X resolver is adjusted to produce a coarse error of 150 mv rms π phase.

3.1.15 Ambiguity

3.1.15.1 Override. The read counter shall contain an angle of 225 degrees ±1 bit when the 1X resolver is set to an ambiguity condition (1X = 225°, 16X = 0°).

3.1.15.2 Turn-on (IMU). The CA Error signal shall be 11±3V rms 0 phase and the coarse error signal shall be 1.660±0.083V rms π phase when the resolvers are set to an ambiguity condition (1X = 225°, 16X = 0°) in the Turn-on mode. The CA Error signal shall be 3.2±0.4V rms π phase when the 1X resolver is increased to 245 degrees.

3.1.16 Cage Voltage (IMU). The cage voltage shall be 10 mv rms max for a 1X resolver angle of 0 degrees, 0.45±0.02V rms for a 1X resolver angle of 1.0 degree, and 26±1V rms for a 1X resolver angle of 90 degrees.

4.3.16.2 RR Axes. With the 16X resolver set to 0 degrees and a D/A Enable applied, the D/A AC Error output shall be 10 mv rms max. With the 16X resolver adjusted to produce a read counter reading of 8 bits, the D/A AC Error output shall be 10 mv rms max. With the 16X resolver set to 90 degrees, the D/A AC Error output shall be 10 mv rms max.

4.3.17 Coarse Align Amplifier (IMU)

4.3.17.1 Fine Error Gain. With the 1X resolver set to 0 degrees and the CA mode applied, the 16X resolver shall be adjusted to produce a minimum null at the Fine Error TP. With the 16X resolver angle increased 1.760 degrees from the 16X null angle, the CA Error output voltage shall be 45±5 mv rms, 0 phase.

4.3.17.2 DAC Gain.

a. With the 1X resolver set to 0 degrees, and the CDUZ mode applied, the 16X resolver shall be adjusted to produce a Fine Error TP null. With the CDUZ mode removed, the D/A AC Error output shall be 10 mv rms max.

b. With an Error Counter Enable and 10+ $\Delta\theta_C$ pulses applied, the D/A AC Error output shall be 132.0 ±7.0 mv rms 0 phase. The CA Error output shall be 35.0±6.0 mv rms π phase. With the Error Counter Enable removed, the CA Error output shall be 10 mv rms max.

c. Repeat b. using 10 $-\Delta\theta_C$ pulses. D/A AC Error and CA Error phases shall change by 180 degrees.

4.3.17.3 DAC Saturation. With an Error Counter Enable and 384 $+\Delta\theta_C$ pulses applied, the CA Error output shall be 124.0±30 mv rms total, π phase. With 384 $-\Delta\theta_C$ pulses, applied, the CA Error output shall be 124.0±30 mv rms total, 0 phase.

4.3.17.4 Coarse Error Gain. With the 1X resolver set to 0 degrees, the 16X resolver set to obtain a Fine Error null with the read counter at zero, and the CDUZ mode applied and then removed, the CA Error output shall be less than 5 mv rms. With the CDUZ mode applied and the 1X resolver adjusted for a Coarse Error TP voltage of 150 mv rms, π phase, the CA Error TP voltage shall be 1.30 ±0.25V rms, 0 phase.

4.3.18 Ambiguity

4.3.18.1 Override. With the 1X resolver set to 225 degrees, the 16X resolver set to 0 degrees and CDUZ applied, the Fine Error TP null shall be less than 16.66 mv rms and the Coarse Error TP null voltage shall be less than 100 mv rms. With CDUZ subsequently removed, the read counter shall read 225 degrees ±1 bit.

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APPROVALS	C. METZGER NASA/MSC	12/7/65 12/7/65 MIT/IL 12/7/65	M. W. Smith ACSP

3.1.17 Cage Override (IMU). The DAC AC Error output shall be 198±12 mv rms and the CA relay drive voltage shall be 28±3 vdc when an Error Counter Enable and 15 $+\Delta\theta_C$ pulses are applied. The CA relay drive voltage shall be 1.5 vdc max and the DAC AC Error output shall be 10 mv rms max when a Cage Override is applied in addition to the Error Counter Enable and 15 $+\Delta\theta_C$ pulses.

3.1.18 Switch and System Error. The system digitizing error shall be within +0.075 and -0.045 degrees for the 16X resolver system and ±0.6 degrees max for the 1X resolver system.

3.1.19 General Null. The $\Delta\theta_G$ pulses and error T.P. voltages shall be generated as specified in Table III when the 1X and 16X resolvers are adjusted to the angles specified.

3.1.20 Coarse and Fine Amplitude and Phase Variation. The CDU Read Loop shall not oscillate under the conditions specified in Table IV.

3.1.21 Thermal Stability. The assembly shall meet the requirements of 3.1.1, 3.1.8.1, 3.1.10, 3.1.12, and 3.1.20 with the assembly mounted on a cold plate and the interface temperatures maintained at 50° ±3°F and 110° ±3°F.

TABLE III

GENERAL NULL

INPUT RESOLVER (Degrees)		OUTPUT ERROR VOLTAGE		PULSE TOTAL $[(+\Delta\theta_G) - (-\Delta\theta_G)]$
		Fine	Coarse	
1X	16X	Max	Max	
0	0	75MV P-P	0.650V P-P	0
75.9	135	↑	↑	6912
2.8	45			256
168.7	180			15,360
5.6	90			512
239	225			21,760
19.7	315			1,792
331.8	270	↓	↓	30,208
0	0	75MV P-P	0.650V P-P	0

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4.3 TESTS. The following tests shall be performed on each of the three IMU axes and on each of the two RR axes unless otherwise specified herein.

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 2007222. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, contaminants, encapsulant defects, pin misalignment, and legibility and appearance of marking. Following completion of the final Pressure Fill and Leak test as specified on 2007222, the assembly shall be externally visually inspected for scratches, dents, nicks, and legibility of marking.

4.3.2 Workmanship-Vibration. The assembly shall be mounted on a vibration fixture in a manner in which it is mounted in the spacecraft and vibrated along the three orthogonal axes. The vibration shall be simple harmonic motion swept from 10 to 2000 cps at a rate of 1 octave per 15 sec. The magnitude of vibration shall be 1.5g rms. During vibration the assembly shall be electrically tested as specified in 4.3.2.1. The vibration transmissibility of the mounting fixture shall be such that the total input to the item will not exceed 1.5 times the specified value throughout the frequency range.

4.3.2.1 Electrical. During vibration the assembly shall be electrically tested through one complete vibration sweep at each of the resolver settings specified in Table VII. The electrical tests shall be as follows:

a. P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulse lines shall be monitored throughout the sweep cycle and presence of P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulses shall constitute failure.

b. With an EC Enable (IMU) or a D/A Enable (RR) applied, a 3200 pps signal in pulse bursts of 1023 pulses per burst applied alternately to the $+\Delta\theta_C$ and $-\Delta\theta_C$ inputs and the 1X and 16X resolvers and read counter at the angles specified in Table VII, the DAC AC and DC Error Signals shall be modulated at 1.56±0.10 cps and shall be as shown in Figure 2 and as specified in Table VII. The DAC DC shall be tested for the RR axis only, and DID shall be moded for the RR axis. A discontinuity of 0.5 msec, or more shall constitute a failure of the dc output. A discontinuity of 0.5 msec or more shall constitute a failure of the ac output. The ISS and OSS 28V rms, 800 cps excitation shall be maintained as close to nominal value as possible during this test.

c. The output discretes specified in Table VIII shall be continuously monitored for state change or pulse presence in accordance with Table VIII.

TABLE VII
DAC ERROR OUTPUT

RESOLVER ANGLE		READ COUNTER ANGLE (±1 bit)	DAC AC ERROR (V rms)	DAC DC ERROR (vdc)
1X (°)	16X (°)			
2.8	45	2^9	4.7 to 5.4	4.7 to 5.4
165	135	2^9 2^{10} 2^{12} 2^{13} 2^{14}	↕	↕
239	225	2^9 2^{11} 2^{13} 2^{15}		
334	315	2^9 2^{10} 2^{11} 2^{13} 2^{14} 2^{15}	4.7 to 5.4	4.7 to 5.4

4.3 TESTS. The following tests shall be performed on each of the three IMU axes and on each of the two RR axes unless otherwise specified herein.

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 2007222. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, contaminants, encapsulant defects, pin misalignment, and legibility and appearance of marking. Following completion of the final Pressure Fill and Leak test as specified on 2007222, the assembly shall be externally visually inspected for scratches, dents, nicks, and legibility of marking.

4.3.2 Workmanship-Vibration. The assembly shall be mounted on a vibration fixture in a manner in which it is mounted in the spacecraft and vibrated along the three orthogonal axes. The vibration shall be simple harmonic motion swept from 10 to 2000 cps at a rate of 1 octave per 15 sec. The magnitude of vibration shall be 1.5g rms. During vibration the assembly shall be electrically tested as specified in 4.3.2.1. The vibration transmissibility of the mounting fixture shall be such that the total input to the item will not exceed 1.5 times the specified value throughout the frequency range.

4.3.2.1 Electrical. During vibration the assembly shall be electrically tested through one complete vibration sweep at each of the resolver settings specified in Table VII. The electrical tests shall be as follows:

a. P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulse lines shall be monitored throughout the sweep cycle and presence of P_I, $+\Delta\theta_G$ and $-\Delta\theta_G$ pulses shall constitute failure.

b. With an EC Enable (IMU) or a D/A Enable (RR) applied, a 3200 pps signal in pulse bursts of 1023 pulses per burst applied alternately to the $+\Delta\theta_C$ and $-\Delta\theta_C$ inputs and the 1X and 16X resolvers and read counter at the angles specified in Table VII, the DAC AC and DC Error Signals shall be modulated at 1.56±0.10 cps and shall be as shown in Figure 2 and as specified in Table VII. The DAC DC shall be tested for the RR axis only, and DID shall be moded for the RR axis. A discontinuity of 0.5 msec, or more shall constitute a failure of the dc output. A discontinuity of 0.5 msec or more shall constitute a failure of the ac output. The ISS and OSS 28V rms, 800 cps excitation shall be maintained as close to nominal value as possible during this test.

c. The output discretes specified in Table VIII shall be continuously monitored for state change or pulse presence in accordance with Table VIII.

TABLE VII
DAC ERROR OUTPUT

RESOLVER ANGLE		READ COUNTER ANGLE(± 1 bit)	DAC AC ERROR (V rms)	DAC DC ERROR (vdc)
1X (°)	16X (°)			
2.8	45	2^9	4.7 to 5.4	4.7 to 5.4
165	135	2^9 2^{10} 2^{12} 2^{13} 2^{14}	↕	↕
239	225	2^9 2^{11} 2^{13} 2^{15}	↕	↕
334	315	2^9 2^{10} 2^{11} 2^{13} 2^{14} 2^{15}	4.7 to 5.4	4.7 to 5.4

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TABLE II

DAC OUTPUT

EC&L COUNTER CONDITION	PULSES APPLIED	+ DC OUTPUT - DC VOLTS	AC OUTPUT 0 OR π V RMS
Null	0	0.0000±5 mv	0.0000±5 mv
2^0	1	0.0132±12%	0.0133±12%
2^1	2	0.0264±6.5%	0.0266±7%
2^2	4	0.0527±6.5%	0.0532±7%
2^3	8	0.1055±3.5%	0.1065±5.5%
2^4	16	0.2110±3.5%	0.2130±5.5%
2^5	32	0.4220±3.5%	0.4260±5.5%
2^6	64	0.8440±3.5%	0.8520±5.5%
2^7	128	1.6880±3.5%	1.7040±5.5%
$2^5.2^7$	160	2.1100±1.5%	2.130±2%, ±5°
2^8	256	3.3760±3.5%	3.408±5.5%
$2^7.2^8$	384	5.064±3.5%	5.112±5.5%
$2^7.2^8$	385*1	5.064±3.5%	5.112±5.5%
$2^0.2^1.2^2.2^3.2^4$ $2^5.2^6.2^8$	-1*2	5.0508±4.8%	5.102±6%
$2^1.2^2.2^3.2^4.2^5.$ $2^6.2^8$	-2*3	-0.0132±12%	-0.0133±12%

*1 Reading shall be within ±3 mv of the previous reading at 384 pulses.
*2 Apply one pulse in the opposite direction to obtain this condition. The null voltage of the dc output shall be added to (if minus) or subtracted (if plus) from the dc output.
*3 The output (ac or dc) voltage shall be decreased from the value previously obtained with -1 pulse, by the amounts shown.

3.1.13 A/D to D/A Feedback Loop

3.1.13.1 IMU Axes. The D/A AC output shall be as follows when the CDU is in the Coarse Align Mode (CA Enable and EC Enable applied) and the 16X resolver is adjusted to the following read counter angles:

a. The D/A AC Error output shall be 13.3±1.6 mv rms π phase when the read counter angle is 0.703 degrees.

b. The D/A AC Error output shall be 26.6±1.9 mv rms π phase when the read counter angle is 1.4 degrees. With CA Enable removed, the D/A AC error shall be 10 mv rms maximum.

c. The D/A AC Error output shall be 26.6±1.9 mv rms 0 phase when the read counter angle is 358.6 degrees.

TABLE II

DAC OUTPUT

EC&L COUNTER CONDITION	PULSES APPLIED	+ DC OUTPUT - DC VOLTS	AC OUTPUT 0 OR π V RMS
Null	0	0.0000±5 mv	0.0000±5 mv
2^0	1	0.0132±12%	0.0133±12%
2^1	2	0.0264±6.5%	0.0266±7%
2^2	4	0.0527±6.5%	0.0532±7%
2^3	8	0.1055±3.5%	0.1065±5.5%
2^4	16	0.2110±3.5%	0.2130±5.5%
2^5	32	0.4220±3.5%	0.4260±5.5%
2^6	64	0.8440±3.5%	0.8520±5.5%
2^7	128	1.6880±3.5%	1.7040±5.5%
$2^5.2^7$	160	2.1100±1.5%	2.130±2%, ±5°
2^8	256	3.3760±3.5%	3.408±5.5%
$2^7.2^8$	384	5.064±3.5%	5.112±5.5%
$2^7.2^8$	385*1	5.064±3.5%	5.112±5.5%
$2^0.2^1.2^2.2^3.2^4$ $2^5.2^6.2^8$	-1*2	5.0508±4.8%	5.102±6%
$2^1.2^2.2^3.2^4.2^5.$ $2^6.2^8$	-2*3	-0.0132±12%	-0.0133±12%

*1 Reading shall be within ±3 mv of the previous reading at 384 pulses.

*2 Apply one pulse in the opposite direction to obtain this condition. The null voltage of the dc output shall be added to (if minus) or subtracted (if plus) from the dc output.

*3 The output (ac or dc) voltage shall be decreased from the value previously obtained with -1 pulse, by the amounts shown.

3.1.13 A/D to D/A Feedback Loop

3.1.13.1 IMU Axes. The D/A AC output shall be as follows when the CDU is in the Coarse Align Mode (CA Enable and EC Enable applied) and the 16X resolver is adjusted to the following read counter angles:

a. The D/A AC Error output shall be 13.3±1.6 mv rms π phase when the read counter angle is 0.703 degrees.

b. The D/A AC Error output shall be 26.6±1.9 mv rms π phase when the read counter angle is 1.4 degrees. With CA Enable removed, the D/A AC error shall be 10 mv rms maximum.

c. The D/A AC Error output shall be 26.6±1.9 mv rms 0 phase when the read counter angle is 358.6 degrees.

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3.1.8.3 Coarse Ternary. The Coarse Ternary Schmitt Trigger shall have an 800 pps output when the 1X resolver is set to 8.40±1.40 degrees and the coarse error output shall be 196.0±32.6 mv.rms, π phase.

3.1.8.4 Ambiguity Detect. The Ambiguity Detect Schmitt shall have an 800 pps output when the 1X resolver angle lies between 120±5 degrees and 240±5 degrees.

3.1.9 Speed. The digitizing loop shall settle to a null and the read counter shall contain an angular change of 112.5 degrees within 4.0 seconds maximum when a step change of 112.5 degrees in 1X resolver input angle is applied.

3.1.10 Computer $\pm\Delta\theta_G$ Pulse. The $\pm\Delta\theta_G$ pulse shall have the characteristics specified in Table I, Type VI when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180° ±5° to cause read system oscillation . The CDU Z LAG pulse shall have the characteristics specified in Table I, Type V when the CDU Z signal is also applied.

3.1.11 CDU Fail Detection. The CDU failure circuit shall indicate a failure or no failure as specified when any of the following conditions exist for a period greater than 7 seconds.

a. Fine Error Fail shall not occur when the 16X resolver angle is 8.0 degrees, the 1X resolver angle is 0 degrees and the system is in the CDU Z mode. A Fine Error Fail shall occur when the 16X resolver angle is changed to 14.0 degrees.

b. Coarse Error Fail shall not occur when the 1X resolver angle is 20 degrees, the 16X resolver angle is 0 degrees and the system is in the CDU Z mode. A Coarse Error Fail shall occur when the 1X resolver angle is increased to 33 degrees, and the 16X R.S. is increased to 180 degrees.

c. Cos $(\theta - \psi)$ Fail shall not occur when the 16X resolver excitation is reduced to 25±1V rms while the 1X and 16X resolver angles are at 0 degrees. A Cos $(\theta - \psi)$ Fail shall occur when the 16X resolver excitation is reduced to 9±1V rms.

d. Limit Cycle Fail shall not occur when the digitizing loop is in a limit cycle condition at a rate of 100±1 cps. Limit Cycle Fail shall occur when the limit cycle rate is 200±2 cps.

e. 14 VDC Fail shall not occur when the input of 4.2.1.5.a is 28.0±1.0 vdc. A 14 VDC Fail shall occur when the 14 vdc IMU or RR Test Point voltage is 8.0±0.1 vdc.

3.1.12 D/A Converter. The DAC output shall be as specified in Table II when the error counter is counted up or down.

TABLE II

DAC OUTPUT

EC&L COUNTER CONDITION	PULSES APPLIED	+ DC OUTPUT - DC VOLTS	AC OUTPUT 0 OR π V RMS
Null	0	0.0000±5 mv	0.0000±5 mv
2^0	1	0.0132±12%	0.0133±12%
2^1	2	0.0264±6.5%	0.0266±7%
2^2	4	0.0527±6.5%	0.0532±7%
2^3	8	0.1055±3.5%	0.1065±5.5%
2^4	16	0.2110±3.5%	0.2130±5.5%
2^5	32	0.4220±3.5%	0.4260±5.5%
2^6	64	0.8440±3.5%	0.8520±5.5%
2^7	128	1.6880±3.5%	1.7040±5.5%
$2^5.2^7$	160	2.1100±1.5%	2.130±2%, ±5°
2^8	256	3.3760±3.5%	3.408±5.5%
$2^7.2^8$	384	5.064±3.5%	5.112±5.5%
$2^7.2^8$	385*1	5.064±3.5%	5.112±5.5%
$2^1 2^2 2^4 2^5 2^6 2^8$	-10*		

*Apply 10 pulses in the opposite direction to obtain this condition. The output (AC or DC) voltage shall decrease from the value previously obtained with 385 pulses.

*1 Reading shall be within ±3 mv of the previous reading at 384 pulses.

The null voltage of the dc output shall be added to (if minus) or subtacted (if plus) from the dc output.

3.1.13 A/D to D/A Feedback Loop

3.1.13.1 IMU Axes. The D/A AC output shall be as follows when the CDU is in the Coarse Align Mode (CA Enable and EC Enable applied) and the 16X resolver is adjusted to the following read counter angles:

a. The D/A AC Error output shall be 13.3±1.6 mv rms π phase when the read counter angle is 0.703 degrees.

b. The D/A AC Error output shall be 26.6±1.9 mv rms π phase when the read counter angle is 1.4 degrees. With CA Enable removed, the D/A AC error shall be 10 mv rms maximum.

c. The D/A AC Error output shall be 26.6±1.9 mv rms 0 phase when the read counter angle is 358.6 degrees.

4.3.14 CDU Fail Detection. Unused 16X resolver inputs shall be excited by connecting a 5V rms 0 phase voltage to the unused cos 16X inputs.

4.3.14.1 Fine Error Fail. With the 1X resolver set to 0 degrees, CDUZ applied and the 16X resolver set to 8.000 degrees, no fail signal shall be generated after 7 seconds. With the 16X resolver increased to 14.000 degrees, a fail signal shall be generated within 3 to 7 seconds. With CDUZ removed, the fail signal shall cease within 1 second. (1.5 seconds at 34.0±0.5 vdc applied as specified in 4.2.1.5.a).

4.3.14.2 Coarse Error Fail. With the 16X resolver set to 0 degrees, the 1X resolver set to 20 degrees and CDUZ applied, no failure signal shall be generated. With the 1X resolver increased to 33 degrees and 16X R.S. set to 180 degrees a fail signal shall be generated within 3 to 7 seconds.

4.3.14.3 14 VDC Fail. With the 1X and 16X resolvers set to 0 degrees, no fail signal shall be generated. With the 14 vdc TP voltage adjusted to 8.0±0.1 vdc, a fail signal shall be generated within 3 to 7 seconds.

4.3.14.4 Cos ($\phi - \Psi$) Fail. With the 1X and 16X resolvers set to 0 degrees and the excitation to the 16X resolver adjusted to 25.0±1.0V rms, no fail signal shall be generated. With the excitation reduced to 9.0±1.0V rms, a fail signal shall be generated within 3 to 7 seconds.

4.3.14.5 Limit Cycle Fail. With the 1X resolver set to 0 degrees, the 16X resolver set to 355.00 degrees CDUZ applied and a 100 ±1 cps limit cycle input signal applied as shown in figure 5 or equivalent, no failure signal shall be generated. With the limit cycle increased to 200 ±2 cps, a fail signal shall be generated within 3 to 7 seconds.

4.3.15 D/A Converter. With an EC Enable (for IMU) or a D/A Enable (for RR) applied and the read counter counted up and down in accordance with Table II, the ac and dc DAC outputs shall be as specified therein except that a dc output shall not be present for IMU axes and that a dc output shall not be present for RR axes until DID is applied. ISS and OSS 28.0V rms, 800 cps excitation shall be maintained as close to the nominal value as possible during the test.

4.3.16 A/D to D/A Feedback Loop.

4.3.16.1 IMU Axes. With the 1X and 16X resolvers set to 0 degrees, CDUZ momentarily applied, CA Enable and Error Counter Enable applied and the 16X resolver adjusted to produce a read counter reading of 8 bits, the D/A AC Error voltage shall be 0.0133±0.0016V rms π phase. With the 16X resolver adjusted to produce a read counter reading of 16 bits, the D/A AC Error voltage shall be 0.0266±0.0019V rms π phase. With the 16X resolver adjusted near 358.5 degrees to produce a read counter reading of -16 bits, the D/A AC Error voltage shall be 0.0266±0.0019V rms, 0 phase. Repeat tests without CA Enable applied. The D/A AC Error shall be 10 mv rms max.

3.1.8.3 Coarse Ternary. The Coarse Ternary Schmitt Trigger shall have an 800 pps output when the 1X resolver is set to 8.40±1.40 degrees and the coarse error output shall be 186.6±26.6 mv rms, π phase.

3.1.8.4 Ambiguity Detect. The Ambiguity Detect Schmitt shall have an 800 pps output when the 1X resolver angle lies between 120±5 degrees and 240±5 degrees.

3.1.9 Speed. The digitizing loop shall settle to a null and the read counter shall contain an angular change of 112.5 degrees within 4.0 seconds maximum when a step change of 112.5 degrees in 1X resolver input angle is applied.

3.1.10 Computer $\pm\Delta\theta_G$ Pulse. The $\pm\Delta\theta_G$ pulse shall have the characteristics specified in Table I, Type VI when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180° ±5° to cause read system oscillation The CDU Z LAG pulse shall have the characteristics specified in Table I, Type V when the CDU Z signal is also applied.

3.1.11 CDU Fail Detection. The CDU failure circuit shall indicate a failure or no failure as specified when any of the following conditions exist for a period greater than 7 seconds.

a. Fine Error Fail shall not occur when the 16X resolver angle is 8.0 degrees, the 1X resolver angle is 0 degrees and the system is in the CDU Z mode. A Fine Error Fail shall occur when the 16X resolver angle is changed to 14.0 degrees.

b. Coarse Error Fail shall not occur when the 1X resolver angle is 20 degrees, the 16X resolver angle is 0 degrees and the system is in the CDU Z mode. A Coarse Error Fail shall occur when the 1X resolver angle is increased to 33 degrees, and the 16X R.S. is increased to 180 degrees.

c. Cos ($\theta - \psi$) Fail shall not occur when the 16X resolver excitation is reduced to 25±1V rms while the 1X and 16X resolver angles are at 0 degrees. A Cos ($\theta - \psi$) Fail shall occur when the 16X resolver excitation is reduced to 9±1V rms.

d. Limit Cycle Fail shall not occur when the digitizing loop is in a limit cycle condition at a rate of 100±1 cps. Limit Cycle Fail shall occur when the limit cycle rate is 200±2 cps.

e. 14 VDC Fail shall not occur when the input of 4.2.1.5.a is 28.0±1.0 vdc. A 14 VDC Fail shall occur when the 14 vdc IMU or RR Test Point voltage is 8.0±0.1 vdc.

3.1.12 D/A Converter. The DAC output shall be as specified in Table II when the error counter is counted up or down.

4.3.8 DID READ COUNTER LOCK (RR). With the 1X and 16X resolvers set to 0 degrees and CDUZ momentarily applied, the read counter shall contain an angle of 0 degrees. With the 16X resolver advanced to 11.25 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With DID applied, followed with a CDUZ, and the 16X resolver set to 90 degrees, the read counter shall remain at 11.25 degrees ±1 bit. With CDUZ removed, the read counter shall contain an angle of 90 degrees ±1 bit.

4.3.9 Fine Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 16X resolver adjusted to obtain a Fine Error null, then advanced 0.088 degrees, the Fine Error TP voltage shall be 16±2 mv rms π phase.

4.3.10 Coarse Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 1X resolver adjusted to obtain a Coarse Error null, then advanced 2.8 degrees, the Coarse Error TP voltage shall be 60±7 mv rms, π phase.

4.3.11 Schmitt Trigger Threshold Levels

4.3.11.1 Fine Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until a stable 800 pps pulse train appears at the Fine Ternary Schmitt TP, the Fine Error TP voltage shall be 23.33±3.33 mv rms π phase and the net increase in the 16X resolver angle shall be 0.131±0.020 degrees.

4.3.11.2 High Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until an 800 pps pulse train appears at the High Ternary Schmitt TP, the Fine Error TP voltage shall be 0.40±0.10V rms π phase and the net increase in the 16X resolver angle shall be 2.200±0.440 degrees.

4.3.11.3 Coarse Ternary. With CDUZ applied and the 1X resolver angle increased from a Coarse Error null until an 800 pps pulse train appears at the Coarse Ternary Schmitt TP, the Coarse Error TP voltage shall be 186.6±26.6mv rms π phase and the coarse error angle shall be 8.4±1.4 degrees.

4.3.11.4 Ambiguity Detect. With CDUZ applied, the 16X resolver set to 0 degrees and the 1X resolver increased from 115 degrees until an 800 pps pulse train appears at the Ambiguity Detect TP, the 1X resolver angle shall be 120±5 degrees. The pulse train shall continue to exist until the 1X resolver angle is increased to 240±5 degrees.

4.3.12 Speed. With the 16X resolver set to 0 degrees, the 1X resolver set to 112.5 degrees and CDUZ applied, the Coarse Schmitt (C1) pulses shall disappear within 4 seconds after CDUZ is removed and the read counter shall contain an angle of 112.5 degrees ±1 bit.

4.3.13 Computer $\pm\Delta\theta_G$ Pulses. With the 1X resolver set to 0 degrees and the 16X resolver set to 180° ±5°, the $\pm\Delta\theta_G$ and $\pm\Delta\theta_G$ LAG signals shall have the characteristics specified in Table I, Type VI. With CDUZ added, the CDUZ LAG pulse shall have the characteristics specified in Table I, Type V.

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Coupling Data Unit, Part Number 2007222-021, -041, -061, -081 and -121 hereafter called the CDU.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Sub-assemblies, Parts and Associated Ground Support Equipment
ND1002290	Process Specification for Helium Leak Test

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Components Parts

DRAWINGS

APOLLO G&N

2007222	Coupling Data Unit

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

TABLE XI

PART NO.	WEIGHT (lbs)
2007222-021	42.5
2007222-041	42.5
2007222-061	37.5
2007222-081	37.5
2007222-121	38.13

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

DRAWING NO. 2007222

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals AC	Approvals NASA
12/1/66	J	32216	17	MGM EA	--
12/6/66	K	32330	1, 6	MGM EA	--
2/3/67	L	32905	4, 5, 6, 21	MGM EA	--
2/9/67	M	32940	5, 20	MGM EA	--
2/9/67	N	32955	2, 17, 30	MGM EA	--
3/22/67	P	33347	2, 5, 9, 20, 30	MGM EA	--

This specification consists of page 1 to 30 inclusive.

APPROVALS	A.C. Metzger NASA/MSC	John E. Miller 12/7/65 G. Cushman 12/7/65 W. Kupfer 12/7/65 MIT/IL	M.W. Smith R. Mura AC

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Coupling Data Unit, Part Number 2007222-021, -041, -061, -081, -121, -131 and -141 hereafter called the CDU.

1.2 CLASSIFICATION. The test requirements for the CDU shall be classified as follows. Unless identified by the respective type, all requirements are applicable to all types.

a. Type I. The test requirements for part numbers 2007222-021, -041, -061, -081 and -121 shall be designated as Type I, and so identified in this specification.

b. Type II. The test requirements for part numbers 2007222-131 and -141 shall be designated as Type II and so identified in this specification.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
ND1002290	Process Specification for Helium Leak Test

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DRAWINGS

APOLLO G&N

2007222	Coupling Data Unit

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

3.1.8.3 Coarse Ternary (Type I). The Coarse Ternary Schmitt Trigger shall have an 800 pps output when the 1X resolver is set to 8.40±1.40 degrees and the coarse error output shall be 186.6±26.6 mv rms, π phase.

3.1.8.3.1 Coarse Ternary (Type II). The Coarse Ternary Schmitt Trigger shall have an 800 pps output when the 1X resolver is set to 7±0.5° and the Coarse Error output shall be 145±15 mv rms, π phase.

3.1.8.4 Ambiguity Detect. The Ambiguity Detect Schmitt shall have an 800 pps output when the 1X resolver angle lies between 120±5 degrees and 240±5 degrees.

3.1.9 Speed. The digitizing loop shall settle to a null and the read counter shall contain an angular change of 112.5 degrees within 4.0 seconds maximum when a step change of 112.5 degrees in 1X resolver input angle is applied.

3.1.10 Computer $\pm\Delta\theta_G$ Pulse. The $\pm\Delta\theta_G$ pulse shall have the characteristics specified in Table I, Type VI when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180° ±5° to cause read system oscillation. The CDU Z LAG pulse shall have the characteristics specified in Table I, Type V when the CDU Z signal is also applied.

3.1.11 CDU Fail Detection. The CDU failure circuit shall indicate a failure or no failure as specified when any of the following conditions exist for a period greater than 7 seconds.

a. Fine Error Fail shall not occur when the 16X resolver angle is 8.0 degrees, the 1X resolver angle is 0 degrees and the system is in the CDU Z mode. A Fine Error Fail shall occur when the 16X resolver angle is changed to 14.0 degrees.

b. Coarse Error Fail shall not occur when the 1X resolver angle is 20 degrees, the 16X resolver angle is 0 degrees and the system is in the CDU Z mode. A Coarse Error Fail shall occur when the 1X resolver angle is increased to 33 degrees, and the 16X R.S. is increased to 180 degrees.

c. Cos $(\theta - \psi)$ Fail shall not occur when the 16X resolver excitation is reduced to 25±1V rms while the 1X and 16X resolver angles are at 0 degrees. A Cos $(\theta - \psi)$ Fail shall occur when the 16X resolver excitation is reduced to 9±1V rms.

d. Limit Cycle Fail shall not occur when the digitizing loop is in a limit cycle condition at a rate of 100±1 cps. Limit Cycle Fail shall occur when the limit cycle rate is 200±2 cps.

e. 14 VDC Fail shall not occur when the input of 4.2.1.5.a is 28.0±1.0 vdc. A 14 VDC Fail shall occur when the 14 vdc IMU or RR Test Point voltage is 8.0±0.1 vdc.

3.1.12 D/A Converter. The DAC output shall be as specified in Table II when the error counter is counted up or down.

4.3.8 DID READ COUNTER LOCK (RR). With the 1X and 16X resolvers set to 0 degrees and CDUZ momentarily applied, the read counter shall contain an angle of 0 degrees. With the 16X resolver advanced to 11.25 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With DID applied, followed with a CDUZ, and the 16X resolver set to 90 degrees, the read counter shall remain at 11.25 degrees ±1 bit. With CDUZ removed, the read counter shall contain an angle of 90 degrees ±1 bit.

4.3.9 Fine Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 16X resolver adjusted to obtain a Fine Error null, then advanced 0.088 degrees, the Fine Error TP voltage shall be 16±2 mv rms π phase.

4.3.10 Coarse Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 1X resolver adjusted to obtain a Coarse Error null, then advanced 2.8 degrees, the Coarse Error TP voltage shall be 60±7 mv rms, π phase.

4.3.11 Schmitt Trigger Threshold Levels

4.3.11.1 Fine Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until a stable 800 pps pulse train appears at the Fine Ternary Schmitt TP, the Fine Error TP voltage shall be 23.33±3.33 mv rms π phase and the net increase in the 16X resolver angle shall be 0.131±0.020 degrees.

4.3.11.2 High Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until an 800 pps pulse train appears at the High Ternary Schmitt TP, the Fine Error TP voltage shall be 0.40±0.10V rms π phase and the net increase in the 16X resolver angle shall be 2.200±0.440 degrees.

4.3.11.3 Coarse Ternary (Type I). With CDUZ applied and the 1X resolver angle increased from a Coarse Error null until an 800 pps pulse train appears at the Coarse Ternary Schmitt TP, the Coarse Error TP voltage shall be 186.6±26.6 mv rms π phase and the coarse error angle shall be 8.4±1.4 degrees. The ISS and OSS 28V 800 cps reference excitation and 1X resolver standard excitation shall be maintained as close to the nominal value as possible during this test.

4.3.11.3.1 Coarse Ternary (Type II). With CDUZ applied and the 1X resolver angle increased from a Coarse Error null until an 800 pps pulse train appears at the Coarse Ternary Schmitt TP, the coarse error TP voltage shall be 145±15 mv rms, π phase and the coarse error angle shall be 7±0.50. The ISS and OSS 28V 800 cps reference excitation and 1X resolver standard excitation shall be maintained as close to the nominal value as possible during this test.

4.3.11.4 Ambiguity Detect. With CDUZ applied, the 16X resolver set to 0 degrees and the 1X resolver increased from 115 degrees until an 800 pps pulse train appears at the Ambiguity Detect TP, the 1X resolver angle shall be 120±5 degrees. The pulse train shall continue to exist until the 1X resolver angle is increased to 240±5 degrees.

4.3.12 Speed. With the 16X resolver set to 0 degrees, the 1X resolver set to 112.5 degrees and CDUZ applied, the Coarse Schmitt (C1) pulses shall disappear within 4 seconds after CDUZ is removed and the read counter shall contain an angle of 112.5 degrees ±1 bit.

4.3.13 Computer $\pm\Delta\theta_G$ Pulses. With the 1X resolver set to 0 degrees and the 16X resolver set to 180° ±5°, the $\pm\Delta\theta_G$ and $\pm\Delta\theta_G$ LAG signals shall have the characteristics specified in Table I, Type VI. With CDUZ added, the CDUZ LAG pulse shall have the characteristics specified in Table I, Type V.

TABLE XI

PART NO.	WEIGHT (lbs)
2007222-021	42.5
2007222-041	42.5
2007222-061	37.5
2007222-081	37.5
2007222-121	38.13
2007222-131	38.13
2007222-141	42.5

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

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PROCUREMENT SPECIFICATION

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					AC	NASA
12/1/66	J	32216	17	RDL/AC	MGM EA	--
12/6/66	K	32330	1, 6	RDL/AC	MGM EA	--
2/3/67	L	32905	4, 5, 6, 21	RDL/AC	MGM EA	--
2/9/67	M	32940	5, 20	RDL/AC	MGM EA	--
2/9/67	N	32955	2, 17, 30	RDL/AL	MGM EA	--
3/22/67	P	33347	2, 5, 9, 20, 30	RDL/AC	MGM EA	--
4/6/67	R	33511	5, 20	RDL/AC	MGM EA	--

This specification consists of page 1 to 30 inclusive.

APPROVALS	A. C. Metzger NASA/MSC	John E. Miller 12/7/65 G. Cushman 12/7/65 W. Kupfer 12/7/65 MIT/IL	M. W. Smith R. Mura AC

3.1.8.3 Coarse Ternary (Type I). The Coarse Ternary Schmitt Trigger shall have an 800 pps output when the 1X resolver is set to 8.40±1.40 degrees and the coarse error output shall be 186.6±26.6 mv rms, π phase.

3.1.8.3.1 Coarse Ternary (Type II). The Coarse Ternary Schmitt Trigger shall have an 800 pps output when the 1X resolver is set to 7±0.5° and the Coarse Error output shall be 145±15 mv rms, π phase.

3.1.8.4 Ambiguity Detect. The Ambiguity Detect Schmitt shall have an 800 pps output when the 1X resolver angle lies between 120±6 degrees and 240±6 degrees.

3.1.9 Speed. The digitizing loop shall settle to a null and the read counter shall contain an angular change of 112.5 degrees within 4.0 seconds maximum when a step change of 112.5 degrees in 1X resolver input angle is applied.

3.1.10 Computer $\pm\Delta\theta_G$ Pulse. The $\pm\Delta\theta_G$ pulse shall have the characteristics specified in Table I, Type VI when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180° ±5° to cause read system oscillation. The CDU Z LAG pulse shall have the characteristics specified in Table I, Type V when the CDU Z signal is also applied.

3.1.11 CDU Fail Detection. The CDU failure circuit shall indicate a failure or no failure as specified when any of the following conditions exist for a period greater than 7 seconds.

a. Fine Error Fail shall not occur when the 16X resolver angle is 8.0 degrees, the 1X resolver angle is 0 degrees and the system is in the CDU Z mode. A Fine Error Fail shall occur when the 16X resolver angle is changed to 14.0 degrees.

b. Coarse Error Fail shall not occur when the 1X resolver angle is 20 degrees, the 16X resolver angle is 0 degrees and the system is in the CDU Z mode. A Coarse Error Fail shall occur when the 1X resolver angle is increased to 33 degrees, and the 16X R.S. is increased to 180 degrees.

c. Cos $(\theta-\psi)$ Fail shall not occur when the 16X resolver excitation is reduced to 25±1V rms while the 1X and 16X resolver angles are at 0 degrees. A Cos $(\theta-\psi)$ Fail shall occur when the 16X resolver excitation is reduced to 9±1V rms.

d. Limit Cycle Fail shall not occur when the digitizing loop is in a limit cycle condition at a rate of 100±1 cps. Limit Cycle Fail shall occur when the limit cycle rate is 200±2 cps.

e. 14 VDC Fail shall not occur when the input of 4.2.1.5.a is 28.0±1.0 vdc. A 14 VDC Fail shall occur when the 14 vdc IMU or RR Test Point voltage is 8.0±0.1 vdc.

3.1.12 D/A Converter. The DAC output shall be as specified in Table II when the error counter is counted up or down.

4.3.8 DID READ COUNTER LOCK (RR). With the 1X and 16X resolvers set to 0 degrees and CDUZ momentarily applied, the read counter shall contain an angle of 0 degrees. With the 16X resolver advanced to 11.25 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With DID applied, followed with a CDUZ, and the 16X resolver set to 90 degrees, the read counter shall remain at 11.25 degrees ±1 bit. With CDUZ removed, the read counter shall contain an angle of 90 degrees ±1 bit.

4.3.9 Fine Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 16X resolver adjusted to obtain a Fine Error null, then advanced 0.088 degrees, the Fine Error TP voltage shall be 16±2 mv rms π phase.

4.3.10 Coarse Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 1X resolver adjusted to obtain a Coarse Error null, then advanced 2.8 degrees, the Coarse Error TP voltage shall be 60±7 mv rms, π phase.

4.3.11 Schmitt Trigger Threshold Levels

4.3.11.1 Fine Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until a stable 800 pps pulse train appears at the Fine Ternary Schmitt TP, the Fine Error TP voltage shall be 23.33±3.33 mv rms π phase and the net increase in the 16X resolver angle shall be 0.131±0.020 degrees.

4.3.11.2 High Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until an 800 pps pulse train appears at the High Ternary Schmitt TP, the Fine Error TP voltage shall be 0.40±0.10V rms π phase and the net increase in the 16X resolver angle shall be 2.200±0.440 degrees.

4.3.11.3 Coarse Ternary (Type I). With CDUZ applied and the 1X resolver angle increased from a Coarse Error null until an 800 pps pulse train appears at the Coarse Ternary Schmitt TP, the Coarse Error TP voltage shall be 186.6±26.6 mv rms π phase and the coarse error angle shall be 8.4±1.4 degrees. The ISS and OSS 28V 800 cps reference excitation and 1X resolver standard excitation shall be maintained as close to the nominal value as possible during this test.

4.3.11.3.1 Coarse Ternary (Type II). With CDUZ applied and the 1X resolver angle increased from a Coarse Error null until an 800 pps pulse train appears at the Coarse Ternary Schmitt TP, the coarse error TP voltage shall be 145±15 mv rms, π phase and the coarse error angle shall be 7±0.50. The ISS and OSS 28V 800 cps reference excitation and 1X resolver standard excitation shall be maintained as close to the nominal value as possible during this test.

4.3.11.4 Ambiguity Detect. With CDUZ applied, the 16X resolver set to 0 degrees and the 1X resolver increased from 115 degrees until an 800 pps pulse train appears at the Ambiguity Detect TP, the 1X resolver angle shall be 120±6 degrees. The pulse train shall continue to exist until the 1X resolver angle is increased to 240±6 degrees.

4.3.12 Speed. With the 16X resolver set to 0 degrees, the 1X resolver set to 112.5 degrees and CDUZ applied, the Coarse Schmitt (C1) pulses shall disappear within 4 seconds after CDUZ is removed and the read counter shall contain an angle of 112.5 degrees ±1 bit.

4.3.13 Computer $\pm\Delta\theta_G$ Pulses. With the 1X resolver set to 0 degrees and the 16X resolver set to 180° ±5°, the $\pm\Delta\theta_G$ and $\pm\Delta\theta_G$ LAG signals shall have the characteristics specified in Table I, Type VI. With CDUZ added, the CDUZ LAG pulse shall have the characteristics specified in Table I, Type V.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

DRAWING NO. 2007222

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
12/1/66	J	32216	17	MGM EA	--
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2/3/67	L	32905	4, 5, 6, 21	MGM EA	--
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2/9/67	N	32955	2, 17, 30	MGM EA	--
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This specification consists of page 1 to 30 inclusive.

APPROVALS	A. C. Metzger NASA/MSC	John E. Miller G. Cushman	12/7/65 12/7/65	W. Kupfer 12/7/65	M. W. Smith	R. Mura
		MIT/IL			AC	

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

COUPLING DATA UNIT (LEM)

DRAWING NO. 2007222

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
12/1/66	J	32216	17	MGM EA	--
12/6/66	K	32330	1, 6	MGM EA	--
2/3/67	L	32905	4, 5, 6, 21	MGM EA	--
3/9/67	M	32940	5, 20	MGM EA	--
2/9/67	N	32955	2, 17, 30	MGM EA	--
3/22/67	P	33347	2, 5, 9, 20, 30	MGM EA	--
4/6/67	R	33511	5, 20	MGM EA	--
4/27/67	S	33685	3, 20	MGM EA	--
5/27/67	T	33859	7, 22	MGM EA	--

This specification consists of page 1 to 30 inclusive.

APPROVALS	A. C. Metzger NASA/MSC	John E. Miller 12/7/65 G. Cushman 12/7/65 MIT/IL	W. Kupfer 12/7/65	M. W. Smith AC	R. Mura

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4/27/67	S	33685	3, 20	MGM EA	--
5/27/67	T	33859	7, 22	MGM EA	--
8/10/67	U	34316	26	EA	--

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3/22/67	P	33347	2, 5, 9, 20, 30	MGM EA	--
4/6/67	R	33511	5, 20	MGM EA	--
4/27/67	S	33685	3, 20	MGM EA	--
5/27/67	T	33859	7, 22	MGM EA	--
8/10/67	U	34316	26	EA	--
8/18/67	V	34362	6	MGM EA	--

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TABLE II

DAC OUTPUT

EC&L COUNTER CONDITION	PULSES APPLIED	+ DC OUTPUT - DC VOLTS	AC OUTPUT 0 OR π V RMS
Null	0	0.0000±5 mv	0.0000±5 mv
2^0	1	0.0132±12%	0.0133±12%
2^1	2	0.0264±6.5%	0.0266±7%
2^2	4	0.0527±6.5%	0.0532±7%
2^3	8	0.1055±3.5%	0.1065±5.5%
2^4	16	0.2110±3.5%	0.2130±5.5%
2^5	32	0.4220±3.5%	0.4260±5.5%
2^6	64	0.8440±3.5%	0.8520±5.5%
2^7	128	1.6880±3.5%	1.7040±5.5%
$2^5.2^7$	160	2.1100±1.5%	2.130±2%, ±5°
2^8	256	3.3760±3.5%	3.408±5.5%
$2^7.2^8$	384	5.064±3.5%	5.112±5.5%
$2^7.2^8$	385*1	5.064±3.5%	5.112±5.5%
$2^1 2^2 2^4 2^5 2^6 2^8$	-10*		

*Apply 10 pulses in the opposite direction to obtain this condition. The output (AC or DC) voltage shall decrease from the value previously obtained with 385 pulses.

*1 Reading shall be within ±3 mv of the previous reading at 384 pulses.

Algebraically subtract the dc null voltage (0 pulses) from the dc output.

3.1.13 A/D to D/A Feedback Loop

3.1.13.1 IMU Axes. The D/A AC output shall be as follows when the CDU is in the Coarse Align Mode (CA Enable and EC Enable applied) and the 16X resolver is adjusted to the following read counter angles:

a. The D/A AC Error output shall be 13.3±1.6 mv rms π phase when the read counter angle is 0.703 degrees.

b. The D/A AC Error output shall be 26.6±1.9 mv rms π phase when the read counter angle is 1.4 degrees. With CA Enable removed, the D/A AC error shall be 10 mv rms maximum.

c. The D/A AC Error output shall be 26.6±1.9 mv rms 0 phase when the read counter angle is 358.6 degrees.

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8/18/67	V	34362	6	MGM EA	--
9/7/67	W	34534	2, 30	WS EA	--

This specification consists of page 1 to 30 inclusive.

APPROVALS	A. C. Metzger NASA/MSC	John E. Miller 12/7/65 G. Cushman 12/7/65 W. Kupfer 12/7/65 MIT/IL	M. W. Smith R. Mura AC

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Coupling Data Unit, Part Number 2007222-021, -041, -061, -081, -121, -131, -141, -171, -211 and -221, hereafter called the CDU.

1.2 CLASSIFICATION. The test requirements for the CDU shall be classified as follows. Unless identified by the respective type, all requirements are applicable to all types.

a. Type I. The test requirements for part numbers 2007222-021, -041, -061, -081 and -121 shall be designated as Type I, and so identified in this specification.

b. Type II. The test requirements for part numbers 2007222-131, -141, -171, -211 and -221 shall be designated as Type II and so identified in this specification.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
ND1002290	Process Specification for Helium Leak Test

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Components Parts

DRAWINGS

APOLLO G&N

2007222	Coupling Data Unit

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

TABLE XI

PART NO.	WEIGHT (lbs)
2007222-021	42.5
2007222-041	42.5
2007222-061	37.5
2007222-081	37.5
2007222-121	38.13
2007222-131	38.13
2007222-141	42.5
2007222-171	38.13
2007222-211	42.5
2007222-221	38.13

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

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5/27/67	T	33859	7, 22	MGM EA	--
8/10/67	U	34316	26	EA	--
8/18/67	V	34362	6	MGM EA	--
9/7/67	W	34534	2, 30	WS EA	--
10/12/67	Y	34844	2, 30	EA	--

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APPROVALS	A. C. Metzger NASA/MSC	John E. Miller 12/7/65 G. Cushman 12/7/65 W. Kupfer 12/7/65 MIT/IL	M. W. Smith R. Mura AC

1. SCOPE

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a. The contract
b. This specification
c. Documents listed in this section

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PROCUREMENT SPECIFICATION

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APPROVALS	C. METZGER NASA/MSC	John E. Miller 12/7/65 R. Gershman 12/7/65 W. Kupfer MIT/IL 12/7/65	M. W. Smith | R Mura ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Coupling Data Unit, Part Number 2007222-021, hereafter called the CDU.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

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b. This specification
c. Documents listed in this section

3. REQUIREMENTS

3.1 PERFORMANCE. The following performance characteristics are applicable to each of 5 CDU channels (3 IMU Axes and 2 RR Axes) unless otherwise specified herein. The Fine Align mode of operation is implied unless otherwise specified.

3.1.1 Basic Null. The $\Delta\theta G$ pulses and error T.P. voltages shall be generated as specified in Table III when the 1X and 16X resolvers are adjusted to the angles specified. resolver is set to 0 degrees. The fine error null voltage shall be [illegible] at 16X resolver input angle of [illegible] degrees.

3.1.2 Coarse Align Read Counter Lock (IMU). The read counter shall become locked to the last resolver angle being received ±1 bit by the application of a CA Enable and shall not count any new resolver angles being received. The read counter shall resume counting the new resolver angles when the CA Enable is removed.

3.1.3 Coarse Align Relay Drive (IMU). The CA relay drive voltage shall be 28±1 vdc when the CDU is in the Fine Align mode. The drive voltage shall be 1.5 vdc maximum when a CA Enable signal is applied.

3.1.4 Coarse Align Rate (IMU). The P_I pulse characteristics shall be as specified in Table I, Type IV and Figure 1 when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180 degrees to cause read loop oscillation. When the CA Enable and EC Enable modes are applied the P_I pulse characteristics shall be as specified in Table I, Type III.

3.1.5 DID Read Counter Lock (RR). The read counter shall become locked to the last resolver angle received by the application of a DID signal followed by a CDU Z signal. Further changes in resolver angles shall have no effect until the CDU Z signal is removed, then the read counter shall resume counting and contain the last resolver angle received.

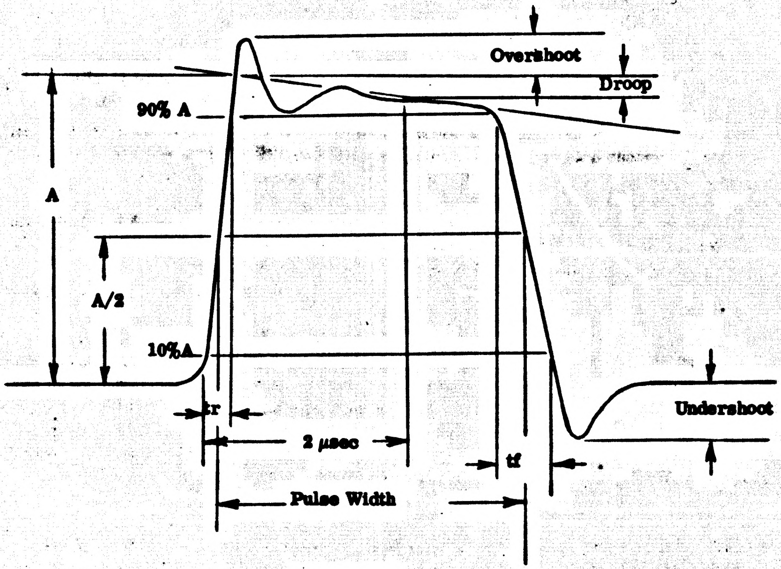
3.1.6 Fine Bit Size. The in-phase component of the Fine [illegible] Error signal appearing at the Fine Error TP shall be 16±2 mv rms, π phase when the 16X resolver input angle is increased 0.088 degrees from the fine read system null condition.

3.1.7 Coarse Bit Size. The in-phase component of the Coarse [illegible] Error signal appearing at the Coarse Error TP shall be 60±7 mv rms, π phase when the 1X resolver input angle is increased 2.8 degrees from the coarse read system null condition.

3.1.8 Schmitt Trigger Threshold Levels

3.1.8.1 Fine Ternary. The Fine Ternary Schmitt Trigger shall have an 800 pps output when the 16X resolver is set to 0.131±0.020 degrees and the fine error output shall be 23.33±3.33 mv rms, π phase.

3.1.8.2 High Ternary. The High Ternary Schmitt Trigger shall have an 800 pps output when the 16X resolver is set to 2.20±0.44 degrees and the fine error output shall be 0.40±0.10V rms, π phase.


Overshoot
Droop
90% A
A
A/2
10%A
tr
2 μsec
Pulse Width
tf
Undershoot

WAVEFORM

FIGURE 1

TABLE I

PULSE TRAIN CHARACTERISTICS

PARAMETER	TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V
PRF	51.2K pps	3.2K pps	6.4K pps	12.8K pps	51.2K pps
Amplitude (A)	4.5±0.5V p	4.5±0.5V p	3.5±1V p	3.5±1V p	7±3V p
Width (at 1/2 A)	3.0±0.5 μsec	3.0±0.5 μsec	3±1 μsec	3±1 μsec	3±1 μsec
Droop at 2 μsec	<20% A	<20% A	<20% A	<20% A	<20% A
Overshoot	<20% A	<20% A	<20% A	<20% A	<20% A
Undershoot	<20% A	<20% A	<20% A	<20% A	<20% A
Risetime (tr)	≤0.2 μsec	≤0.2 μsec	≤1.0 μsec	≤0.2 μsec	≤0.2 μsec
Falltime (tf)	≤1.0 μsec	≤1.0 μsec	≤1.0 μsec	≤1.0 μsec	≤1.0 μsec

3.1.8.3 Coarse Ternary. The Coarse Ternary Schmitt Trigger shall have an 800 pps output when the 1X resolver is set to 8.40±1.40 degrees and the coarse error output shall be 196.0±32.6 mv.rms, π phase.

3.1.8.4 Ambiguity Detect. The Ambiguity Detect Schmitt shall have an 800 pps output when the 1X resolver angle lies between 120±5 degrees and 240±5 degrees.

3.1.9 Speed. The digitizing loop shall settle to a null and the read counter shall contain an angular change of 112.5 degrees within 4.0 seconds maximum when a step change of 112.5 degrees in 1X resolver input angle is applied.

3.1.10 Computer $\pm\Delta\theta_G$ Pulse. The $\pm\Delta\theta_G$ pulse shall have the characteristics specified in Table I, Type III when the 1X resolver is set to 0 degrees and the 16X resolver is set to 180 degrees to cause read system oscillation. The CDU Z LAG pulse shall have the characteristics specified in Table I, Type V when the CDU Z signal is also applied.

3.1.11 CDU Fail Detection. The CDU failure circuit shall indicate a failure or no failure as specified when any of the following conditions exist for a period greater than 7 seconds.

a. Fine Error Fail shall not occur when the 16X resolver angle is 8.0 degrees, the 1X resolver angle is 0 degrees and the system is in the CDU Z mode. A Fine Error Fail shall occur when the 16X resolver angle is changed to 12.0 degrees.

b. Coarse Error Fail shall not occur when the 1X resolver angle is 20 degrees, the 16X resolver angle is 0 degrees and the system is in the CDU Z mode. A Coarse Error Fail shall occur when the 1X resolver angle is increased to 33 degrees, and the 16X R.S. is increased to 180 degrees.

c. Cos $(\theta - \psi)$ Fail shall not occur when the 16X resolver excitation is reduced to 25 V rms while the 1X and 16X resolver angles are at 0 degrees. A Cos $(\theta - \psi)$ Fail shall occur when the 16X resolver excitation is reduced to 15V rms.

d. Limit Cycle Fail shall not occur when the digitizing loop is in a limit cycle condition at a rate of 100±1 cps. Limit Cycle Fail shall occur when the limit cycle rate is 200±2 cps.

e. 14 VDC Fail shall not occur when the 14 vdc IMU or RR supply voltage is equal to 10±0.1 vdc. A 14 vdc Fail shall occur when the 14 vdc IMU or RR supply voltage is 8±0.1 vdc.

3.1.12 D/A Converter. The DAC output shall be as specified in Table II when the error counter is counted up or down.

TABLE II

DAC OUTPUT

EC&L Counter Condition	Pulses Applied	$\pm$DC Output DC Volts	AC Output 0 or π vrms
Null	0	0.0000±5mv	0.0000 ±5 mv
2^0	1	0.0132 ±5%	0.0132 ±8%
2^1	2	0.0264 ±5%	0.0264 ±8%
2^2	4	0.0528 ±5%	0.0528 ±5%
2^3	8	0.1056 ±3%	0.1056
2^4	16	0.2112	0.2112
2^5	32	0.4224	0.4224
2^6	64	0.8448	0.8448
2^7	128	1.6896 ±3%	1.6896 ±5%
$2^5.2^7$	160	2.1100 ±1%	2.1100 ±3%, ±5°
2^8	256	3.3792 ±3%	3.3792 ±5%
$2^7.2^8$	384	5.050	5.050
$2^7.2^8$	385	5.050	5.050
$2^0.2^1.2^2.2^3.2^4.2^5.2^6.2^8$	-1*	5.036 ±3%	5.036 ±5%

* Apply one pulse in the opposite direction to obtain this condition. The null voltage of the DC output shall be added to (if minus) or subtracted (if plus) from the DC output.

3.1.13 A/D to D/A Feedback Loop

3.1.13.1 IMU Axes. The CA Error output shall be as follows when the CDU is in the Coarse Align Mode (CA Enable and EC Enable applied) and the 16X resolver is adjusted to the following read counter angles:

a. The D/A AC Error output shall be 13.15 ±1.15 mv rms π phase when the read counter angle is 0.703 degrees.

b. The D/A AC Error output shall be 26.5 ±2.5 mv rms π phase when the read counter angle is 1.4 degrees. With CA Enable removed, the D/A AC error shall be 10 mv rms maximum.

c. The D/A AC Error output shall be 26.5 ±2.5 mv rms 0 phase when the read counter angle is 358.6 degrees.

3.1.13.2 RR Axes. The DAC AC Error output shall be 10mv rms max 0 or π phase when a D/A Enable is applied and the 16X resolver is adjusted to produce read counter angles of 0.703 and 90 degrees.

3.1.14 Coarse Align Amplifier (IMU)

3.1.14.1 Fine Error Gain. The CA Error output shall be 48±5 mv rms 0 phase when the 16X resolver is adjusted 1.76 degrees from the fine error null while in the CA mode and with the 1X resolver at 0 degrees.

3.1.14.2 DAC Gain. The DAC AC output and CA error output shall be as follows when the following inputs are applied.

a. The DAC AC output shall be 132.0±13.2 mv rms 0 phase and the CA Error output shall be 36±8 mv rms π phase when 10 $+\Delta\theta_C$ pulses and an EC Enable are applied. The CA error output shall be 10 mv rms max when the EC Enable is removed.

b. The DAC AC output shall be 132.0±13.2 mv rms π phase and the CA Error output shall be 36±8 mv rms 0 phase when 10 $-\Delta\theta_C$ pulses and an EC Enable are applied. The CA Error output shall be 10 mv rms max when the EC Enable is removed.

c. The CA Error output shall be 165±45 mv rms π phase when 256 $+\Delta\theta_C$ pulses and an EC Enable are applied.

d. The CA Error output shall be 165±45 mv rms 0 phase when 256 $-\Delta\theta_C$ pulses and an EC Enable are applied.

3.1.14.3 Coarse Error Gain. The CA Error signal shall be 1.30±0.25V rms 0 phase when the 16X resolver is adjusted to produce a fine error null and the 1X resolver is adjusted to produce a coarse error of 150 mv rms π phase.

3.1.15 Ambiguity

3.1.15.1 Override. The read counter shall contain an angle of 225 degrees ±1 bit when the 1X resolver is set to an ambiguity condition ($1X = 225°$, $16X = 0°$).

3.1.15.2 Turn-on (IMU). The CA Error signal shall be 11±3V rms 0 phase and the coarse error signal shall be 1.660±0.083V rms π phase when the resolvers are set to an ambiguity condition ($1X = 225°$, $16X = 0°$) in the Turn-on mode. The CA Error signal shall be 3.3±0.3V rms π phase when the 1X resolver is increased to 245 degrees.

3.1.16 Cage Voltage (IMU). The cage voltage shall be 10 mv rms max for a 1X resolver angle of 0 degrees, 0.45±0.02V rms for a 1X resolver angle of 1.0 degree, and 26±1V rms for a 1X resolver angle of 90 degrees.

3.1.17 Cage Override (IMU). The DAC AC Error output shall be 198 ±12 mv rms and the CA relay drive voltage shall be 28 ±3 vdc when an Error Counter Enable and 15 $+\Delta\theta_C$ pulses are applied. The CA relay drive voltage shall be 1.5 vdc max and the DAC AC Error output shall be 10 mv rms max when a Cage Override is applied in addition to the Error Counter Enable and 15 $+\Delta\theta_C$ pulses.

3.1.18 Switch and System Error. The system digitizing error shall be within +0.075 and -0.035 degrees for the 16X resolver system and ±0.5 degrees max for the 1X resolver system.

3.1.19 General Null. The $\Delta\theta_C$ pulses and error T.P. voltages shall be generated as specified in Table III when the 1X and 16X resolvers are adjusted to the angles specified.

3.1.20 Coarse and Fine Amplitude and Phase Variation. The CDU Read Loop shall not oscillate in the CDU Z mode under the conditions specified in Table IV.

3.1.21 Thermal Stability. The assembly shall operate as specified in 3.1.1, 3.1.8.1, 3.1.10, 3.1.12, and 3.1.20 at an ambient temperature of 50° ±3°F and 110° ±3°F when mounted on a cold plate having a coolant inlet temperature of 75° ±5°F and a flow rate of 33 ±5 lb/hr.

TABLE III

GENERAL NULL

INPUT RESOLVER (Degrees)		OUTPUT ERROR VOLTAGE		PULSE TOTAL $[(+\Delta\theta_C) - (-\Delta\theta_C)]$
1X	16X	Fine Max	Coarse Max	
0	0	75MV P-P	0.650V P-P	0
81.5	135	↑	↑	7,424
2.8	45			256
168.7	180			15,360
5.6	90			512
239	225			21,760
19.7	315			1,792
321.8	270	↓	↓	30,208
0	0	75MV P-P	0.650V P-P	0

TABLE IV

OSCILLATION OF CDU READ LOOP

CONDITIONS					
Carrier ϕ (°)		Resolver (°)		Resolver Excit (V rms)	
1X	16X	1X	16X	1X	16X
COARSE SYSTEM					
0	0	45	0	30	28
-15	↑	45	0	32	↑
+15		45	0	28	
0		47.8	45	23	
-15	↓	47.8	45	23	↓
+15	0	47.8	45	23	28
FINE SYSTEM					
0	+20	0	0	26	32
0	+20	0	0	26	24
0	-20	0	0	26	32
0	-20	0	0	26	24

3.2 PRODUCT CONFIGURATION

3.2.1 **Drawings.** The configuration of the assembly shall be in accordance with Drawing 2007222-021 and all drawings and engineering data referenced thereon.

3.2.2 Standards of Manufacturing, Manufacturing Process and Production

3.2.2.1 **Continuity and DC Resistance.** The resistance between the pins specified in Table V shall be as specified therein.

TABLE V

CONTINUITY AND DC RESISTANCE

SIGNAL		PINS		RESISTANCE (Ohms)	
		Hi	Lo	Min	Max
ISS	+28VDC-0VDC	136	236	500	
	+28VDC-Chassis	136	639	100K	
	0VDC-Chassis	236	639	100K	
	+ 4VDC-0VDC	422	119	5K	
	+ 4VDC-Chassis	422	639	100K	
	Forward Velocity	237	337		0.5
	Lateral Velocity	437	537		0.5
OSS	+28VDC-0VDC	336	436	500	
	+28VDC-Chassis	336	639	100K	

4.2.1.3 Previbration Tests. Previbration testing shall include 3.2.1 and 3.2.2.1.

4.2.1.4 Final Electrical Tests. All the tests specified in 4.1 except 3.1.21 and 3.21 shall be performed as final electrical tests.

4.2.1.5 Inputs. Unless otherwise specified, the assembly shall be tested using the following inputs.

a. 28 ±1 vdc, 3 amps maximum, 33.0 ±0.1 vdc enhanced, 22.0 ±0.1 vdc degraded. (See 4.2.1.5.1).

b. 50 ±3 vdc.

c. 28.00 ±0.28V rms, 800.0 ±1.0 cps System Reference synchronized to 51.2 Kpps.

d. Simulated resolver systems consisting of the following:

   (1) 1X Resolver, 26 ±.26V rms output, 0 ±2° phase
   (2) 16X Resolver, 5 ±.05V rms output, 0 ±2° phase

e. Clock pulses as specified in Table I, Type I.

f. $\pm\Delta\theta_C$ pulses as specified in Table I, Type II, gates in non-repetitive pulse bursts of 1, 2, 4, 8, 16, 23, 32, 64, 128, 256, 383, 384, 385, and 768 pulses per burst.

g. All mode inputs shall be OVDC thru 2K (ON) and thru 1 Meg (OFF).

4.2.1.5.1 DC Stability. Each of the following tests shall be run with the +28 vdc supply voltage adjusted to 22.0 ±0.1 vdc and then repeated with the voltage adjusted to 33.0 ±0.1 vdc. All other tests shall be run with a 28 ±3 vdc supply voltage, except 4.3.2.1 which shall be run at 22.0 ± 0.1 vdc.

4.3.4, 4.3.6, 4.3.9, 4.3.10, 4.3.11, 4.3.14.1, 4.3.15, 4.3.17, 4.3.21 (as specified therein), 4.3.22, 4.3.23 (as specified therein), 4.3.24.

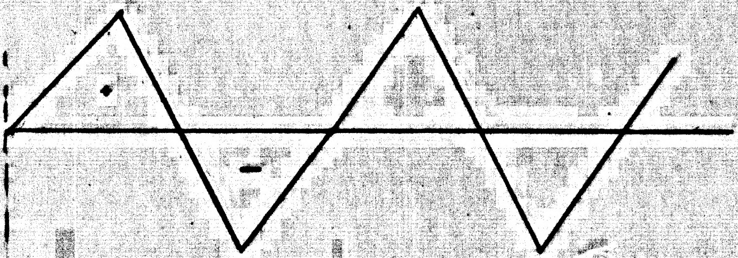
4.2.2 Pressure Fill and Leak. The assembly shall be filled with dry nitrogen and helium as specified in ND 1002290. It shall then be placed in a vacuum fixture and the fixture exhausted per the ND. The maximum leak rate shall be as specified in the ND.

4.2.3 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

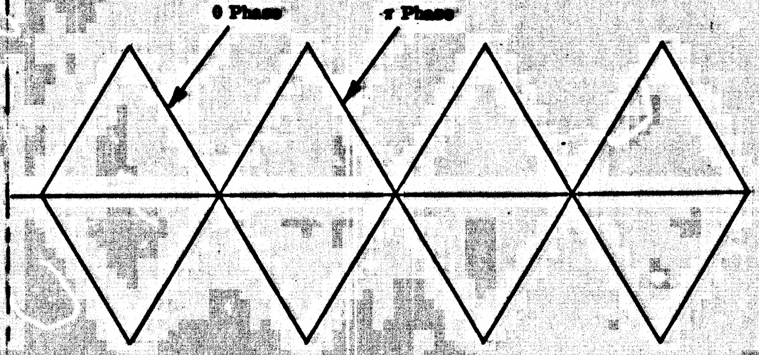
TABLE VI

SIGNAL AND LOAD CONNECTION LIST

	SIGNAL	IG	MG	OG	SHAFT	TRUN	OTHER	LOAD (Ohms)
RESOLVER								
SIN - 16X	Hi	140	142	144	146	148		
	Lo	240	242	244	246	248		
	Shld	340	342	344	346	348		
COS - 16X	Hi	440	442	444	446	448		
	Lo	540	542	544	546	548		
	Shld	640	642	644	646	648		
SIN - 1X	Hi	141	143	145	147	149		
	Lo	241	243	245	247	249		
	Shld	341	343	345	347	349		
COS - 1X	Hi	441	443	445	447	449		
	Lo	541	543	545	547	549		
	Shld	641	643	645	647	649		
POWER SERVO ASSEMBLY								
IMU	Cage	129	429	130				
	OV	229	529	230				
	(F) Shld	329	629	330				
Coarse Align Signal	Hi	430	131	431				30K±10%
	Lo	530	231	531				
	(F) Shld	630	331	631				
D/A AC Signal	Hi	132	432	133	433	134		20K±10%
	Lo	232	532	233	533	234		
	(F) Shld	332	632	333	633	334		
D/A DC Signal	Hi				237	437		20K±10%
	Lo				337	537		
	(F) Shld				137	637		
OSS 28 V rms 1% 800 cps	Hi						228	
	Lo						328	
	Shld						128	
ISS 28 V rms 1% 800 cps	Hi						428	
	Lo						528	
	Shld						628	



DC OUTPUT


θ Phase
π Phase

AC OUTPUT

DSG OUTPUTS

FIGURE 2.

4.3.8 DID READ COUNTER LOCK (RR). With the 1X and 16X resolvers set to 0 degrees and CDUZ momentarily applied, the read counter shall contain an angle of 0 degrees. With the 16X resolver advanced to 11.25 degrees, the read counter shall contain an angle of 11.25 degrees ±1 bit. With DID applied, followed with a CDUZ, and the 16X resolver set to 90 degrees, the read counter shall remain at 11.25 degrees ±1 bit. With CDUZ removed, the read counter shall contain an angle of 90 degrees ±1 bit.

4.3.9 Fine Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 16X resolver adjusted to obtain a Fine Error null, then advanced 0.088 degrees, the Fine Error TP voltage shall be 16±2 mv rms π phase.

4.3.10 Coarse Bit Size. With the 1X and 16X resolvers set to 0 degrees, CDUZ applied, the 1X resolver adjusted to obtain a Coarse Error null, then advanced 2.8 degrees, the Coarse Error TP voltage shall be 60±7 mv rms, π phase.

4.3.11 Schmitt Trigger Threshold Levels

4.3.11.1 Fine Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until a stable 800 pps pulse train appears at the Fine Ternary Schmitt TP, the Fine Error TP voltage shall be 23.33±3.33 mv rms π phase and the net increase in the 16X resolver angle shall be 0.131±0.020 degrees.

4.3.11.2 High Ternary. With CDUZ applied and the 16X resolver angle increased from a Fine Error null until an 800 pps pulse train appears at the High Ternary Schmitt TP, the Fine Error TP voltage shall be 0.40±0.10V rms π phase and the net increase in the 16X resolver angle shall be 2.200±0.440 degrees.

4.3.11.3 Coarse Ternary. With CDUZ applied and the 1X resolver angle increased from a Coarse Error null until an 800 pps pulse train appears at the Coarse Ternary Schmitt TP, the Coarse Error TP voltage shall be 196.0±32.6 mv rms π phase and the coarse error angle shall be 8.4±1.4 degrees.

4.3.11.4 Ambiguity Detect. With CDUZ applied, the 16X resolver set to 0 degrees and the 1X resolver increased from 115 degrees until an 800 pps pulse train appears at the Ambiguity Detect TP, the 1X resolver angle shall be 120±5 degrees. The pulse train shall continue to exist until the 1X resolver angle is increased to 240±5 degrees.

4.3.12 Speed. With the 16X resolver set to 0 degrees, the 1X resolver set to 112.5 degrees and CDUZ applied, the Coarse Schmitt (C1) pulses shall disappear within 4 seconds after CDUZ is removed and the read counter shall contain an angle of 112.5 degrees ±1 bit.

4.3.13 Computer $\pm\Delta\theta_G$ Pulses. With the 1X resolver set to 0 degrees and the 16X resolver set to 180 degrees, the $\pm\Delta\theta_G$ and $\pm\Delta\theta_G$ LAG signals shall have the characteristics specified in Table I, Type III. With CDUZ added, the CDUZ LAG pulse shall have the characteristics specified in Table I, Type V.

4.3.14 CDU Fail Detection. Unused 16X resolver inputs shall be excited by connecting a 5V rms 0 phase voltage to the unused cos 16X inputs.

4.3.14.1 Fine Error Fail. With the 1X resolver set to 0 degrees, CDUZ applied and the 16X resolver set to 8.000 degrees, no fail signal shall be generated after 7 seconds. With the 16X resolver increased to 12.000 degrees, a fail signal shall be generated within 3 to 7 seconds. With CDUZ removed, the fail signal shall cease within 1 second.

4.3.14.2 Coarse Error Fail. With the 16X resolver set to 0 degrees, the 1X resolver set to 20 degrees and CDUZ applied, no failure signal shall be generated. With the 1X resolver increased to 33 degrees and 16X R.S. set to 180 degrees a fail signal shall be generated within 3 to 7 seconds.

4.3.14.3 14 VDC Fail. With the 1X and 16X resolvers set to 0 degrees and the 14 vdc TP voltage adjusted to 10.0 ±0.1 vdc, a no fail signal shall be generated. With the 14 vdc TP voltage adjusted to 8.0 ±0.1 vdc, a fail signal shall be generated within 3 to 7 seconds.

4.3.14.4 Cos $(\phi - \psi)$ Fail. With the 1X and 16X resolvers set to 0 degrees and the excitation to the 16X resolver adjusted to 25V rms, no fail signal shall be generated. With the excitation reduced to 14V rms, a fail signal shall be generated within 3 to 7 seconds.

4.3.14.5 Limit Cycle Fail. With the 1X resolver set to 0 degrees, the 16X resolver set to 355.00 degrees CDUZ applied and a 100 ±1 cps limit cycle input signal applied as shown in figure 5 or equivalent, no failure signal shall be generated. With the limit cycle increased to 200 ±2 cps, a fail signal shall be generated within 3 to 7 seconds.

4.3.15 D/A Converter. With an EC Enable (for IMU) or a D/A Enable (for RR) applied and the read counter counted up and down in accordance with Table II, the ac and dc DAC outputs shall be as specified therein except that a dc output shall not be present for IMU axes and that a dc output shall not be present for RR axes until DID is applied.

4.3.16 A/D to D/A Feedback Loop.

4.3.16.1 IMU Axes. With the 1X and 16X resolvers set to 0 degrees, CDUZ momentarily applied, CA Enable and Error Counter Enable applied and the 16X resolver adjusted to produce a read counter reading of 8 bits, the D/A AC Error voltage shall be 0.013 ±0.002V rms π phase. With the 16X resolver adjusted to produce a read counter reading of 16 bits, the D/A AC Error voltage shall be 0.026 ±0.004V rms π phase. With the 16X resolver adjusted near 358.5 degrees to produce a read counter reading o -16 bits, the D/A AC Error voltage shall be 0.026 ±0.004V rms, 0 phase. Repeat tests without CA Enable applied. The D/A AC Error shall be $<$ 10 mv rms.

4.3.16.2 RR Axes. With the 16X resolver set to 0 degrees and a D/A Enable applied, the D/A AC Error output shall be < 10 mv rms. With the 16X resolver adjusted to produce a read counter reading ot 8 bits, the D/A AC Error output shall be < 10 mv rms. With the 16X resolver set to 90 degrees, the D/A AC Error output shall be < 10 mv rms.

4.3.17 Coarse Align Amplifier (IMU)

4.3.17.1 Fine Error Gain. With the 1X resolver set to 0 degrees and the CA mode applied, the 16X resolver shall be adjusted to produce a minimum null at the Fine Error TP. With the 16X resolver angle increased 1.760 degrees from the 16X null angle, the CA Error output voltage shall be 48 ±5 mv rms, 0 phase.

4.3.17.2 DAC Gain.

a. With the 1X resolver set to 0 degrees, and the CDUZ mode applied, the 16X resolver shall be adjusted to produce a Fine Error TP null. With the CDUZ mode removed, the D/A AC Error output shall be < 10 mv rms.

b. With an Error Counter Enable and 10 $+\Delta\theta_C$ pulses applied, the D/A AC Error output shall be 132.0 ±13.2 mv rms 0 phase. The CA Error output shall be 36 ±8 mv rms π phase. With the Error Counter Enable removed, the CA Error output shall be < 10 mv rms.

c. Repeat b. using 10 $-\Delta\theta_C$ pulses. D/A AC Error and CA Error phases shall change by 180 degrees.

4.3.17.3 DAC Saturation. With an Error Counter Enable and 256 $+\Delta\theta_C$ pulses applied, the CA Error output shall be 165 ±45 mv rms, π phase. With 256 $-\Delta\theta_C$ pulses, applied, the CA Error output shall be 165 ±45 mv rms, 0 phase.

4.3.17.4 Coarse Error Gain. With the 1X resolver set to 0 degrees, the 16X resolver set to obtain a Fine Error null with the read counter at zero, and the CDUZ mode applied and then removed, the CA Error output shall be less than 5 mv rms. With the CDUZ mode applied and the 1X resolver adjusted for a Coarse Error TP voltage of 150 mv rms, π phase, the CA Error TP voltage shall be 1.30 ±0.25V rms, 0 phase.

4.3.18 Ambiguity

4.3.18.1 Override. With the 1X resolver set to 225 degrees, the 16X resolver set to 0 degrees and CDUZ applied, the Fine Error TP null voltage shall be less than 16.66 mv rms and the Coarse Error TP null voltage shall be less than 100 mv rms. With CDUZ subsequently removed, the read counter shall read 225 degrees ±1 bit.

4.3.18.2 Turn-On (IMU). With the 16X resolver set to 0 degrees, the 1X resolver set to 225 degrees, and CDUZ and CA Enable applied, the Coarse Error TP voltage shall be ≥ 1.58 and ≥ 1.75V rms π phase and the CA Error TP voltage shall be 11 ±3V rms 0 phase. With the 1X resolver increased to 245 degrees, the CA Error TP voltage shall be 3.3 ±0.3V rms, π phase.

4.3.19 Cage Voltage (IMU). With the 16X resolver set to 0 degrees and the 1X resolver set to 0 degrees, the IMU Cage voltage shall be less than 10 mv rms. With the 1X resolver adjusted to 1 degree, the IMU Cage voltage shall be 0.45 ±0.02V rms. With the 1X resolver set to 90 degrees, the IMU Cage voltage shall be 26 ±1V rms.

4.3.20 Cage Override (IMU). With a 300 ohm 10W resistor connected between I88 +28 vdc and CA Relay Drive, the CA Relay Drive voltage shall be 28 ±3 vdc. With a "CDU Common to PSA" applied to Cage Override, the CA Relay Drive voltage shall be <1 vdc. With the 300 ohm resistor removed, an Error Counter Enable applied and 15 $+\Delta\theta_C$ pulses applied, the D.A AC Signal shall be 198 ±12 mv rms. With a Cage Override applied, the D/A AC Signal shall be less than 10 mv rms.

4.3.21 Switch and System Error

a. With the 1X and 16X resolvers adjusted to obtain the read counter bits specified in Table 1X, the read counter locked by applying a CA Enable (IMU Axis) or a DID followed by CDUZ (RR Axis), and the 16X resolver readjusted to obtain a Fine Error TP null, the angular difference between the 16X resolver angle specified in Table IX and the final 16X resolver angle shall be calculated to be between +0.075 and -0.035 degrees. The read counter shall be unlocked by removing the CA Enable (IMU Axis) or CDUZ (RR Axis).

b. The requirements specified in a. shall be met for each fine system angle specified in Table IX.

c. With the 1X and 16X resolvers adjusted to obtain the read counter bits of the coarse system specified in Table 1X, then readjusted to obtain a null at the Coarse Error TP, the angular difference between the final 1X resolver setting and the 1X resolver angle specified in Table 1X shall be calculated to be less than 0.5 degrees.

d. The test requirements specified in c. shall be met for each coarse system angle specified in Table 1X.

4.3.22 General Null. With the 1X and 16X resolvers sequentially adjusted to the angles specified in Table III, the $\Delta\theta_C$ pulses shall be generated as specified ±1 bit, and the Coarse and Fine Error TP voltages shall be as specified.

4.2.23 Coarse and Fine Amplitude and Phase Variation. With the 1X and 16X resolver input angle, excitation and phase shift adjusted as specified in Table IV, the CDU Read Loop shall not oscillate. Oscillation in the coarse system shall be tested by adjusting the 1X resolver angle plus and minus 0.1 degree from the angle specified in Table IV. Oscillation in the fine system shall be tested by adjusting the 16X resolver angle from 0 degree to 90 degrees then back to 0 degree. The coars e system shall be tested first at a 22.0 ±0.1 vdc supply voltage, then retested at a 33.0 ±0.1 vdc supply voltage. The fine system shall be tested at a 28 ±3 vdc supply voltage.

TABLE IX

SYSTEM ERROR

1X RS COARSE CTR ANGLE	16X RS FINE CTR ANGLE	READ COUNTER BITS 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FINE SYSTEM																	
0.0°	0 *																
↑	0.088	1															
	0.176		1														
	0.352			1													
	0.703				1												
	1.406					1											
	2.813						1										
	5.625							1									
	11.162	1	1	1	1	1	1	1									
	11.250								1								
	16.875							1	1								
	22.412	1	1	1	1	1	1	1	1								
	22.500									1							
	28.125							1		1							
	33.662	1	1	1	1	1	1	1		1							
	33.750								1	1							
↓	39.375							1	1	1							
0.0°	44.912	1	1	1	1	1	1	1	1	1							
2.8°	45.000*										1						
↑	50.625							1			1						
	56.162	1	1	1	1	1	1	1			1						
	56.250								1		1						
	61.875							1	1		1						
	67.412	1	1	1	1	1	1	1	1		1						
	67.500									1	1						
	73.125							1		1	1						
	78.662	1	1	1	1	1	1	1		1	1						
	78.750								1	1	1						
↓	84.375							1	1	1	1						
2.8°	89.912	1	1	1	1	1	1	1	1	1	1						
5.6°	90.00 *											1					
↑	95.625							1				1					
	101.162	1	1	1	1	1	1	1				1					
	101.250								1			1					
	106.875							1	1			1					
	112.412	1	1	1	1	1	1	1	1			1					
	112.500									1		1					
	118.125							1		1		1					
	123.662	1	1	1	1	1	1	1		1		1					
	123.750								1	1		1					
	129.375							1	1	1		1					
	134.912*	1	1	1	1	1	1	1	1	1		1					
↓	135.000										1	1					
5.6°	140.625							1			1	1					

TABLE IX (Continued)

1X RS COARSE CTR ANGLE	16X RS FINE CTR ANGLE	READ COUNTER BITS 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FINE SYSTEM																	
5.6°	146.162	1	1	1	1	1	1	1			1	1					
	146.250								1		1	1					
	151.875							1	1		1	1					
	157.412	1	1	1	1	1	1	1	1		1	1					
	157.500									1	1	1					
	163.125							1		1	1	1					
	168.662	1	1	1	1	1	1	1		1	1	1					
	168.750								1	1	1	1					
	174.375							1	1	1	1	1					
5.6°	179.912	1	1	1	1	1	1	1	1	1	1	1					
11.2	180.000*												1				
	185.625							1					1				
	191.162	1	1	1	1	1	1	1					1				
	191.250								1				1				
	196.875							1	1				1				
	202.412	1	1	1	1	1	1	1	1				1				
	202.500									1			1				
	208.125							1		1			1				
	213.662	1	1	1	1	1	1	1		1			1				
	213.750								1	1			1				
	219.375							1	1	1			1				
	224.912	1	1	1	1	1	1	1	1	1			1				
	225.000										1		1				
	230.625							1			1		1				
	236.162	1	1	1	1	1	1	1			1		1				
	236.250								1		1		1				
	241.875							1	1		1		1				
	247.412	1	1	1	1	1	1	1	1		1		1				
	247.500*									1	1		1				
	253.125							1		1	1		1				
	258.662	1	1	1	1	1	1	1		1	1		1				
	258.750								1	1	1		1				
	264.375							1	1	1	1		1				
11.2	269.912	1	1	1	1	1	1	1	1	1	1		1				
16.8	270.000											1	1				
	275.625							1				1	1				
	281.162	1	1	1	1	1	1	1				1	1				
	281.250								1			1	1				
	286.875							1	1			1	1				
	292.412	1	1	1	1	1	1	1	1			1	1				
	292.500									1		1	1				
	298.125							1		1		1	1				
16.8	303.662	1	1	1	1	1	1	1		1		1	1				

TABLE IX (Continued)

1X RS COARSE CTR ANGLE	16X RS FINE CTR ANGLE	READ COUNTER BITS 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FINE SYSTEM																	
16.8	303.750								1	1		1	1				
↑	309.375							1	1	1		1	1				
	314.912	1	1	1	1	1	1	1	1	1		1	1				
	315.000										1	1	1				
	320.625							1			1	1	1				
	326.162	1	1	1	1	1	1	1			1	1	1				
	326.250								1		1	1	1				
	331.875							1	1		1	1	1				
	337.412*	1	1	1	1	1	1	1	1		1	1	1				
	337.500									1	1	1	1				
	343.125							1		1	1	1	1				
	348.662	1	1	1	1	1	1	1		1	1	1	1				
	348.750								1	1	1	1	1				
↓	354.375							1	1	1	1	1	1				
16.8	359.912	1	1	1	1	1	1	1	1	1	1	1	1				
22.5	360.000																
COARSE SYSTEM																	
2.8	67.500									1	1						
5.6	90.000											1					
11.2	180.000												1				
19.6	270.000										1	1	1				
22.5	000.000													1			
45.0	000.000														1		
67.5	000.000													1	1		
90.0	000.000															1	
157.5	000.000 *													1	1	1	
180.0	000.000																1
247.5	000.000 *													1	1		1
270.0	000.000															1	1
337.5	000.000 *													1	1	1	1

*Angles to be tested with the +28 vdc supply voltage adjusted first to 22.0±0.1 vdc and then retested at a supply voltage of 33.0±0.1 vdc.

4.3.24 Thermal Stability. The assembly shall be mounted on a cold plate. The cold plate - CDU interface temperature shall be monitored by four interface sensors mounted as shown in Figure 3. The coldplate temperature shall be adjusted until any one interface sensor reaches 50° ±3°F and maintained there during the cold soak and test period shown in Figure 4. The coldplate temperature shall be adjusted until any one interface sensor reaches 110 ±3°F and maintained there during the hot soak and test period shown in Figure 4.

The four interface sensors and six internal sensors shall be monitored continuously through soaking and testing. The interface temperatures must be within 47 to 113°F and the internal temperatures must be between 41 to 130°F throughout soaking and testing. All the interface sensor temperatures shall be within a 10°F range.

Power shall be applied continuously through soaking and testing.

The CDU assembly shall be covered by an insulating box (lined with 1 inch thick polyurethane foam or equivalent).

4.3.24.1 Electrical Test. The electrical tests shall be performed with the dc supply voltage adjusted to 22.0 ±0.1 vdc when the temperature is 50 ±5°F and 33.0 ±0.1 vdc when the temperature is 110°±5°F. The electrical tests shall consist of the following tests performed during the intervals shown in Figure 4.

a. Basic Null (4.3.4.)
b. Fine Ternary Schmitt Trigger Level (4.3.11.1)
c. D/A Converter (4.3.15). Use Table X instead of Table II. Use D/A DC output for RR.
d. Computer $\pm\Delta\theta_G$ Pulses (4.3.13)
e. Coarse and Fine Amplitude and Phase Variation (4.3.23)

TABLE X

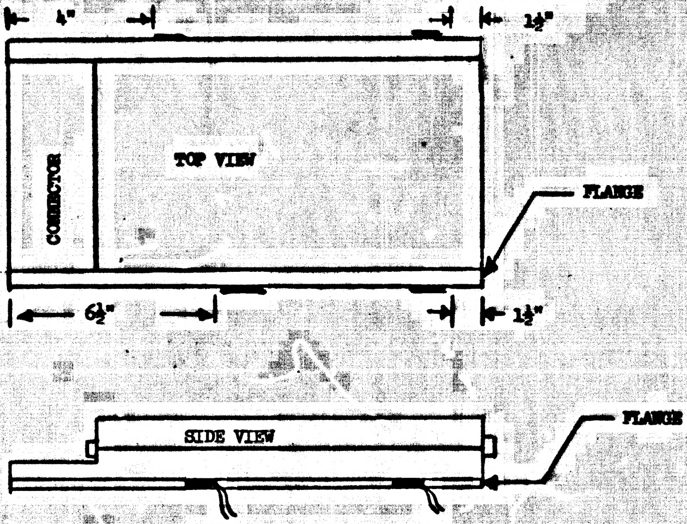
D/A OUTPUT

COUNTER CONDITION	PULSES APPLIED	D/A AC OUTPUT (V rms) (0 or π Phase)	
		Min	Max
Null	0	0	0.0125
2^0	1	0.012	0.0143
$2^7.2^8$	384	4.747	5.353
$2^0.2^1.2^2.2^4$	23	0.279	0.326

5. PREPARATION FOR DELIVERY

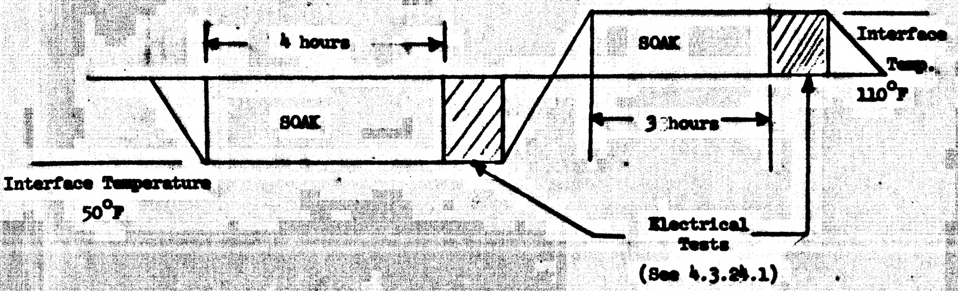
5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.


4"
1½"
CONNECTOR
TOP VIEW
FLANGE
6½"
1½"
SIDE VIEW
FLANGE

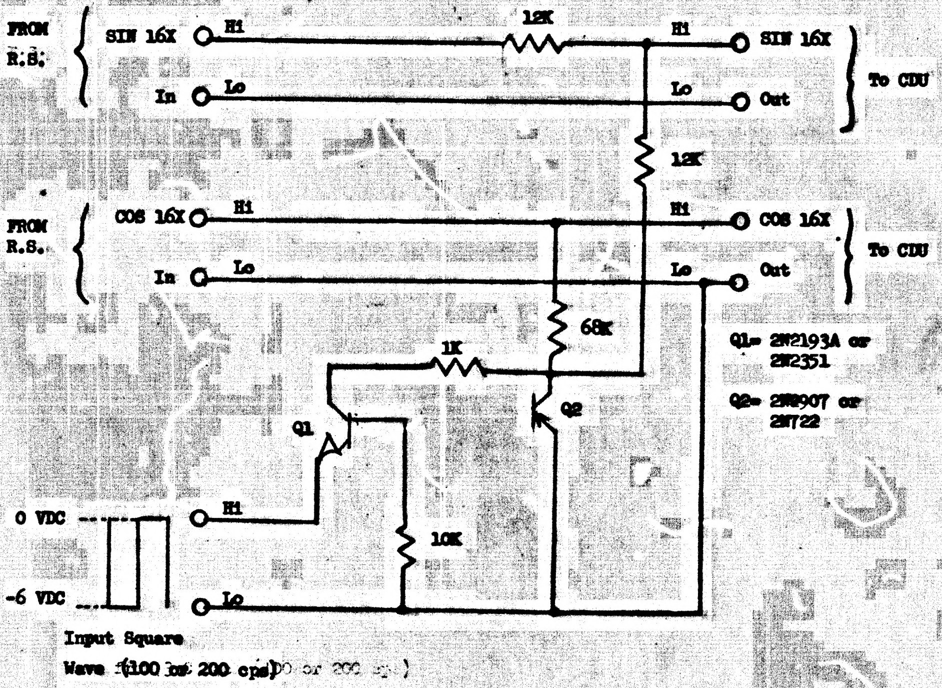
INTERFACE SENSOR LOCATION

FIGURE 3


4 hours
SOAK
Interface
Temp.
110°F
SOAK
3 hours
Interface Temperature
50°F
Electrical
Tests
(See 4.3.24.1)

SOAK AND ELECTRICAL TEST SCHEDULE

FIGURE 4.

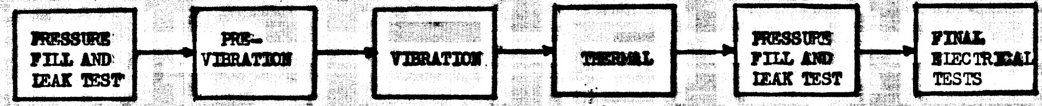

FROM
R.S.
SIN 16X
In
Hi
Lo
12K
Hi
Lo
SIN 16X
Out
To CDU
12K
FROM
R.S.
COS 16X
In
Hi
Lo
Hi
Lo
COS 16X
Out
To CDU
68K
1K
Q1
Q2
10K
0 VDC
-6 VDC
Hi
Lo
Input Square
Wave (100 or 200 cps)

Q1= 2N2193A or
2N2351

Q2= 2N2907 or
2N722

LIMIT CYCLE GENERATOR

FIGURE 5


PRESSURE FILL AND LEAK TEST
PRE-VIBRATION
VIBRATION
THERMAL
PRESSURE FILL AND LEAK TEST
FINAL ELECTRICAL TESTS

TEST FLOWGRAM

Figure 6

APOLLO G&N Specification
PS2016144 REV A
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Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

SIGNAL CONDITIONER ASSEMBLY

DRAWING NO. 1007700

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/23/66	A	26588	3, -11, 13	WK	TM

This specification consists of page 1 to 14 inclusive.

APPROVALS	A. C. METZG NASA/MSC	28 Jan 66 MIT/IL	ACSP

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Continuity. Continuity shall be as specified in Table I.

TABLE I

CONTINUITY

		CONNECTOR 30A1		RESISTANCE (ohms)
From	To	From	To	Max
P2-1	P1-83	J1-73	P1-52	1.0
P2-2	P1-66	J1-97	P1-68	↑
P2-5	P1-100	J1-85	P1-69	
P2-7	P1-119	J1-98	P1-86	
P2-8	P1-120	J1-7	P1-72	
P2-10	J1-19	J1-84	P1-71	↓
P2-11	J1-6	J1-21	P1-71	1.0

3.1.2 Insulation Resistance. The resistance from each connector pin to the assembly frame shall be equal to or greater than 100 megohms, except for connect pin 30A1P2-13 which is ≤1.0 ohm.

3.1.3 Offset Voltage. The offset voltage shall be not greater than ±40 mvdc at the output pins of assembly Sections C, D, E, F, I, and L specified in Table II. The offset voltage shall not be greater than 2.5±0.3 vdc at the output pins of Section K specified in Table II.
3.1.4 Scale Factors. The respective scale factors for the assembly sections shall be as specified in Table II.

3.1.5 Output Ripple. The maximum ripple voltage shall be less than 15 mv at the output pins of assembly sections C, D, E, F, I and L specified in Table II.

3.1.6 Thermistor Control Circuit. The output voltage of the thermistor control circuit, assembly section G, shall be not less than 1.85 vdc nor greater than 2.505 vdc at the output pins specified in Table II.

3.1.7 Input Impedance. The input impedance shall be less than 1 ohm at 800 cps.

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 1007700 and all drawings and engineering data referenced thereon.

3.2.2 Weight. The weight of the assembly shall be measured to the nearest tenth of a pound.

3.2.3 **Calibration Reference Data.** The assembly shall be operated in accordance with Table III. The input or output voltages for the respective input or output voltages specified in Table III shall be recorded where applicable.

TABLE II

SCALE FACTOR INPUT-OUTPUT PINS AND VOLTAGES

Assembly Section	INPUTS				OUTPUTS				Output Scale Factor	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
A.1	J1-65	J1-66	26.0 vdc	30.0 vdc	P1-61	J1-66	4.70	4.72	0.155	0.181
A.2	J1-4	J1-18	26.0 vdc	30.0 vdc	P1-62	J1-18	4.70	4.72	0.155	0.181
A.3	J1-19	J1-6	26.0 vdc	30.0 vdc	P1-59	J1-6	4.70	4.72	0.155	0.181
A.4	J1-20	J1-6	26.0 vdc	30.0 vdc	P1-60	J1-6	4.70	4.72	0.155	0.181
B.1	J1-10	J1-23	26.95 vdc	29.05 vdc	P1-45	J1-23	4.06	4.08	0.139	0.151
B.2	J1-12	J1-23	26.95 vdc	29.05 vdc	P1-44	J1-23	4.06	4.08	0.139	0.151
B.3	J1-11	J1-23	26.95 vdc	29.05 vdc	P1-79	J1-23	4.06	4.08	0.139	0.151
B.4	J1-46	J1-23	26.95 vdc	29.05 vdc	P1-63	J1-23	4.06	4.08	0.139	0.151
B.5	J1-13	J1-23	26.95 vdc	29.05 vdc	P1-46	J1-23	4.06	4.08	0.139	0.151
C.1	J1-106	J1-93	7.7 vdc	8.3 vdc	P1-87	P1-72	2.495	2.505	0.300	0.326
C.2	J1-108	J1-107	7.7 vdc	8.3 vdc	P1-105	P1-72	2.495	2.505	0.300	0.326
C.3	J1-95	J1-94	7.7 vdc	8.3 vdc	P1-127	P1-72	2.495	2.505	0.300	0.326
D.1	J1-96	J1-82	6.75 vac	8.25 vac	P1-88	P1-72	2.495	2.505	0.302	0.372
D.2	J1-70	J1-71	6.75 vac	8.25 vac	P1-107	P1-72	2.495	2.505	0.302	0.372
D.3	J1-72	J1-83	6.75 vac	8.25 vac	P1-128	P1-72	2.495	2.505	0.302	0.372
D.4	J1-105	J1-103	6.75 vac	8.25 vac	P1-39	P1-72	2.495	2.505	0.302	0.372
E.1*[1]	J1-3	J1-2	19.30 vac	20.70 vac	P1-131	P1-72	2.495	2.505	0.121	0.130
E.2	J1-28	J1-40	19.30 vac	20.70 vac	P1-130	P1-72	2.495	2.505	0.121	0.130
E.3	J1-30	J1-31	19.30 vac	20.70 vac	P1-110	P1-72	2.495	2.505	0.121	0.130
E.4	J1-14	J1-1	19.30 vac	20.70 vac	P1-90	P1-72	2.495	2.505	0.121	0.130
E.5	J1-29	J1-15	19.30 vac	20.70 vac	P1-91	P1-72	2.495	2.505	0.121	0.130
E.6	J1-17	J1-16	19.30 vac	20.70 vac	P1-108	P1-72	2.495	2.505	0.121	0.130

Table II (Continued)

Assembly Section	INPUT				OUTPUT				Output Scale Factor	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
F.1	J1-61	J1-51	5.0 vac	5.5 vac	P1-17	P1-72	2.495	2.505	0.454	0.500
F.2	J1-60	J1-51	5.0 vac	5.5 vac	P1-18	P1-72	2.495	2.505	0.454	0.500
F.3	J1-50	J1-51	5.0 vac	5.5 vac	P1-35	P1-72	2.495	2.505	0.454	0.500
G.1*2	J1-48	J1-49	1580Ω	1680Ω	P1-50	P1-71	1.85	2.505	--	--
G.2*2	J1-48	J1-37	1580Ω	1680Ω	P1-15	P1-71	1.85	2.505	--	--
G.3*2	J1-48	J1-47	1580Ω	1680Ω	P1-34	P1-71	1.85	2.505	--	--
G.4*2	J1-48	J1-38	1580Ω	1680Ω	P1-51	P1-71	1.85	2.505	--	--
H*1	J1-42	J1-53	19.8 vdc	20.2 vdc	P1-55	P1-71	11.35	12.65	0.562	0.637
I	J1-35	J1-6	-26 vdc	-30 vdc	P1-89	P1-71	2.495	2.505	0.454	0.500
K.1 *3	J1-33	J1-32	5.0 vac	5.5 vac	P1-83	P1-66	4.995	5.005	0.91	1.0
K.2 *3	J1-43	J1-32	5.0 vac	5.5 vac	P1-101	P1-100	4.995	5.005	0.91	1.0
K.3 *3	J1-44	J1-32	5.0 vac	5.5 vac	P1-119	P1-120	4.995	5.005	0.91	1.0
L.1	J1-90	J1-103	5.0 vac	6.2 vac	P1-58	P1-72	2.495	2.505	0.454	0.500
L.2	J1-104	J1-103	5.0 vac	6.2 vac	P1-40	P1-72	2.495	2.505	0.454	0.500
L.3	J1-92	J1-103	5.0 vac	6.2 vac	P1-56	P1-72	2.495	2.505	0.454	0.500
L.4	J1-102	J1-103	5.0 vac	6.2 vac	P1-20	P1-72	2.495	2.505	0.454	0.500
L.5	J1-88	J1-103	5.0 vac	6.2 vac	P1-22	P1-72	2.495	2.505	0.454	0.500

*1 Section E leads 5° ±1° reference
*2 Set up for input condition.
*3 Lagging 45° ±1° reference

Section D, E and L, ac input voltage frequency is 800 cps, and Sections F and K, ac input voltage frequencies are 3200 cps.

TABLE V

INPUT-OUTPUT PINS AND VOLTAGES FOR WORKMANSHIP-VIBRATION

Assembly Section	INPUT				OUTPUT			
	Input Pins Connector 30A1		*Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
A.1	J1-65	J1-66	26.0 vdc	30.0 vdc	P1-61	J1-66	4.36	5.06
A.2	J1-4	J1-8	26.0 vdc	30.0 vdc	P1-62	J1-18	4.36	5.06
A.3	J1-19	J1-6	26.0 vdc	30.0 vdc	P1-59	J1-6	4.36	5.06
A.4	J1-20	J1-6	26.0 vdc	30.0 vdc	P1-60	J1-6	4.36	5.06
B.1	J1-10	J1-23	26.95 vdc	29.05 vdc	P1-45	J1-23	3.92	4.22
B.2	J1-12	J1-23	26.95 vdc	29.05 vdc	P1-44	J1-23	3.92	4.22
B.3	J1-11	J1-23	26.95 vdc	29.05 vdc	P1-79	J1-23	3.92	4.22
B.4	J1-46	J1-23	26.95 vdc	29.05 vdc	P1-63	J1-23	3.92	4.22
B.5	J1-13	J1-23	26.95 vdc	29.05 vdc	P1-46	J1-23	3.92	4.22
C.1	J1-106	J1-93	7.7 vdc	8.3 vdc	P1-87	P1-72	2.485	2.515
C.2	J1-108	J1-107	7.7 vdc	8.3 vdc	P1-105	P1-72	2.485	2.515
C.3	J1-95	J1-94	7.7 vdc	8.3 vdc	P1-127	P1-72	2.485	2.515
D.1	J1-96	J1-82	6.75 vdc	8.25 vac	P1-88	P1-72	2.485	2.515
D.2	J1-70	J1-71	6.75 vac	8.25 vac	P1-107	P1-72	2.485	2.515
D.3	J1-72	J1-83	6.75 vac	8.25 vac	P1-128	P1-72	2.485	2.515
D.4	J1-105	J1-103	6.75 vac	8.25 vac	P1-39	P1-72	2.485	2.515
E.1	J1-3	J1-2	24.30 vac	25.40 vac	P1-131	P1-72	2.485	2.515
E.2	J1-28	J1-40	24.30 vac	25.40 vac	P1-130	P1-72	2.485	2.515
E.3	J1-30	J1-31	24.30 vac	25.40 vac	P1-110	P1-72	2.485	2.515
E.4	J1-14	J1-1	24.30 vac	25.40 vac	P1-90	P1-72	2.485	2.515
E.5	J1-29	J1-15	24.30 vac	25.40 vac	P1-91	P1-72	2.485	2.515
E.6	J1-17	J1-16	24.30 vac	25.40 vac	P1-108	P1-72	2.485	2.515
F.1	J1-61	J1-51	5.0 vac	5.5 vac	P1-17	P1-72	2.485	2.515
F.2	J1-60	J1-51	5.0 vac	5.5 vac	P1-18	P1-72	2.485	2.515
F.3	J1-50	J1-51	5.0 vac	5.5 vac	P1-35	P1-72	2.485	2.515
F.4	J1-90	J1-103	5.0 vac	5.5 vac	P1-58	P1-72	2.485	2.515
F.5	J1-104	J1-103	5.0 vac	5.5 vac	P1-40	P1-72	2.485	2.515
F.6	J1-92	J1-103	5.0 vac	5.5 vac	P1-56	P1-72	2.485	2.515
F.7	J1-102	J1-103	5.0 vac	5.5 vac	P1-20	P1-72	2.485	2.515
F.8	J1-88	J1-103	5.0 vac	5.5 vac	P1-22	P1-72	2.485	2.515
G.1	J1-48	J1-49	1580Ω	1680Ω	P1-50	P1-71	1.85	2.505
G.2	J1-48	J1-37	1580Ω	1680Ω	P1-15	P1-71	1.85	2.505
G.3	J1-48	J1-47	1580Ω	1680Ω	P1-34	P1-71	1.85	2.505
G.4	J1-48	J1-38	1580Ω	1680Ω	P1-51	P1-71	1.85	2.505

TABLE V (Continued)

Assembly Section	INPUT				OUTPUT			
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
H	J1-42	J1-53	19.8 vdc	20.2 vdc	P1-55	P1-71	11.35	12.65
I	J1-35	J1-6	-26 vdc	-30 vdc	P1-89	P1-71	2.485	2.515
K.1	J1-33	J1-32	5.0 vac	5.5 vac	P1-83	P1-66	4.995	5.005
K.2	J1-43	J1-32	5.0 vac	5.5 vac	P1-101	P1-100	4.995	5.005
K.3	J1-44	J1-32	5.0 vac	5.5 vac	P1-119	P1-120	4.995	5.005

* See notes of Table II

d. The continuity of the assembly shall be continuously monitored at the pins specified in Table VI. Any evidence of discontinuity shall be cause for rejection. The continuity monitoring circuitry shall have a response time of 10 μsec or less for any open circuit.

TABLE VI

CONTINUITY

CONNECTOR 30A1		RESISTANCE (ohms)
From	To	Max
J1-73	P1-52	1.0
J1-97	P1-68	↑
J1-85	P1-69	
J1-98	P1-86	↓
J1-84	P1-71	1.0

e. The output signals specified in Table V shall be continuously monitored during vibration, The electrical measuring equipment used to monitor the output signals shall be capable of measuring out-of-tolerance conditions that exist for a period greater than 1 msec.

f. During vibration, the amplitude shall have a tolerance of ±100 mv from the initial amplitude. The after-vibration amplitude shall have a tolerance of ±1.0 percent from the initial amplitude.

g. After vibration, the following shall be performed:

(1) The assembly shall be examined in accordance with 4.3.1.

(2) The output signals shall be measured to assure compliance with Table V. The input signals shall have the same amplitude as the previbration input signals.

4.3.6 Offset Voltage. The offset voltage test shall be performed as follows:

a. A 1 megohm ±1 percent load resistor shall be connected across each pair of output pins specified in Table V, except assembly section K which shall have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table V.

b. Each input Hi pin specified in Table V shall be connected to its respective Lo pin.

c. The operating voltages specified in Table IV shall be applied to the assembly.

d. The dc voltage across the output pins specified in Table II shall be measured and shall meet the requirement specified in 3.1.3.

4.3.7 Scale Factor. The scale factor test shall be performed as follows:

a. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table II.

b. The operating voltages and input signals specified in Tables II and IV shall be applied to the assembly.

c. The input voltages shall be adjusted within the ranges specified in Table II to obtain the outputs specified.

d. The voltage at each pair of input and output pins specified in Table II shall be measured.

e. With the input signal level maintained as in d, the phase of the 800 and 3200 cps inputs shall be shifted by 180.0° ±1.0°.

f. The voltage at each pair of output pins specified in Table II shall be measured. The scale factor shall be as specified in Table II. Reversing the phase of the ac signals shall reverse the polarity of the output. Reversing the polarity of the dc input signals of Section C, Table II, shall reverse the polarity of the output. The output voltage shall be within ±100 mv of that before phase or polarity reversal.

4.3.8 Output Ripple. The output ripple test shall be performed as follows:

a. The operating voltages specified in Table IV shall be applied to the assembly.

APOLLO G&N Specification
PS2016144 REV B
Original Issue Date: 28 Jan 66
Release Authority: TDRR 25748
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

SIGNAL CONDITIONER ASSEMBLY

DRAWING NO. 1007700

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/23/66	A	26588	3, -11, 13	WK	TM
5/3/66	B	28463	3, 5, 10, 11, 13	WK	ACM

This specification consists of page 1 to 14 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	28 Jan 66 MIT/IL	ACSP

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Continuity. Continuity shall be as specified in Table I.

TABLE I

CONTINUITY

		CONNECTOR 30A1		RESISTANCE (ohms)
From	To	From	To	Max
P2-1	P1-83			
P2-2	P1-66	J1-73	P1-52	1.0
P2-4	P1-101	J1-97	P1-68	↑
P2-5	P1-100	J1-85	P1-69	
P2-7	P1-119	J1-98	P1-86	
P2-8	P1-120	J1-7	P1-72	
P2-10	J1-19	J1-84	P1-71	↓
P2-11	J1-6	J1-21	P1-71	1.0

3.1.2 Insulation Resistance. The resistance from each connector pin to the assembly frame shall be equal to or greater than 100 megohms, except for connect pin 30A1P2-13 which is ≤1.0 ohm.

3.1.3 Offset Voltage. The offset voltage shall be not greater than ±40 mvdc at the output pins of assembly Sections C, D, E, F, I, and L specified in Table II. The offset voltage shall not be greater than 2.5±0.3 vdc at the output pins of Section K specified in Table II.

3.1.4 Scale Factors. The respective scale factors for the assembly sections shall be as specified in Table II.

3.1.5 Output Ripple. The maximum ripple voltage shall be less than 15 mv at the output pins of assembly sections C, D, E, F, I and L specified in Table II.

3.1.6 Thermistor Control Circuit. The output voltage of the thermistor control circuit, assembly section G, shall be not less than 1.85 vdc nor greater than 2.505 vdc at the output pins specified in Table II.

3.1.7 Input Impedance. The input impedance shall be less than 1 ohm at 800 cps.

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 1007700 and all drawings and engineering data referenced thereon.

3.2.2 Weight. The weight of the assembly shall be measured to the nearest tenth of a pound.

3.2.3 **Calibration Reference Data.** The assembly shall be operated in accordance with Table III. The input or output voltages for the respective input or output voltages specified in Table III shall be recorded where applicable.

Table II (Continued)

Assembly Section	INPUT				OUTPUT				Output Scale Factor	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
F.1	J1-61	J1-51	5.0 vac	5.5 vac	P1-17	P1-72	2.495	2.505	0.454	0.500
F.2	J1-60	J1-51	5.0 vac	5.5 vac	P1-18	P1-72	2.495	2.505	0.454	0.500
F.3	J1-50	J1-51	5.0 vac	5.5 vac	P1-35	P1-72	2.495	2.505	0.454	0.500
G.1*[2]	J1-48	J1-49	1580Ω	1680Ω	P1-50	P1-71	1.85	2.505	--	--
G.2*[2]	J1-48	J1-37	1580Ω	1680Ω	P1-15	P1-71	1.85	2.505	--	--
G.3*[2]	J1-48	J1-47	1580Ω	1680Ω	P1-34	P1-71	1.85	2.505	--	--
G.4*[2]	J1-48	J1-38	1580Ω	1680Ω	P1-51	P1-71	1.85	2.505	--	--
H*[1]	J1-42	J1-53	19.8 vdc	20.2 vdc	P1-55	P1-71	11.35	12.65	0.562	0.637
I	J1-35	J1-6	-26 vdc	-30 vdc	P1-89	P1-71	3.99	4.01	0.133	0.154
K.1 *[3]	J1-33	J1-32	5.0 vac	5.5 vac	P1-83	P1-66	4.995	5.005	0.91	1.0
K.2 *[3]	J1-43	J1-32	5.0 vac	5.5 vac	P1-101	P1-100	4.995	5.005	0.91	1.0
K.3 *[3]	J1-44	J1-32	5.0 vac	5.5 vac	P1-119	P1-120	4.995	5.005	0.91	1.0
L.1	J1-90	J1-103	5.0 vac	6.2 vac	P1-58	P1-72	2.495	2.505	0.454	0.500
L.2	J1-104	J1-103	5.0 vac	6.2 vac	P1-40	P1-72	2.495	2.505	0.454	0.500
L.3	J1-92	J1-103	5.0 vac	6.2 vac	P1-56	P1-72	2.495	2.505	0.454	0.500
L.4	J1-102	J1-103	5.0 vac	6.2 vac	P1-20	P1-72	2.495	2.505	0.454	0.500
L.5	J1-88	J1-103	5.0 vac	6.2 vac	P1-22	P1-72	2.495	2.505	0.454	0.500

*1 Section E leads 5° ±1° reference
*2 Set up for input condition.
*3 Lagging 45° ±1° reference

Section D, E and L, ac input voltage frequency is 800 cps, and Sections F and K, ac input voltage frequencies are 3200 cps.

TABLE V

INPUT-OUTPUT PINS AND VOLTAGES FOR WORKMANSHIP-VIBRATION

Assembly Section	INPUT				OUTPUT			
	Input Pins Connector 30A1		*Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
A.1	J1-65	J1-66	26.0 vdc	30.0 vdc	P1-61	J1-66	4.36	5.06
A.2	J1-4	J1-8	26.0 vdc	30.0 vdc	P1-62	J1-18	4.36	5.06
A.3	J1-19	J1-6	26.0 vdc	30.0 vdc	P1-59	J1-6	4.36	5.06
A.4	J1-20	J1-6	26.0 vdc	30.0 vdc	P1-60	J1-6	4.36	5.06
B.1	J1-10	J1-23	26.95 vdc	29.05 vdc	P1-45	J1-23	3.92	4.22
B.2	J1-12	J1-23	26.95 vdc	29.05 vdc	P1-44	J1-23	3.92	4.22
B.3	J1-11	J1-23	26.95 vdc	29.05 vdc	P1-79	J1-23	3.92	4.22
B.4	J1-46	J1-23	26.95 vdc	29.05 vdc	P1-63	J1-23	3.92	4.22
B.5	J1-13	J1-23	26.95 vdc	29.05 vdc	P1-46	J1-23	3.92	4.22
C.1	J1-106	J1-93	7.7 vdc	8.3 vdc	P1-87	P1-72	2.485	2.515
C.2	J1-108	J1-107	7.7 vdc	8.3 vdc	P1-105	P1-72	2.485	2.515
C.3	J1-95	J1-94	7.7 vdc	8.3 vdc	P1-127	P1-72	2.485	2.515
D.1	J1-96	J1-82	6.75 vdc	8.25 vac	P1-88	P1-72	2.485	2.515
D.2	J1-70	J1-71	6.75 vac	8.25 vac	P1-107	P1-72	2.485	2.515
D.3	J1-72	J1-83	6.75 vac	8.25 vac	P1-128	P1-72	2.485	2.515
D.4	J1-105	J1-103	6.75 vac	8.25 vac	P1-39	P1-72	2.485	2.515
E.1	J1-3	J1-2	19.30 vac	20.70 vac	P1-131	P1-72	2.485	2.515
E.2	J1-28	J1-40	19.30 vac	20.70 vac	P1-130	P1-72	2.485	2.515
E.3	J1-30	J1-31	19.30 vac	20.70 vac	P1-110	P1-72	2.485	2.515
E.4	J1-14	J1-1	19.30 vac	20.70 vac	P1-90	P1-72	2.485	2.515
E.5	J1-29	J1-15	19.30 vac	20.70 vac	P1-91	P1-72	2.485	2.515
E.6	J1-17	J1-16	19.30 vac	20.70 vac	P1-108	P1-72	2.485	2.515
F.1	J1-61	J1-51	5.0 vac	5.5 vac	P1-17	P1-72	2.485	2.515
F.2	J1-60	J1-51	5.0 vac	5.5 vac	P1-18	P1-72	2.485	2.515
F.3	J1-50	J1-51	5.0 vac	5.5 vac	P1-35	P1-72	2.485	2.515
F.4	J1-90	J1-103	5.0 vac	5.5 vac	P1-58	P1-72	2.485	2.515
F.5	J1-104	J1-103	5.0 vac	5.5 vac	P1-40	P1-72	2.485	2.515
F.6	J1-92	J1-103	5.0 vac	5.5 vac	P1-56	P1-72	2.485	2.515
F.7	J1-102	J1-103	5.0 vac	5.5 vac	P1-20	P1-72	2.485	2.515
F.8	J1-88	J1-103	5.0 vac	5.5 vac	P1-22	P1-72	2.485	2.515
G.1	J1-48	J1-49	1180Ω	12800Ω	P1-50	P1-71	2.495	2.505
G.2	J1-48	J1-37	1180Ω	12800Ω	P1-15	P1-71	2.495	2.505
G.3	J1-48	J1-47	1180Ω	12800Ω	P1-34	P1-71	2.495	2.505
G.4	J1-48	J1-38	1180Ω	12800Ω	P1-51	P1-71	2.495	2.505

TABLE V (Continued)

Assembly Section	INPUT				OUTPUT			
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
H	J1-42	J1-53	19.8 vdc	20.2 vdc	P1-55	P1-71	11.35	12.65
I	J1-35	J1-6	-26 vdc	-30 vdc	P1-89	P1-71	3.900	4.100
•								
K.1	J1-33	J1-32	5.0 vac	5.5 vac	P1-83	P1-66	4.995	5.005
K.2	J1-43	J1-32	5.0 vac	5.5 vac	P1-101	P1-100	4.995	5.005
K.3	J1-44	J1-32	5.0 vac	5.5 vac	P1-119	P1-120	4.995	5.005

* See notes of Table II

d. The continuity of the assembly shall be continuously monitored at the pins specified in Table VI. Any evidence of discontinuity shall be cause for rejection. The continuity monitoring circuitry shall have a response time of 10 μsec or less for any open circuit.

TABLE VI

CONTINUITY

CONNECTOR 30A1		RESISTANCE (ohms)
From	To	Max
J1-73	P1-52	1.0
J1-97	P1-68	↑
J1-85	P1-69	│
J1-98	P1-86	↓
J1-84	P1-71	1.0

e. The output signals specified in Table V shall be continuously monitored during vibration. The electrical measuring equipment used to monitor the output signals shall be capable of measuring out-of-tolerance conditions that exist for a period greater than 1 msec.

f. During vibration, the amplitude shall have a tolerance of ±100 mv from the initial amplitude. The after-vibration amplitude shall have a tolerance of ±1.0 percent from the initial amplitude.

g. After vibration, the following shall be performed:

(1) The assembly shall be examined in accordance with 4.3.1.

(2) The output signals shall be measured to assure compliance with Table V. The input signals shall have the same amplitude as the previbration input signals.

4.3.6 Offset Voltage. The offset voltage test shall be performed as follows:

a. A 1 megohm ±1 percent load resistor shall be connected across each pair of output pins specified in Table V and Table II except assembly section K which have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table V and Table II.

b. Each input Hi pin specified in Table V and Table II shall be connected to its respective Lo pin.

c. The operating voltages specified in Table IV shall be applied to the assembly.

d. The dc voltage across the output pins specified in Table II shall be measured and shall meet the requirement specified in 3.1.3.

4.3.7 Scale Factor. The scale factor test shall be performed as follows:

a. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table II.

b. The operating voltages and input signals specified in Tables II and IV shall be applied to the assembly.

c. The input voltages shall be adjusted within the ranges specified in Table II to obtain the outputs specified.

d. The voltage at each pair of input and output pins specified in Table II shall be measured.

e. With the input signal level maintained as in d, the phase of the 800 and 3200 cps inputs shall be shifted by 180.0° ±1.0°.

f. The voltage at each pair of output pins specified in Table II shall be measured. The scale factor shall be as specified in Table II. Reversing the phase of the ac signals shall reverse the polarity of the output. Reversing the polarity of the dc input signals of Section C, Table II, shall reverse the polarity of the output. The output voltage shall be within ±100 mv of that before phase or polarity reversal.

4.3.8 Output Ripple. The output ripple test shall be performed as follows:

a. The operating voltages specified in Table IV shall be applied to the assembly.

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2/23/66	A	26588	3, -11, 13	WK	TM
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This specification consists of page 1 to 14 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	28 Jan 66 MIT/IL	ACSP

TABLE II

SCALE FACTOR INPUT-OUTPUT PINS AND VOLTAGES

Assembly Section	INPUTS				OUTPUTS				Output Scale Factor	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
A.1	J1-65	J1-66	26.0 vdc	30.0 vdc	P1-61	J1-66	4.70	4.72	0.155	0.181
A.2	J1-4	J1-18	26.0 vdc	30.0 vdc	P1-62	J1-18	4.70	4.72	0.155	0.181
A.3	J1-19	J1-6	26.0 vdc	30.0 vdc	P1-59	J1-6	4.70	4.72	0.155	0.181
A.4	J1-20	J1-6	26.0 vdc	30.0 vdc	P1-60	J1-6	4.70	4.72	0.155	0.181
B.1	J1-10	J1-23	26.95 vdc	29.05 vdc	P1-45	J1-23	4.06	4.08	0.139	0.151
B.2	J1-12	J1-23	26.95 vdc	29.05 vdc	P1-44	J1-23	4.06	4.08	0.139	0.151
B.3	J1-11	J1-23	26.95 vdc	29.05 vdc	P1-79	J1-23	4.06	4.08	0.139	0.151
B.4	J1-46	J1-23	26.95 vdc	29.05 vdc	P1-63	J1-23	4.06	4.08	0.139	0.151
B.5	J1-13	J1-23	26.95 vdc	29.05 vdc	P1-46	J1-23	4.06	4.08	0.139	0.151
C.1	J1-106	J1-93	7.7 vdc	8.3 vdc	P1-87	P1-72	2.495	2.505	0.300	0.326
C.2	J1-108	J1-107	7.7 vdc	8.3 vdc	P1-105	P1-72	2.495	2.505	0.300	0.326
C.3	J1-95	J1-94	7.7 vdc	8.3 vdc	P1-127	P1-72	2.495	2.505	0.300	0.326
D.1	J1-96	J1-82	6.75 vac	8.25 vac	P1-88	P1-72	2.495	2.505	0.302	0.372
D.2	J1-70	J1-71	6.75 vac	8.25 vac	P1-107	P1-72	2.495	2.505	0.302	0.372
D.3	J1-72	J1-83	6.75 vac	8.25 vac	P1-128	P1-72	2.495	2.505	0.302	0.372
D.4	J1-105	J1-103	45 mvac	55 mvac	P1-39	P1-72	2.495	2.505	450.0	560.0
E.1*[1]	J1-3	J1-2	19.30 vac	20.70 vac	P1-131	P1-72	2.495	2.505	0.121	0.130
E.2	J1-28	J1-40	19.30 vac	20.70 vac	P1-130	P1-72	2.495	2.505	0.121	0.130
E.3	J1-30	J1-31	19.30 vac	20.70 vac	P1-110	P1-72	2.495	2.505	0.121	0.130
E.4	J1-14	J1-1	19.30 vac	20.70 vac	P1-90	P1-72	2.495	2.505	0.121	0.130
E.5	J1-29	J1-15	19.30 vac	20.70 vac	P1-91	P1-72	2.495	2.505	0.121	0.130
E.6	J1-17	J1-16	19.30 vac	20.70 vac	P1-108	P1-72	2.495	2.505	0.121	0.130

Table II (Continued)

Assembly Section	INPUT				OUTPUT				Output Scale Factor	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
F.1	J1-61	J1-51	5.0 vac	5.5 vac	P1-17	P1-72	2.495	2.505	0.454	0.500
F.2	J1-60	J1-51	5.0 vac	5.5 vac	P1-18	P1-72	2.495	2.505	0.454	0.500
F.3	J1-50	J1-51	5.0 vac	5.5 vac	P1-35	P1-72	2.495	2.505	0.454	0.500
G.1*2	J1-48	J1-49	1580Ω	1680Ω	P1-50	P1-71	1.85	2.505	--	--
G.2*2	J1-48	J1-37	1580Ω	1680Ω	P1-15	P1-71	1.85	2.505	--	--
G.3*2	J1-48	J1-47	1580Ω	1680Ω	P1-34	P1-71	1.8	2.505	--	--
G.4*2	J1-48	J1-38	1580Ω	1680Ω	P1-51	P1-71	[illegible]	.505	--	--
H*1	J1-42	J1-53	19.8 vdc	20.2 vdc	P1-55	P1-	1	12.65	0.562	0.637
I	J1-35	J1-6	-26 vdc	-30 vdc	P1-89	P1-71	3	4.01	0.133	0.154
K.1 *3	J1-33	J1-32	5.0 vac	5.5 vac	P1-83	P1-66	4.995	5.005	0.91	1.0
K.2 *3	J1-43	J1-32	5.0 vac	5.5 vac	P1-101	P1-100	4.995	5.005	0.91	1.0
K.3 *3	J1-44	J1-32	5.0 vac	5.5 vac	P1-119	P1-120	4.995	5.005	0.91	1.0
L.1	J1-90	J1-103	5.0 vac	6.2 vac	P1-58	P1-72	2.495	2.505	0.403	0.500
L.2	J1-104	J1-103	5.0 vac	6.2 vac	P1-40	P1-72	2.495	2.505	0.403	0.500
L.3	J1-92	J1-103	5.0 vac	6.2 vac	P1-56	P1-72	2.495	2.505	0.403	0.500
L.4	J1-102	J1-103	5.0 vac	6.2 vac	P1-20	P1-72	2.495	2.505	0.403	0.500
L.5	J1-88	J1-103	5.0 vac	6.2 vac	P1-22	P1-72	2.495	2.505	0.403	0.500

*1 Section E leads 5° ±1° reference

*2 Set up for input condition.

*3 Lagging 45° ±1° reference

Section D, E and L, ac input voltage frequency is 800 cps, and Sections F and K, ac input voltage frequencies are 3200 cps.

TABLE V

INPUT-OUTPUT PINS AND VOLTAGES FOR WORKMANSHIP-VIBRATION

Assembly Section	INPUT				OUTPUT			
	Input Pins Connector 30A1		*Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
A.1	J1-65	J1-66	26.0 vdc	30.0 vdc	P1-61	J1-66	4.36	5.06
A.2	J1-4	J1-8	26.0 vdc	30.0 vdc	P1-62	J1-18	4.36	5.06
A.3	J1-19	J1-6	26.0 vdc	30.0 vdc	P1-59	J1-6	4.36	5.06
A.4	J1-20	J1-6	26.0 vdc	30.0 vdc	P1-60	J1-6	4.36	5.06
B.1	J1-10	J1-23	26.95 vdc	29.05 vdc	P1-45	J1-23	3.92	4.22
B.2	J1-12	J1-23	26.95 vdc	29.05 vdc	P1-44	J1-23	3.92	4.22
B.3	J1-11	J1-23	26.95 vdc	29.05 vdc	P1-79	J1-23	3.92	4.22
B.4	J1-46	J1-23	26.95 vdc	29.05 vdc	P1-63	J1-23	3.92	4.22
B.5	J1-13	J1-23	26.95 vdc	29.05 vdc	P1-46	J1-23	3.92	4.22
C.1	J1-106	J1-93	7.7 vdc	8.3 vdc	P1-87	P1-72	2.485	2.515
C.2	J1-108	J1-107	7.7 vdc	8.3 vdc	P1-105	P1-72	2.485	2.515
C.3	J1-95	J1-94	7.7 vdc	8.3 vdc	P1-127	P1-72	2.485	2.515
D.1	J1-96	J1-82	6.75 vdc	8.25 vac	P1-88	P1-72	2.485	2.515
D.2	J1-70	J1-71	6.75 vac	8.25 vac	P1-107	P1-72	2.485	2.515
D.3	J1-72	J1-83	6.75 vac	8.25 vac	P1-128	P1-72	2.485	2.515
D.4	J1-105	J1-103	45 mvac	55 mvac	P1-39	P1-72	2.485	2.515
E.1	J1-3	J1-2	19.30 vac	20.70 vac	P1-131	P1-72	2.485	2.515
E.2	J1-28	J1-40	19.30 vac	20.70 vac	P1-130	P1-72	2.485	2.515
E.3	J1-30	J1-31	19.30 vac	20.70 vac	P1-110	P1-72	2.485	2.515
E.4	J1-14	J1-1	19.30 vac	20.70 vac	P1-90	P1-72	2.485	2.515
E.5	J1-29	J1-15	19.30 vac	20.70 vac	P1-91	P1-72	2.485	2.515
E.6	J1-17	J1-16	19.30 vac	20.70 vac	P1-108	P1-72	2.485	2.515
F.1	J1-61	J1-51	5.0 vac	5.5 vac	P1-17	P1-72	2.485	2.515
F.2	J1-60	J1-51	5.0 vac	5.5 vac	P1-18	P1-72	2.485	2.515
F.3	J1-50	J1-51	5.0 vac	5.5 vac	P1-35	P1-72	2.485	2.515
F.4	J1-90	J1-103	5.0 vac	6.2 vac	P1-58	P1-72	2.485	2.515
F.5	J1-104	J1-103	5.0 vac	6.2 vac	P1-40	P1-72	2.485	2.515
F.6	J1-92	J1-103	5.0 vac	6.2 vac	P1-56	P1-72	2.485	2.515
F.7	J1-102	J1-103	5.0 vac	6.2 vac	P1-20	P1-72	2.485	2.515
F.8	J1-88	J1-103	5.0 vac	6.2 vac	P1-22	P1-72	2.485	2.515
G.1	J1-48	J1-49	1180Ω	12800Ω	P1-50	P1-71	2.495	2.505
G.2	J1-48	J1-37	1180Ω	12800Ω	P1-15	P1-71	2.495	2.505
G.3	J1-48	J1-47	1180Ω	12800Ω	P1-34	P1-71	2.495	2.505
G.4	J1-48	J1-38	1180Ω	12800Ω	P1-51	P1-71	2.495	2.505

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				MIT	NASA

This specification consists of page 1 to 14 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	Bruce L Hughes W Kupfer 28 Jan 66 MIT/IL	D H Krier ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Signal Conditioner Assembly, Part Number 1007700-021, hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202C	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

1007700	Signal Conditioner Assembly

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. - In event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Continuity. Continuity shall be as specified in Table I.

TABLE I

CONTINUITY

		CONNECTOR 30A1		RESISTANCE (ohms)
From	To	From	To	Max
P2-1	P1-83	J1-73	P1-52	1.0
P2-2	P1-66	J1-97	P1-68	↕
P2-5	P1-100	J1-85	P1-69	
P2-7	P1-119	J1-98	P1-86	
P2-8	P1-120	J1-7	P1-72	
P2-10	J1-19	J1-84	P1-71	
P2-11	J1-6	J1-21	P1-71	1.0

3.1.2 Insulation Resistance. The resistance from each connector pin to the assembly frame shall be equal to or greater than 100 megohms.

3.1.3 Offset Voltage. The offset voltage shall be not greater than ±40 mvdc at the output pins of assembly sections C, D, E, F, I, and K specified in Table II. The offset voltage shall not be greater than 2.5±0.3 mvdc at the output pins of section L specified in Table II.

3.1.4 Scale Factors. The respective scale factors for the assembly sections shall be as specified in Table II.

3.1.5 Output Ripple. The maximum ripple voltage shall be less than 15 mv at the output pins of assembly sections C, D, E, F, I and L specified in Table II.

3.1.6 Thermistor Control Circuit. The output voltage of the thermistor control circuit, assembly section G, shall be not less than 1.85 vdc nor greater than 2.45 vdc at the output pins specified in Table II.

3.1.7 Input Impedance. The input impedance shall be less than 1 ohm at 800 cps.

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 1007700 and all drawings and engineering data referenced thereon.

3.2.2 Weight. The weight of the assembly shall be measured to the nearest tenth of a pound.

3.2.3 Calibration Reference Data. The assembly shall be operated in accordance with Table III. The input or output voltages for the respective input or output voltages specified in Table III shall be recorded where applicable.

TABLE II

SCALE FACTOR INPUT-OUTPUT PINS AND VOLTAGES

Assembly Section	INPUTS				OUTPUTS				Output Scale Factor	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
A.1	J1-65	J1-66	26.0 vdc	30.0 vdc	P1-61	J1-66	4.70	4.72	0.155	0.181
A.2	J1-4	J1-18	26.0 vdc	30.0 vdc	P1-62	J1-18	4.70	4.72	0.155	0.181
A.3	J1-19	J1-6	26.0 vdc	30.0 vdc	P1-59	J1-6	4.70	4.72	0.155	0.181
A.4	J1-20	J1-6	26.0 vdc	30.0 vdc	P1-60	J1-6	4.70	4.72	0.155	0.181
B.1	J1-10	J1-23	26.95 vdc	29.05 vdc	P1-45	J1-23	4.06	4.08	0.139	0.151
B.2	J1-12	J1-23	26.95 vdc	29.05 vdc	P1-44	J1-23	4.06	4.08	0.139	0.151
B.3	J1-11	J1-23	26.95 vdc	29.05 vdc	P1-79	J1-23	4.06	4.08	0.139	0.151
B.4	J1-46	J1-23	26.95 vdc	29.05 vdc	P1-63	J1-23	4.06	4.08	0.139	0.151
B.5	J1-13	J1-23	26.95 vdc	29.05 vdc	P1-46	J1-23	4.06	4.08	0.139	0.151
C.1	J1-106	J1-93	7.7 vdc	8.3 vdc	P1-87	P1-72	2.495	2.505	0.300	0.326
C.2	J1-108	J1-107	7.7 vdc	8.3 vdc	P1-105	P1-72	2.495	2.505	0.300	0.326
C.3	J1-95	J1-94	7.7 vdc	8.3 vdc	P1-127	P1-72	2.495	2.505	0.300	0.326
D.1	J1-96	J1-82	6.75 vac	8.25 vac	P1-88	P1-72	2.495	2.505	0.302	0.372
D.2	J1-70	J1-72	6.75 vac	8.25 vac	P1-107	P1-72	2.495	2.505	0.302	0.372
D.3	J1-72	J1-83	6.75 vac	8.25 vac	P1-128	P1-72	2.495	2.505	0.302	0.372
D.4	J1-105	J1-103	6.75 vac	8.25 vac	P1-39	P1-72	2.495	2.505	0.302	0.372
E.1*[1]	J1-3	J1-2	19.30 vac	20.70 vac	P1-131	P1-72	2.495	2.505	0.121	0.130
E.2	J1-28	J1-40	19.30 vac	20.70 vac	P1-130	P1-72	2.495	2.505	0.121	0.130
E.3	J1-30	J1-31	19.30 vac	20.70 vac	P1-110	P1-72	2.495	2.505	0.121	0.130
E.4	J1-14	J1-1	19.30 vac	20.70 vac	P1-90	P1-72	2.495	2.505	0.121	0.130
E.5	J1-29	J1-15	19.30 vac	20.70 vac	P1-91	P1-72	2.495	2.505	0.121	0.130
E.6	J1-17	J1-16	19.30 vac	20.70 vac	P1-108	P1-72	2.495	2.505	0.121	0.130

Table II (Continued)

Assembly Section	INPUT				OUTPUT				Output Scale Factor	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
F.1	J1-61	J1-51	5.0 vac	5.5 vac	P1-17	P1-72	2.495	2.505	0.454	0.500
F.2	J1-60	J1-51	5.0 vac	5.5 vac	P1-18	P1-72	2.495	2.505	0.454	0.500
F.3	J1-50	J1-51	5.0 vac	5.5 vac	P1-35	P1-72	2.495	2.505	0.454	0.500
G.1*2	J1-48	J1-49	1580Ω	1680Ω	P1-50	P1-72	1.85	2.45	--	--
G.2*2	J1-48	J1-37	1580Ω	1680Ω	P1-15	P1-71	1.85	2.45	--	--
G.3*2	J1-48	J1-47	1580Ω	1680Ω	P1-34	P1-71	1.85	2.45	--	--
G.4*2	J1-48	J1-38	1580Ω	1680Ω	P1-51	P1-71	1.85	2.45	--	--
H*1	J1-42	J1-53	19.8 vdc	20.2 vdc	P1-55	P1-71	11.35	12.65	0.562	0.637
I	J1-35	J1-6	-26 vdc	-30 vdc	P1-89	P1-71	2.495	2.505	0.454	0.500
J	J1-24	J1-36	119 vdc	121 vdc	P1-128	P1-71	2.495	2.505	0.454	0.500
K.1 *3	J1-33	J1-32	5.0 vac	5.5 vac	P1-83	P1-66	4.995	5.005	0.91	1.000
K.2 *3	J1-43	J1-32	5.0 vac	5.5 vac	P1-101	P1-100	4.995	5.005	0.91	1.000
K.3 *3	J1-44	J1-32	5.0 vac	5.5 vac	P1-119	P1-120	4.995	5.005	0.91	1.0
L.1 *3	J1-90	J1-103	5.0 vac	6.2 vac	P1-58	P1-72	2.495	2.505	0.454	0.500
L.2 *3	J1-104	J1-103	5.0 vac	6.2 vac	P1-40	P1-72	2.495	2.505	0.454	0.500
L.3 *3	J1-92	J1-103	5.0 vac	6.2 vac	P1-56	P1-72	2.495	2.505	0.454	0.500
L.4 *3	J1-102	J1-103	5.0 vac	6.2 vac	P1-20	P1-72	2.495	2.505	0.454	0.500
L.5 *3	J1-88	J1-103	5.0 vac	6.2 vac	P1-22	P1-72	2.495	2.505	0.454	0.500

*1 Section E leads 5° reference
*2 Set up for input condition.
*3 Lagging 45° reference

Sections D and E ac input voltage frequency is 800 cps, and sections F, K, and L ac input voltage frequencies are 3200 cps.

TABLE III

CALIBRATION

INPUT				OUTPUT			
Connector 30A1 Pin Number		Voltage	Nomenclature	Connector 30A1 Pin Number		Voltage (vdc)	Nomenclature
Hi	Lo			Hi	Lo		
SCALAR CALIBRATION CURVE							
J1-19	J1-6	28.0±0.1 vdc	+28 VDC IMU	J1-59	J1-6		IMU OPERATE
J1-20	J1-6		+28 VDC IMU STBY	J1-60	J1-6		IMU STANDBY
J1-4	J1-18		+28 VDC AGC	J1-62	J1-18		AGC OPERATE
J1-65	J1-66		+28 VDC OPTICS	J1-61	J1-66		OPTICS OPERATE
J1-10	J1-23		GIMBAL LOCK	J1-45	J1-23		GIMBAL LOCK
J1-12	J1-23		G&N ERROR LIGHT	J1-44	J1-23		ERROR DETECTOR
J1-11	J1-23		IMU TEMP CONT LIGHT FAIL	J1-79	J1-23		IMU TEMP FAIL
J1-46	J1-23		IMU DELAY LIGHT	J1-63	J1-23		IMU DELAY
J1-13	J1-23	28.0±0.1 vdc	AGC POWER SUPPLY FAIL	J1-46	J1-23		AGC POWER FAIL
GIMBAL RESOLVER CALIBRATION							
J1-17	J1-16	800.0±0.8 cps	SINE A OG IX	P1-108	P1-72	0, -2.5, - -1.5, -0.5 +0.5, +1.5, +2.5	OG IX SIN
J1-29	J1-15		SINE A MG IX	P1-91	P1-72		MG IX SIN
J1-14	J1-1		SINE A IG IX	P1-90	P1-72		IG IX SIN
J1-30	J1-31		COS A OG IX	P1-110	P1-72		OG IX COS
J1-28	J1-40		COS A MG IX	P1-130	P1-72		MG IX COS
J1-3	J1-2	800.0±0.8 cps	COS A IG IX	P1-131	P1-72		IG IX COS
TORQUE MOTOR CALIBRATION							
J1-106	J1-93		IG TORQUE MOTOR	P1-87	P1-72	0, -2.5, -1.5, -0.5, +0.5, +1.5, +2.5	IG TORQUE MOTOR
J1-108	J1-107		MG TORQUE MOTOR	P1-105	P1-72		MG TORQUE MOTOR
J1-95	J1-94		OG TORQUE MOTOR	P1-127	P1-72		OG TORQUE MOTOR
SERVO MOTOR CALIBRATION							
J1-61	J1-51		IMU IG & Y GYRO ERROR	P1-17	P1-72	0, -2.5, -1.5, -0.5, +0.5, +1.5, +2.5	IG SERVO ERROR
J1-60	J1-51		IMU MG ERROR	P1-18	P1-72		MG SERVO ERROR
J1-50	J1-51		IMU OG ERROR	P1-35	P1-72		OG SERVO ERROR
J1-33*[1]	J1-32		X PIPA ERROR MONITOR	P1-83	P1-60	0, 1, 2, 3, 4, 5	X PIPA RECORDER
J1-43*[1]	J1-32		Y PIPA ERROR MONITOR	P1-101	P1-100	0, 1, 2, 3, 4, 5	Y PIPA RECORDER
J1-44*[1]	J1-32		Z PIPA ERROR MONITOR	P1-119	P1-120	0, 1, 2, 3, 4, 5	Z PIPA RECORDER

TABLE III (Continued)

INPUT				OUTPUT			
Connector 30A1 Pin Number		Voltage	Nomenclature	Connector 30A1 Pin Number		Voltage (vdc)	Nomenclature
Hi	Lo			Hi	Lo		
SERVO MOTOR CALIBRATION (Continued)							
J1-90	J1-103		SXT TRUNNION MDA	P1-58	P1-72	0, -2.5, -1.5, -0.5, +0.5, +1.5, +2.5	SXT TR MDA OUT
J1-104	J1-103		SXT SHAFT MDA OUTPUT	P1-40	P1-72		SXT SH MDA OUT
J1-92	J1-103		SXT TRUNNION MTR CONTROL WDG	P1-56	P1-72		SXT TR MDA OUT
J1-102	J1-103		TRUNNION CDU MDA	P1-20	P1-72		TR CDU MDA OUT
J1-88	J1-103		SHAFT CDU MDA	P1-22	P1-72		SH CDU MDA OUT
CDU RESOLVER CALIBRATION							
J1-96	J1-82		IG CDU IX ERROR	P1-88	P1-72	0, -2.5, -1.5, -0.5, +0.5, +1.5, +2.5	IG CDU IX ERROR
J1-70	J1-71		MG CDU IX ERROR	P1-107	P1-72		MG CDU IX ERROR
J1-72	J1-83		OG CDU IX ERROR	P1-128	P1-72		OG CDU IX ERROR

* A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table III except for (*) pins. The load resistor for these pins shall be 100K ±1.0 percent.

The ac input signals to the Servo Motor frequency is 3200 cps lagging the reference by 0° and 45°. The ac input lagging signals to the resolvers and torque motor are 800 cps. The ac input signals to the resolvers and torque [illegible]

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Continuity	3.1.1	4.3.3
Insulation Resistance	3.1.2	4.3.4
Offset Voltage	3.1.3	4.3.6
Scale Factors	3.1.4	4.3.7
Output Ripple	3.1.5	4.3.8
Thermistor Control Circuit	3.1.6	4.3.9
Input Impedance	3.1.7	4.3.10
Drawing Compliance	3.2.1	4.3.1
Verification	3.2.2 & 3.2.3	4.3.2

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25° ±10°C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg

4.2.1.2 Test Power. The following test power is required for testing the assembly:

a. 28.0±0.1 vdc (adjustable)
b. 20.0±0.2 vdc (adjustable)
c. 8.0±0.3 vdc (adjustable)
d. 120.0±0.1 vdc (adjustable)
e. 7.50±0.75V rms, 800.0±0.8 cps (adjustable)
f. 28.0±2.8V rms, 800.0±0.8 cps (adjustable), 0° and 45° lagging reference
g. 5.0 +0.5, -0.0, 3200.0±3.2 cps (adjustable), 0° and 45° lagging reference,
h. 20.0±0.7 vac, 800.0±0.8 cps (adjustable), 5° leading reference
i. -28±2 vdc

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected, Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3 TESTS

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 1007700. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, pin misalignment, and legibility and appearance of markings.

4.3.2 Verification. Calibration records or data and weight measurement records shall be examined to verify that the requirements of 3.2.2 and 3.2.3 have been met.

4.3.3 Continuity. The continuity between the pins specified in Table I shall be measured with a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202.

4.3.4 Insulation Resistance. The resistance from each connector pin to the assembly frame shall be measured in accordance with Method 302 of Standard MIL-STD-202 using a megohmmeter having an output voltage of 225±75 vdc and limited to a short circuit current of 6.0 μa. The resistance shall be equal to or greater than 100 megohms.

4.3.5 Workmanship-Vibration. The assembly shall be mounted in the vibration fixture in a manner similar to the way it will be mounted in service and the test shall be performed as follows:

a. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table II.

b. The operating voltages and input signals specified in Tables IV and V shall be applied and the input signals adjusted to obtain the outputs specified in Table V.

TABLE IV

OPERATING VOLTAGES

CONNECTOR 30A1 PINS		VOLTAGE	FREQUENCY (cps)
Hi	Lo		
J1-5	J1-6	20.0±0.2 vdc	--
J1-9	J1-8	28.00±0.28V rms	800.0±0.8
J1-59	J1-58	2.0±0.1V rms	3200.0±3.2
J1-45	J1-55	28.00±0.28V rms	800.0±0.8

c. The assembly shall be vibrated along the horizontal, vertical and lateral axes (see Figure 1) with a simple harmonic motion swept from 10 to 2000 cps at a rate of one octave per 15 seconds. The magnitude of vibration shall be 6.0g rms limited to a 0.4 inch pp constant displacement from 10 cps to the crossover frequency.

TABLE V

INPUT-OUTPUT PINS AND VOLTAGES FOR WORKMANSHIP-VIBRATION

Assembly Section	INPUT				OUTPUT			
	Input Pins Connector 30A1		*Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
A.1	J1-65	J1-66	26.0 vdc	30.0 vdc	P1-61	J1-66	4.36	5.06
A.2	J1-4	J1-8	26.0 vdc	30.0 vdc	P1-62	J1-18	4.36	5.06
A.3	J1-19	J1-6	26.0 vdc	30.0 vdc	P1-59	J1-6	4.36	5.06
A.4	J1-20	J1-6	26.0 vdc	30.0 vdc	P1-60	J1-6	4.36	5.06
B.1	J1-10	J1-23	26.95 vdc	29.05 vdc	P1-45	J1-23	3.92	4.22
B.2	J1-12	J1-23	26.95 vdc	29.05 vdc	P1-44	J1-23	3.92	4.22
B.3	J1-11	J1-23	26.95 vdc	29.05 vdc	P1-79	J1-23	3.92	4.22
B.4	J1-46	J1-23	26.95 vdc	29.05 vdc	P1-63	J1-23	3.92	4.22
B.5	J1-13	J1-23	26.95 vdc	29.05 vdc	P1-46	J1-23	3.92	4.22
C.1	J1-106	J1-93	7.7 vdc	8.3 vdc	P1-87	P1-72	2.485	2.515
C.2	J1-108	J1-107	7.7 vdc	8.3 vdc	P1-105	P1-72	2.485	2.515
C.3	J1-95	J1-94	7.7 vdc	8.3 vdc	P1-127	P1-72	2.485	2.515
D.1	J1-96	J1-82	6.75 vdc	8.25 vac	P1-88	P1-72	2.485	2.515
D.2	J1-70	J1-71	6.75 vac	8.25 vac	P1-107	P1-72	2.485	2.515
D.3	J1-72	J1-83	6.75 vac	8.25 vac	P1-128	P1-72	2.485	2.515
D.4	J1-105	J1-103	6.75 vac	8.25 vac	P1-39	P1-72	2.485	2.515
E.1	J1-3	J1-2	24.30 vac	25.40 vac	P1-131	P1-72	2.485	2.515
E.2	J1-28	J1-40	24.30 vac	25.40 vac	P1-130	P1-72	2.485	2.515
E.3	J1-30	J1-31	24.30 vac	25.40 vac	P1-110	P1-72	2.485	2.515
E.4	J1-14	J1-1	24.30 vac	25.40 vac	P1-90	P1-72	2.485	2.515
E.5	J1-29	J1-15	24.30 vac	25.40 vac	P1-91	P1-72	2.485	2.515
E.6	J1-17	J1-16	24.30 vac	25.40 vac	P1-108	P1-72	2.485	2.515
F.1	J1-61	J1-51	5.0 vac	5.5 vac	P1-17	P1-72	2.485	2.515
F.2	J1-60	J1-51	5.0 vac	5.5 vac	P1-18	P1-72	2.485	2.515
F.3	J1-50	J1-51	5.0 vac	5.5 vac	P1-35	P1-72	2.485	2.515
F.4	J1-90	J1-103	5.0 vac	5.5 vac	P1-58	P1-72	2.485	2.515
F.5	J1-104	J1-103	5.0 vac	5.5 vac	P1-40	P1-72	2.485	2.515
F.6	J1-92	J1-103	5.0 vac	5.5 vac	P1-56	P1-72	2.485	2.515
F.7	J1-102	J1-103	5.0 vac	5.5 vac	P1-20	P1-72	2.485	2.515
F.8	J1-88	J1-103	5.0 vac	5.5 vac	P1-22	P1-72	2.485	2.515
G.1	J1-48	J1-49	1580Ω	1680Ω	P1-50	P1-71	1.85	2.45
G.2	J1-48	J1-37	1580Ω	1680Ω	P1-15	P1-71	1.85	2.45
G.3	J1-48	J1-47	1580Ω	1680Ω	P1-34	P1-71	1.85	2.45
G.4	J1-48	J1-38	1580Ω	1680Ω	P1-51	P1-71	1.85	2.45

TABLE V (Continued)

Assembly Section	INPUT				OUTPUT			
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
H	J1-42	J1-53	19.8 vdc	20.2 vdc	P1-55	P1-71	11.35	12.65
I	J1-35	J1-6	-26 vdc	-30 vdc	P1-89	P1-71	2.485	2.515
J	J1-24	J1-36	119 vdc	121 vdc	P1-128	P1-71	2.485	2.515
K.1	J1-33	J1-32	5.0 vac	5.5 vac	P1-83	P1-66	2.485	2.515
K.2	J1-43	J1-32	5.0 vac	5.5 vac	P1-101	P1-100	2.485	2.515
K.3	J1-44	J1-32	5.0 vac	5.5 vac	P1-119	P1-120	2.485	2.515

* See notes of Table II

d. The continuity of the assembly shall be continuously monitored at the pins specified in Table VI. Any evidence of discontinuity shall be cause for rejection. The continuity monitoring circuitry shall have a response time of 10 μsec or less for any open circuit.

TABLE VI

CONTINUITY

CONNECTOR 30A1		RESISTANCE (ohms)
From	To	Max
J1-73	P1-52	1.0
J1-97	P1-68	
J1-85	P1-69	↕
J1-98	P1-86	
J1-84	P1-71	1.0

e. The output signals specified in Table V shall be continuously monitored during vibration. The electrical measuring equipment used to monitor the output signals shall be capable of measuring out-of-tolerance conditions that exist for a period greater than 1 msec.

f. During vibration, the amplitude shall have a tolerance of ±100 mv from the initial amplitude. The after-vibration amplitude shall have a tolerance of ±1.0 percent from the initial amplitude.

g. After vibration, the following shall be performed:

  (1) The assembly shall be examined in accordance with 4.3.1.

  (2) The output signals shall be measured to assure compliance with Table V. The input signals shall have the same amplitude as the previbration input signals.

4.3.6 Offset Voltage. The offset voltage test shall be performed as follows:

a. A 1 megohm ±1 percent load resistor shall be connected across each pair of output pins specified in Table V, except assembly section K wnich shall have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table V.

b. Each input Hi pin specified in Table V shall be connected to its respective Lo pin.

c. The operating voltages specified in Table IV shall be applied to the assembly.

d. The dc voltage across the output pins specified in Table II shall be measured and shall meet the requirement specified in 3.1.3.

4.3.7 Scale Factor. The scale factor test shall be performed as follows:

a. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table II.

b. The operating voltages and input signals specified in Tables II and IV shall be applied to the assembly.

c. The input voltages shall be adjusted within the ranges specified in Table II to obtain the outputs specified.

d. The voltage at each pair of input and output pins specified in Table II shall be measured.

e. With the input signal level maintained as in d, the phase of the 800 and 3200 cps inputs shall be shifted by 180.0° ±0.5°.

f. The voltage at each pair of output pins specified in Table II shall be measured. The scale factor shall be as specified in Table II. Reversing the phase of the ac signals shall reverse the polarity of the output and the dc level of the output shall be maintained within ±100 mv of that before phase reversal.

4.3.8 Output Ripple. The output ripple test shall be performed as follows:

a. The operating voltages specified in Table IV shall be applied to the assembly.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

SIGNAL CONDITIONER ASSEMBLY

DRAWING NO. 1007700

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/23/66	A	26585	3-10, 11, 14	WK	TM

This specification consists of page 1 to 14 inclusive.

APPROVALS	C. METZGER NASA/MSC	Bruce L. Hacker 28 Jan 66 MIT/IL	G W Kreer ACSP

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Continuity. Continuity shall be as specified in Table I.

TABLE I

CONTINUITY

		CONNECTOR 30A1		RESISTANCE (ohms)
From	To	From	To	Max
P2-1	P1-83	J1-107	P1-52	1.0
P2-2	P1-66	↑ -129	↑ -68	↑
P2-4	P1-101	-127	-69	
P2-5	P1-100	-106	-86	
P2-7	P1-119	-81	-72	
P2-8	P1-120	↓ -128	↓ -71	↓
P2-10	J1-49	J1-65	P1-71	1.0
P2-11	J1-48			

3.1.2 Insulation Resistance. The resistance from each connector pin to the assembly frame shall be equal to or greater than 100 megohms except for connector pins 30A1P2-13 and 30A1J1-10 which is ≤1.0 ohms.

3.1.3 Offset Voltage. The offset voltage shall be not greater than ±40 mvdc at the output pins of assembly Sections C, D, E, F, I and L specified in Table II. The offset voltage shall not be greater than 2.5±0.3 vdc at the output pins of Section K specified in Table II.

3.1.4 Scale Factors. The respective scale factors for the assembly sections shall be as specified in Table II.

3.1.5 Output Ripple. The maximum ripple voltage shall be less than 15 mv at the output pins of assembly sections C, D, E, F, I and L specified in Table II.

3.1.6 Thermistor Control Circuit. The output voltage of the thermistor control circuit, assembly section G, shall be not less than 1.85 vdc nor greater than 2.505 vdc at the output pins specified in Table II.

3.1.7 Input Impedance. The input impedance shall be less than 1 ohm at 800 cps.

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 1007700 and all drawings and engineering data referenced thereon.

3.2.2 Weight. The weight of the assembly shall be measured to the nearest tenth of a pound.

3.2.3 Calibration Reference Data. The assembly shall be operated in accordance with Table III. The input or output voltages for the respective input or output voltages specified in Table III shall be recorded where applicable.

TABLE II
SCALE FACTOR INPUT-OUTPUT PINS AND VOLTAGES

ASSEMBLY SECTION	INPUTS				OUTPUTS				OUTPUT SCALE FACTOR	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
A.1	J1-6	J1-5	26.0 vdc	30.0 vdc	P1-61	J1-5	4.70	4.72	0.155	0.181
A.2	J1-64	J1-63	26.0 vdc	30.0 vdc	P1-62	J1-63	4.70	4.72	0.155	0.181
A.3	J1-49	J1-41	26.0 vdc	30.0 vdc	P1-59	J1-41	4.70	4.72	0.155	0.181
A.4	J1-47	J1-41	26.0 vdc	30.0 vdc	P1-60	J1-41	4.70	4.72	0.155	0.181
B.1	J1-85	J1-68	26.95 vdc	29.05 vdc	P1-45	J1-68	4.06	4.08	0.139	0.151
B.2	J1-84	J1-68	26.95 vdc	29.05 vdc	P1-44	J1-68	4.06	4.08	0.139	0.151
B.3	J1-86	J1-68	26.95 vdc	29.05 vdc	P1-79	J1-68	4.06	4.08	0.139	0.151
B.4	J1-69	J1-68	26.95 vdc	29.05 vdc	P1-63	J1-68	4.06	4.08	0.139	0.151
B.5	J1-67	J1-68	26.95 vdc	29.05 vdc	P1-46	J1-68	4.06	4.08	0.139	0.151
C.1	J1-92	J1-91	7.7 vdc	8.3 vdc	P1-87	P1-72	2.495	2.505	0.300	0.326
C.2	J1-132	J1-110	7.7 vdc	8.3 vdc	P1-105	P1-72	2.495	2.505	0.300	0.326
C.3	J1-131	J1-109	7.7 vdc	8.3 vdc	P1-127	P1-72	2.495	2.505	0.300	0.326
D.1	J1-59	J1-41	6.75 vac	8.25 vac	P1-88	P1-72	2.495	2.505	0.302	0.372
D.2	J1-60	J1-43	6.75 vac	8.25 vac	P1-107	P1-72	2.495	2.505	0.302	0.372
D.3	J1-77	J1-61	6.75 vac	8.25 vac	P1-128	P1-72	2.495	2.505	0.302	0.372
D.4	J1-19	J1-56	6.75 vac	8.25 vac	P1-39	P1-72	2.495	2.505	0.302	0.372
*E.1	J1-2	J1-3	19.30 vac	20.70 vac	P1-131	P1-72	2.495	2.505	0.121	0.130
E.2	J1-25	J1-44	19.30 vac	20.70 vac	P1-130	P1-72	2.495	2.505	0.121	0.130
E.3	J1-45	J1-27	19.30 vac	20.70 vac	P1-110	P1-72	2.495	2.505	0.121	0.130
E.4	J1-1	J1-23	19.30 vac	20.70 vac	P1-90	P1-72	2.495	2.505	0.121	0.130
E.5	J1-24	J1-42	19.30 vac	20.70 vac	P1-91	P1-72	2.495	2.505	0.121	0.130
E.6	J1-4	J1-26	19.30 vac	20.70 vac	P1-108	P1-72	2.495	2.505	0.121	0.130
F.1	J1-94	J1-93	5.0 vac	5.5 vac	P1-17	P1-72	2.495	2.505	0.454	0.500
F.2	J1-112	J1-93	5.0 vac	5.5 vac	P1-18	P1-72	2.495	2.505	0.454	0.500
F.3	J1-111	J1-93	5.0 vac	5.5 vac	P1-35	P1-72	2.495	2.505	0.454	0.500
**G.1	J1-97	J1-115	1580 ohms	1680 ohms	P1-50	P1-71	1.85	2.505	--	--
**G.2	J1-97	J1-116	1580 ohms	1680 ohms	P1-34	P1-71	1.85	2.505	--	--
**G.3	J1-97	J1-98	1580 ohms	1680 ohms	P1-15	P1-71	1.85	2.505	--	--
**G.4	J1-97	J1-80	1580 ohms	1680 ohms	P1-51	P1-71	1.85	2.505	--	--

TABLE II (Continued)

ASSEMBLY SECTION	INPUTS				OUTPUTS				OUTPUT SCALE FACTOR	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
*H	J1-79	J1-78	19.8 vdc	20.2 vdc	P1-55	J1-65	11.35	12.65	0.562	0.637
I	J1-66	J1-83	-26 vdc	-30 vdc	P1-89	P1-71	2.495	2.505	0.454	0.500
***K.1	J1-95	J1-114	5.0 vac	5.5 vac	P1-83	P1-66	4.995	5.005	0.91	1.0
***K.2	J1-96	J1-114	5.0 vac	5.5 vac	P1-101	P1-100	4.995	5.005	0.91	1.0
***K.3	J1-113	J1-114	5.0 vac	5.5 vac	P1-119	P1-120	4.995	5.005	0.91	1.0
***L.1	J1-20	J1-56	5.0 vac	5.5 vac	P1-58	P1-72	2.495	2.505	0.454	0.500
***L.2	J1-57	J1-56	5.0 vac	5.5 vac	P1-40	P1-72	2.495	2.505	0.454	0.500
***L.3	J1-21	J1-56	5.0 vac	5.5 vac	P1-56	P1-72	2.495	2.505	0.454	0.500
***L.4	J1-73	J1-56	5.0 vac	5.5 vac	P1-20	P1-72	2.495	2.505	0.454	0.500
***L.5	J1-74	J1-56	5.0 vac	5.5 vac	P1-22	P1-72	2.495	2.505	0.454	0.500

* Section E leads 5°±1° reference.
** Set up for input condition.
*** Lagging 45° ±1° reference.

Sections D and E and L ac input voltage frequency is 800 cps, and Sections F and K ac input voltage frequencies are 3200 cps.

TABLE V

INPUT-OUTPUT PINS AND VOLTAGES FOR WORKMANSHIP-VIBRATION

Assembly Section	INPUTS				OUTPUTS			
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
A.1	J1-6	J1-5	26.0 vdc	30.0 vdc	P1-61	J1-5	4.36	5.06
A.2	J1-64	J1-63	26.0 vdc	30.0 vdc	P1-62	J1-63	4.36	5.06
A.3	J1-49	J1-48	26.0 vdc	30.0 vdc	P1-59	J1-41	4.36	5.06
A.4	J1-47	J1-48	26.0 vdc	30.0 vdc	P1-60	J1-41	4.36	5.06
B.1	J1-85	J1-68	26.95 vdc	29.05 vdc	P1-45	J1-68	3.92	4.22
B.2	J1-84	J1-68	26.95 vdc	29.05 vdc	P1-44	J1-68	3.92	4.22
B.3	J1-86	J1-68	26.95 vdc	29.05 vdc	P1-79	J1-68	3.92	4.22
B.4	J1-69	J1-68	26.95 vdc	29.05 vdc	P1-63	J1-68	3.92	4.22
B.5	J1-67	J1-68	26.95 vdc	29.05 vdc	P1-46	J1-68	3.92	4.22
C.1	J1-92	J1-91	7.7 vdc	8.3 vdc	P1-87	P1-72	2.485	25.5
C.2	J1-132	J1-110	7.7 vdc	8.3 vdc	P1-105	P1-72	2.485	25.5
C.3	J1-131	J1-109	7.7 vdc	8.3 vdc	P1-127	P1-72	2.485	25.5
D.1	J1-59	J1-41	6.75 vac	8.25 vac	P1-88	P1-72	2.485	2.515
D.2	J1-60	J1-43	6.75 vac	8.25 vac	P1-107	P1-72	2.485	2.515
D.3	J1-77	J1-61	6.75 vac	8.25 vac	P1-128	P1-72	2.485	2.515
D.4	J1-19	J1-56	6.75 vac	8.25 vac	P1-39	P1-72	2.485	2.515
*1 E.1	J1-2	J1-3	24.30 vac	25.40 vac	P1-131	P1-72	2.485	2.515
E.2	J1-25	J1-44	24.30 vac	25.40 vac	P1-130	P1-72	2.485	2.515
E.3	J1-45	J1-27	24.30 vac	25.40 vac	P1-110	P1-72	2.485	2.515
E.4	J1-1	J1-23	24.30 vac	25.40 vac	P1-90	P1-72	2.485	2.515
E.5	J1-24	J1-42	24.30 vac	25.40 vac	P1-91	P1-72	2.485	2.515
E.6	J1-4	J1-26	24.30 vac	25.40 vac	P1-108	P1-72	2.485	2.515
F.1	J1-94	J1-93	5.0 vac	5.5 vac	P1-17	P1-72	2.485	2.515
F.2	J1-112	J1-93	5.0 vac	5.5 vac	P1-18	P1-72	2.485	2.515
F.3	J1-111	J1-93	5.0 vac	5.5 vac	P1-35	P1-72	2.485	2.515
G.1	J1-97	J1-115	1580 ohms	1680 ohms	P1-50	P1-71	1.85	2.505
G.2	J1-97	J1-116	1580 ohms	1680 ohms	P1-34	P1-71	1.85	2.505
G.3	J1-97	J1-98	1580 ohms	1680 ohms	P1-15	P1-71	1.85	2.505
G.4	J1-97	J1-80	1580 ohms	1680 ohms	P1-51	P1-71	1.85	2.505
H	J1-79	J1-78	19.8 vdc	20.2 vdc	P1-55	P1-65	11.35	12.65
I	J1-66	J1-83	-26 vdc	-30 vdc	P1-89	P1-71	2.485	2.515
*2 K.1	J1-95	J1-114	5.0 vac	5.5 vac	P1-83	P1-66	4.985	5.005
*2 K.2	J1-96	J1-114	5.0 vac	5.5 vac	P1-101	P1-100	4.985	5.005
*2 K.3	J1-113	J1-114	5.0 vac	5.5 vac	P1-119	P1-120	4.985	5.005

*1 Section E leads 5° ±1° reference

*2 Lagging 45° ±1° reference

Sections D and E ac input voltage frequency is 800 cps, and sections F and K ac input voltage frequencies are 3200 cps.

d. The voltage at each pair of input and output pins specified in Table II shall be measured.

e. With the input signal level maintained as in d, the phase of the 800 and 3200 cps inputs shall be shifted by 180.0° ±1.0°.

f. The voltage at each pair of output pins specified in Table II shall be measured. The scale factor shall be as specified in Table II. Reversing the phase of the AC signals shall reverse the polarity of the output. Reversing the polarity of the DC input signals of Section C, Table II, shall reverse the polarity of the output. The output voltage shall be within ±100 mv of that before phase or polarity reversal.

4.3.8 Output Ripple. The output ripple test shall be performed as follows:

a. The operating voltages specified in Table IV shall be applied to the assembly.

b. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table II.

c. The signal voltages specified in Table II shall be consecutively applied to the input pins; simultaneously the peak-to-peak ripple voltage test appearing across the corresponding output pins shall be measured. The maximum ripple voltage shall be as specified in 3.1.5.

4.3.9 Thermistor Control Circuit. With the load connected across the pins specified in Table II for section G, the outputs for section G shall be as specified in 3.1.6.

4.3.10 Input Impedance. With 20.0±0.2 vdc and a 800±8 cps sine wave with a maximum peak voltage of 10 volts applied to 30A1J1-82 (+) and 30A1J1-83 (-), the impedance measured at 30A1J1-5 and 30A1J1-6 shall be less than 1 ohm.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

WS:jls

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

SIGNAL CONDITIONER ASSEMBLY

DRAWING NO. 1007700

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
2/23/66	A	26585	5-10, 11, 14	WK	TM
5/3/66	B	[illegible]	5, 11, 13	WK	ACM

This specification consists of page 1 to 14 inclusive.

APPROVALS	NASA/MSC	Bruce L Hacker 28 Jan 66 MIT/IL	ACSP

TABLE II (Continued)

ASSEMBLY SECTION	INPUTS				OUTPUTS				OUTPUT SCALE FACTOR	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
*H	J1-79	J1-78	19.8 vdc	20.2 vdc	P1-55	J1-65	11.35	12.65	0.562	0.637
I	J1-66	J1-83	-26 vdc	-30 vdc	P1-89	P1-71	3.99	4.01	0.133	0.154
***K. 1	J1-95	J1-114	5.0 vac	5.5 vac	P1-83	P1-66	4.995	5.005	0.91	1.0
***K. 2	J1-96	J1-114	5.0 vac	5.5 vac	P1-101	P1-100	4.995	5.005	0.91	1.0
***K. 3	J1-113	J1-114	5.0 vac	5.5 vac	P1-119	P1-120	4.995	5.005	0.91	1.0
**L. 1	J1-20	J1-56	5.0 vac	5.5 vac	P1-58	P1-72	2.495	2.505	0.454	0.500
**L. 2	J1-57	J1-56	5.0 vac	5.5 vac	P1-40	P1-72	2.495	2.505	0.454	0.500
**L. 3	J1-21	J1-56	5.0 vac	5.5 vac	P1-56	P1-72	2.495	2.505	0.454	0.500
**L. 4	J1-73	J1-56	5.0 vac	5.5 vac	P1-20	P1-72	2.495	2.505	0.454	0.500
**L. 5	J1-74	J1-56	5.0 vac	5.5 vac	P1-22	P1-72.	2.495	2.505	0.454	0.500

* Section E leads 5°±1° reference.

** Set up for input condition.

*** Lagging 45° ±1° reference.

Sections D and E and L ac input voltage frequency is 800 cps, and Sections F and K ac input voltage frequencies are 3200 cps.

TABLE V

INPUT-OUTPUT PINS AND VOLTAGES

FOR WORKMANSHIP-VIBRATION

Assembly Section	INPUTS				OUTPUTS			
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
A.1	J1-6	J1-5	26.0 vdc	30.0 vdc	P1-61	J1-5	4.36	5.06
A.2	J1-64	J1-63	26.0 vdc	30.0 vdc	P1-62	J1-63	4.36	5.06
A.3	J1-49	J1-48	26.0 vdc	30.0 vdc	P1-59	J1-41	4.36	5.06
A.4	J1-47	J1-48	26.0 vdc	30.0 vdc	P1-60	J1-41	4.36	5.06
B.1	J1-85	J1-68	26.95 vdc	29.05 vdc	P1-45	J1-68	3.92	4.22
B.2	J1-84	J1-68	26.95 vdc	29.05 vdc	P1-44	J1-68	3.92	4.22
B.3	J1-86	J1-68	26.95 vdc	29.05 vdc	P1-79	J1-68	3.92	4.22
B.4	J1-69	J1-68	26.95 vdc	29.05 vdc	P1-63	J1-68	3.92	4.22
B.5	J1-67	J1-68	26.95 vdc	29.05 vdc	P1-46	J1-68	3.92	4.22
C.1	J1-92	J1-91	7.7 vdc	8.3 vdc	P1-87	P1-72	2.485	25.5
C.2	J1-132	J1-110	7.7 vdc	8.3 vdc	P1-105	P1-72	2.485	25.5
C.3	J1-131	J1-109	7.7 vdc	8.3 vdc	P1-127	P1-72	2.485	25.5
D.1	J1-59	J1-41	6.75 vac	8.25 vac	P1-88	P1-72	2.485	2.515
D.2	J1-60	J1-43	6.75 vac	8.25 vac	P1-107	P1-72	2.485	2.515
D.3	J1-77	J1-61	6.75 vac	8.25 vac	P1-128	P1-72	2.485	2.515
D.4	J1-19	J1-56	6.75 vac	8.25 vac	P1-39	P1-72	2.485	2.515
*1E.1	J1-2	J1-3	19.3 vac	20.7 vac	P1-131	P1-72	2.485	2.515
E.2	J1-25	J1-44	19.3 vac	20.7 vac	P1-130	P1-72	2.485	2.515
E.3	J1-45	J1-27	19.3 vac	20.7 vac	P1-110	P1-72	2.485	2.515
E.4	J1-1	J1-23	19.3 vac	20.7 vac	P1-90	P1-72	2.485	2.515
E.5	J1-24	J1-42	19.3 vac	20.7 vac	P1-91	P1-72	2.485	2.515
E.6	J1-4	J1-26	19.3 vac	20.7 vac	P1-108	P1-72	2.485	2.515
F.1	J1-94	J1-93	5.0 vac	5.5 vac	P1-17	P1-72	2.485	2.515
F.2	J1-112	J1-93	5.0 vac	5.5 vac	P1-18	P1-72	2.485	2.515
F.3	J1-111	J1-93	5.0 vac	5.5 vac	P1-35	P1-72	2.485	2.515
G.1	J1-97	J1-115	1180 ohms	1280 ohms	P1-50	P1-71	2.495	2.505
G.2	J1-97	J1-116	1180 ohms	1280 ohms	P1-34	P1-71	2.495	2.505
G.3	J1-97	J1-98	1180 ohms	1280 ohms	P1-15	P1-71	2.495	2.505
G.4	J1-97	J1-80	1180 ohms	1280 ohms	P1-51	P1-71	2.495	2.505
H	J1-79	J1-78	19.8 vdc	20.2 vdc	P1-55	P1-65	11.35	12.65
I	J1-66	J1-83	-26 vdc	-30 vdc	P1-89	P1-71	3.900	4.100
*2K.1	J1-95	J1-114	5.0 vac	5.5 vac	P1-83	P1-66	4.985	5.005
*2K.2	J1-96	J1-114	5.0 vac	5.5 vac	P1-101	P1-100	4.985	5.005
*2K.3	J1-113	J1-114	5.0 vac	5.5 vac	P1-119	P1-120	4.985	5.005

*1 Section E leads 5° ±1° reference

*2 Lagging 45° ±1° reference

Sections D and E ac input voltage frequency is 800 cps, and sections F and K ac input voltage frequencies are 3200 cps.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

SIGNAL CONDITIONER ASSEMBLY

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2/23/66	A	26585	3-10, 11, 14	WK	TM
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5/3/66	C	28454	3, 4, 5, 11, 14	WK	ACM

This specification consists of page 1 to 14 inclusive.

APPROVALS	G. METZGER NASA/MSC	28 Jan 66 MIT/IL	ACSP

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Continuity. Continuity shall be as specified in Table I.

TABLE I

CONTINUITY

		CONNECTOR 30A1		RESISTANCE (ohms)
From	To	From	To	Max
P2-1	P1-83	J1-107	P1-52	1.0
P2-2	P1-66	↑ -129	↑ -68	↑
P2-4	P1-101	-127	-69	
P2-5	P1-100	-106	-86	
P2-7	P1-119	-81	-72	
P2-8	P1-120	↓ -128	↓ -71	↓
P2-10	J1-49	J1-65	P1-71	1.0
P2-11	J1-48			

3.1.2 Insulation Resistance. The resistance from each connector pin to the assembly frame shall be equal to or greater than 100 megohms except for connector pins 30A1P2-13 and 30A1J1-10 which is ≤ 1.0 ohms.

3,1,3 Offset Voltage. The offset voltage shall be not greater than ±40 mvdc at the output pins of assembly Sections C, D, E, F, I and L specified in Table II. The offset voltage shall not be greater than 2.5±0.3 vdc at the output pins of Section K specified in Table II.

3.1.4 Scale Factors. The respective scale factors for the assembly sections shall be as specified in Table II.

3.1.5 Output Ripple. The maximum ripple voltage shall be less than 15 mv at the output pins of assembly sections C, D, E, F, I and L specified in Table II.

3.1.6 Thermistor Control Circuit. The output voltage of the thermistor control circuit, assembly section G, shall be not less than 1.85 vdc nor greater than 2.505 vdc at the output pins specified in Table II.

3.1.7 Input Impedance. The input impedance shall be less than 1 ohm at 800 cps.

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 1007700 and all drawings and engineering data referenced thereon.

3.2.2 Weight. The weight of the assembly shall be measured to the nearest tenth of a pound.

3.2.3 Calibration Reference Data. The assembly shall be operated in accordance with Table III. The input or output voltages for the respective input or output voltages specified in Table III shall be recorded where applicable. The output voltage shall be set to within ±0.005 vdc as specified in Table III.

TABLE II
SCALE FACTOR INPUT-OUTPUT PINS AND VOLTAGES

ASSEMBLY SECTION	INPUTS				OUTPUTS				OUTPUT SCALE FACTOR	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
A.1	J1-6	J1-5	26.0 vdc	30.0 vdc	P1-61	J1-5	4.70	4.72	0.155	0.181
A.2	J1-64	J1-63	26.0 vdc	30.0 vdc	P1-62	J1-63	4.70	4.72	0.155	0.181
A.3	J1-49	J1-48	26.0 vdc	30.0 vdc	P1-59	J1-48	4.70	4.72	0.155	0.181
A.4	J1-47	J1-48	26.0 vdc	30.0 vdc	P1-60	J1-48	4.70	4.72	0.155	0.181
B.1	J1-85	J1-68	26.95 vdc	29.05 vdc	P1-45	J1-68	4.06	4.08	0.139	0.151
B.2	J1-84	J1-68	26.95 vdc	29.05 vdc	P1-44	J1-68	4.06	4.08	0.139	0.151
B.3	J1-86	J1-68	26.95 vdc	29.05 vdc	P1-79	J1-68	4.06	4.08	0.139	0.151
B.4	J1-69	J1-68	26.95 vdc	29.05 vdc	P1-63	J1-68	4.06	4.08	0.139	0.151
B.5	J1-67	J1-68	26.95 vdc	29.05 vdc	P1-46	J1-68	4.06	4.08	0.139	0.151
C.1	J1-92	J1-91	7.7 vdc	8.3 vdc	P1-87	P1-72	2.495	2.505	0.300	0.326
C.2	J1-132	J1-110	7.7 vdc	8.3 vdc	P1-105	P1-72	2.495	2.505	0.300	0.326
C.3	J1-131	J1-109	7.7 vdc	8.3 vdc	P1-127	P1-72	2.495	2.505	0.300	0.326
D.1	J1-59	J1-41	6.75 vac	8.25 vac	P1-88	P1-72	2.495	2.505	0.302	0.372
D.2	J1-60	J1-43	6.75 vac	8.25 vac	P1-107	P1-72	2.495	2.505	0.302	0.372
D.3	J1-77	J1-61	6.75 vac	8.25 vac	P1-128	P1-72	2.495	2.505	0.302	0.372
D.4	J1-19	J1-56	45 mvac	55 mvac	P1-39	P1-72	2.495	2.505	450.0	560.0
*E.1	J1-2	J1-3	19.30 vac	20.70 vac	P1-131	P1-72	2.495	2.505	0.121	0.130
E.2	J1-25	J1-44	19.30 vac	20.70 vac	P1-130	P1-72	2.495	2.505	0.121	0.130
E.3	J1-45	J1-27	19.30 vac	20.70 vac	P1-110	P1-72	2.495	2.505	0.121	0.130
E.4	J1-1	J1-23	19.30 vac	20.70 vac	P1-90	P1-72	2.495	2.505	0.121	0.130
E.5	J1-24	J1-42	19.30 vac	20.70 vac	P1-91	P1-72	2.495	2.505	0.121	0.130
E.6	J1-4	J1-26	19.30 vac	20.70 vac	P1-108	P1-72	2.495	2.505	0.121	0.130
F.1	J1-94	J1-93	5.0 vac	5.5 vac	P1-17	P1-72	2.495	2.505	0.454	0.500
F.2	J1-112	J1-93	5.0 vac	5.5 vac	P1-18	P1-72	2.495	2.505	0.454	0.500
F.3	J1-111	J1-93	5.0 vac	5.5 vac	P1-35	P1-72	2.495	2.505	0.454	0.500
**G.1	J1-97	J1-115	1580 ohms	1680 ohms	P1-50	P1-71	1.85	2.505	--	--
**G.2	J1-97	J1-116	1580 ohms	1680 ohms	P1-34	P1-71	1.85	2.505	--	--
**G.3	J1-97	J1-98	1580 ohms	1680 ohms	P1-15	P1-71	1.85	2.505	--	--
**G.4	J1-97	J1-80	1580 ohms	1680 ohms	P1-51	P1-71	1.85	2.505	--	--

TABLE II (Continued)

ASSEMBLY SECTION	INPUTS				OUTPUTS				OUTPUT SCALE FACTOR	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
*H	J1-79	J1-78	19.8 vdc	20.2 vdc	P1-55	J1-65	11.35	12.65	0.562	0.637
I	J1-66	J1-83	-26 vdc	-30 vdc	P1-89	P1-71	3.99	4.01	0.133	0.154
***K. 1	J1-95	J1-114	5.0 vac	5.5 vac	P1-83	P1-66	4.995	5.005	0.91	1.0
***K. 2	J1-96	J1-114	5.0 vac	5.5 vac	P1-101	P1-100	4.995	5.005	0.91	1.0
***K. 3	J1-113	J1-114	5.0 vac	5.5 vac	P1-119	P1-120	4.995	5.005	0.91	1.0
***L. 1	J1-20	J1-56	45 mvac	55 mvac	P1-58	P1-72	2.495	2.505	450.0	560.0
***L. 2	J1-57	J1-56	5.0 vac	6.2 vac	P1-40	P1-72	2.495	2.505	0.403	0.500
***L. 3	J1-21	J1-56	5.0 vac	6.2 vac	P1-56	P1-72	2.495	2.505	0.403	0.500
***L. 4	J1-73	J1-56	5.0 vac	6.2 vac	P1-20	P1-72	2.495	2.505	0.403	0.500
***L. 5	J1-74	J1-56	5.0 vac	6.2 vac	P1-22	P1-72	2.495	2.505	0.403	0.500

* Section E leads 5°±1° reference.

** Set up for input condition.

*** Lagging 45° ±1° reference.

Sections D and E and L ac input voltage frequency is 800 cps, and Sections F and K ac input voltage frequencies are 3200 cps.

TABLE V

INPUT-OUTPUT PINS AND VOLTAGES

FOR WORKMANSHIP-VIBRATION

Assembly Section	INPUTS				OUTPUTS			
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
A.1	J1-6	J1-5	26.0 vdc	30.0 vdc	P1-61	J1-5	4.36	5.06
A.2	J1-64	J1-63	26.0 vdc	30.0 vdc	P1-62	J1-63	4.36	5.06
A.3	J1-49	J1-48	26.0 vdc	30.0 vdc	P1-59	J1-41	4.36	5.06
A.4	J1-47	J1-48	26.0 vdc	30.0 vdc	P1-60	J1-41	4.36	5.06
B.1	J1-85	J1-68	26.95 vdc	29.05 vdc	P1-45	J1-68	3.92	4.22
B.2	J1-84	J1-68	26.95 vdc	29.05 vdc	P1-44	J1-68	3.92	4.22
B.3	J1-86	J1-68	26.95 vdc	29.05 vdc	P1-79	J1-68	3.92	4.22
B.4	J1-69	J1-68	26.95 vdc	29.05 vdc	P1-63	J1-68	3.92	4.22
B.5	J1-67	J1-68	26.95 vdc	29.05 vdc	P1-46	J1-68	3.92	4.22
C.1	J1-92	J1-91	7.7 vdc	8.3 vdc	P1-87	P1-72	2.485	25.5
C.2	J1-132	J1-110	7.7 vdc	8.3 vdc	P1-105	P1-72	2.485	25.5
C.3	J1-131	J1-109	7.7 vdc	8.3 vdc	P1-127	P1-72	2.485	25.5
D.1	J1-59	J1-41	6.75 vac	8.25 vac	P1-88	P1-72	2.485	2.515
D.2	J1-60	J1-43	6.75 vac	8.25 vac	P1-107	P1-72	2.485	2.515
D.3	J1-77	J1-61	6.75 vac	8.25 vac	P1-128	P1-72	2.485	2.515
D.4	J1-19	J1-56	45 mvac	55 mvac	P1-39	P1-72	2.485	2.515
*1E.1	J1-2	J1-3	19.3 vac	20.7 vac	P1-131	P1-72	2.485	2.515
E.2	J1-25	J1-44	19.3 vac	20.7 vac	P1-130	P1-72	2.485	2.515
E.3	J1-45	J1-27	19.3 vac	20.7 vac	P1-110	P1-72	2.485	2.515
E.4	J1-1	J1-23	19.3 vac	20.7 vac	P1-90	P1-72	2.485	2.515
E.5	J1-24	J1-42	19.3 vac	20.7 vac	P1-91	P1-72	2.485	2.515
E.6	J1-4	J1-26	19.3 vac	20.7 vac	P1-108	P1-72	2.485	2.515
F.1	J1-94	J1-93	5.0 vac	5.5 vac	P1-17	P1-72	2.485	2.515
F.2	J1-112	J1-93	5.0 vac	5.5 vac	P1-18	P1-72	2.485	2.515
F.3	J1-111	J1-93	5.0 vac	5.5 vac	P1-35	P1-72	2.485	2.515
G.1	J1-97	J1-115	1180 ohms	1280 ohms	P1-50	P1-71	2.495	2.505
G.2	J1-97	J1-116	1180 ohms	1280 ohms	P1-34	P1-71	2.495	2.505
G.3	J1-97	J1-98	1180 ohms	1280 ohms	P1-15	P1-71	2.495	2.505
G.4	J1-97	J1-80	1180 ohms	1280 ohms	P1-51	P1-71	2.495	2.505
H	J1-79	J1-78	19.8 vdc	20.2 vdc	P1-55	P1-65	11.35	12.65
I	J1-66	J1-83	-26 vdc	-30 vdc	P1-89	P1-71	3.900	4.100
*2K.1	J1-95	J1-114	5.0 vac	5.5 vac	P1-83	P1-66	4.985	5.005
*2K.2	J1-96	J1-114	5.0 vac	5.5 vac	P1-101	P1-100	4.985	5.005
*2K.3	J1-113	J1-114	5.0 vac	5.5 vac	P1-119	P1-120	4.985	5.005
L1	J1-20	J1-56	45 mvac	55 mvac	P1-58	P1-72	2.485	2.515
L2	J1-57	J1-56	5.0 vac	6.2 vac	P1-40	P1-72	2.485	2.515
L3	J1-21	J1-56	5.0 vac	6.2 vac	P1-56	P1-72	2.485	2.515
L4	J1-73	J1-56	5.0 vac	6.2 vac	P1-20	P1-72	2.485	2.515
L5	J1-74	J1-56	5.0 vac	6.2 vac	P1-22	P1-72	2.485	2.515

*1 Section E leads 5° ±1° reference.

*2 Lagging 45° ±1° reference

Sections D and E ac input voltage frequency is 800 cps, and sections F and K ac input voltage frequencies are 3200 cps.

d. The voltage at each pair of input and output pins specified in Table II shall be measured.

e. With the input signal level maintained as in d, the phase of the 800 and 3200 cps inputs shall be shifted by 180.0° ±1.0°.

f. The voltage at each pair of output pins specified in Table II shall be measured. The scale factor shall be as specified in Table II. Reversing the phase of the AC signals shall reverse the polarity of the output. Reversing the polarity of the DC input signals of Section C, Table II, shall reverse the polarity of the output. The output voltage shall be within ±100 mv of that before phase or polarity reversal.

4.3.8 Output Ripple. The output ripple test shall be performed as follows:

a. The operating voltages specified in Table IV shall be applied to the assembly.

b. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table II.

c. The signal voltages specified in Table II shall be consecutively applied to the input pins; simultaneously the peak-to-peak ripple voltage test appearing across the corresponding output pins shall be measured. The maximum ripple voltage shall be as specified in 3.1.5.

4.3.9 Thermistor Control Circuit. With the load connected across the pins specified in Table II for section G, the outputs for section G shall be as specified in 3.1.6.

4.3.10 Input Impedance. With 20.0±0.2 vdc and a 800±8 cps sine wave with a maximum peak voltage of 10 volts applied to 30A1J1-82 (+) and 30A1J1-83 (−), the impedance measured at 30A1J1-82 and 30A1J1-83 shall be less than 1 ohm.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

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2/23/66	A	26585	3-10, 11, 14 FH/AC	WK	TM
5/3/66	B	28455	5, 11, 13 RDG/AC	WK	ACM
5/3/66	C	28454	3, 4, 5, 11, 14 RDL/AC	WK	ACM
5/24/66	D	29159	4, 5, 11, 14 RDL/AC	MGM	ACM

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d. The voltage at each pair of input and output pins specified in Table II shall be measured.

e. With the input signal level maintained as in d, the phase of the 800 and 3200 cps inputs shall be shifted by 180.0° ±1.0° .

f. The voltage at each pair of output pins specified in Table II shall be measured. The scale factor shall be as specified in Table II. Reversing the phase of the AC signals shall reverse the polarity of the output. Reversing the polarity of the DC input signals of Section C, Table II, shall reverse the polarity of the output. The output voltage shall be within ±100 mv of that before phase or polarity reversal except for Section K which shall be 0 vdc ±400 mv after reversal of the input.

4.3.8 Output Ripple. The output ripple test shall be performed as follows:

a. The operating voltages specified in Table IV shall be applied to the assembly.

b. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table II.

c. The signal voltages specified in Table II shall be consecutively applied to the input pins; simultaneously the peak-to-peak ripple voltage test appearing across the corresponding output pins shall be measured. The maximum ripple voltage shall be as specified in 3.1.5.

4.3.9 Thermistor Control Circuit. With the load connected across the pins specified in Table II for section G, the outputs for section G shall be as specified in 3.1.6.

4.3.10 Input Impedance. With 20.0±0.2 vdc and a 800±8 cps sine wave with a maximum peak voltage of 10 volts applied to 30A1J1-82 (+) and 30A1J1-83 (−), the impedance measured at 30A1J1-82 and 30A1J1-83 shall be less than 1 ohm.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

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5/3/66	C	28454	3, 4, 5, 11, 14 RDG/AC	WK	ACM
5/24/66	D	29159	4, 5, 11, 14 RDG/AC	MGM	ACM
7/28/66	E	30294	3, 14 RDG/AC	EA	--

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d. The voltage at each pair of input and output pins specified in Table II shall be measured.

e. With the input signal level maintained as in d, the phase of the 800 and 3200 cps inputs shall be shifted by 180.0° ±1.0° .

f. The voltage at each pair of output pins specified in Table II shall be measured. The scale factor shall be as specified in Table II. Reversing the phase of the AC signals shall reverse the polarity of the output. Reversing the polarity of the DC input signals of Section C, Table II, shall reverse the polarity of the output. The output voltage shall be within ±100 mv of that before phase or polarity reversal except for Section K which shall be 0 vdc ±600 mv after reversal of the input.

4.3.8 Output Ripple. The output ripple test shall be performed as follows:

a. The operating voltages specified in Table IV shall be applied to the assembly.

b. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a 100K ±1 percent load resistor connected across each pair of output pins specified in Table II.

c. The signal voltages specified in Table II shall be consecutively applied to the input pins; simultaneously the peak-to-peak ripple voltage test appearing across the corresponding output pins shall be measured. The maximum ripple voltage shall be as specified in 3.1.5.

4.3.9 Thermistor Control Circuit. With the load connected across the pins specified in Table II for section G, the outputs for section G shall be as specified in 3.1.6.

4.3.10 Input Impedance. With 20.0±0.2 vdc and a 800±8 cps sine wave with a maximum peak voltage of 10 volts applied to 30A1J1-82 (+) and 30A1J1-83 (−), the impedance measured at 30A1J1-82 and 30A1J1-83 shall be less than 1 ohm.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

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5/24/66	D	29159	4, 5, 11, 14 RDG/AC	MGM	ACM
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Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 14 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	Bruce L Hecker W Kupfer	28 Jan 66 MIT/IL	G W Krier ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Signal Conditioner Assembly, Part Number 1007700-031, hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking for APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202C	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

1007700	Signal Conditioner Assembly

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
d. Documents listed in this section

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Continuity. Continuity shall be as specified in Table I.

TABLE I

CONTINUITY

		CONNECTOR 30A1		RESISTANCE (ohms)
From	To	From	To	Max
P2-1	P1-83	J1-107	P1-52	1.0
P2-2	P1-66	↑ -129	↑ -68	↑
P2-4	P1-101	-127	-69	
P2-5	P1-100	-106	-86	
P2-7	P1-119	-81	-72	
P2-8	P1-120	↓ -128	↓ -71	↓
P2-10	J1-49	J1-65	P1-71	1.0
P2-11	J1-48			

3.1.2 Insulation Resistance. The resistance from each connector pin to the assembly frame shall be equal to or greater than 100 megohms.

3.1.3 Offset Voltage. The offset voltage shall be not greater than ±40 mvdc at the output pins of assembly sections C, D, E, F, I, K and L specified in Table II. The offset voltage shall not be greater than 2.5±0.3 mvdc at the output pins of section L specified in Table II.

3.1.4 Scale Factors. The respective scale factors for the assembly sections shall be as specified in Table II.

3.1.5 Output Ripple. The maximum ripple voltage shall be less than 15 mv at the output pins of assembly sections C, D, E, F, I and L specified in Table II.

3.1.6 Thermistor Control Circuit. The output voltage of the thermistor control circuit, assembly section G, shall be not less than 1.85 vdc nor greater than 2.45 vdc at the output pins specified in Table II.

3.1.7 Input Impedance. The input impedance shall be less than 1 ohm at 800 cps.

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with Drawing 1007700 and all drawings and engineering data referenced thereon.

3.2.2 Weight. The weight of the assembly shall be measured to the nearest tenth of a pound.

3.2.3 Calibration Reference Data. The assembly shall be operated in accordance with Table III. The input or output voltages for the respective input or output voltages specified in Table III shall be recorded where applicable.

TABLE II
SCALE FACTOR INPUT-OUTPUT PINS AND VOLTAGES

ASSEMBLY SECTION	INPUTS				OUTPUTS				OUTPUT SCALE FACTOR	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
A.1	J1-6	J1-5	26.0 vdc	30.0 vdc	P1-61	J1-5	4.70	4.72	0.155	0.181
A.2	J1-64	J1-63	26.0 vdc	30.0 vdc	P1-62	J1-63	4.70	4.72	0.155	0.181
A.3	J1-49	J1-41	26.0 vdc	30.0 vdc	P1-59	J1-41	4.70	4.72	0.155	0.181
A.4	J1-47	J1-41	26.0 vdc	30.0 vdc	P1-60	J1-41	4.70	4.72	0.155	0.181
B.1	J1-85	J1-68	26.95 vdc	29.05 vdc	P1-45	J1-68	4.06	4.08	0.139	0.151
B.2	J1-84	J1-68	26.95 vdc	29.05 vdc	P1-44	J1-68	4.06	4.08	0.139	0.151
B.3	J1-86	J1-68	26.95 vdc	29.05 vdc	P1-79	J1-68	4.06	4.08	0.139	0.151
B.4	J1-69	J1-68	26.95 vdc	29.05 vdc	P1-63	J1-68	4.06	4.08	0.139	0.151
B.5	J1-67	J1-68	26.95 vdc	29.05 vdc	P1-46	J1-68	4.06	4.08	0.139	0.151
C.1	J1-92	J1-91	7.7 vdc	8.3 vdc	P1-87	P1-72	2.495	2.505	0.300	0.326
C.2	J1-132	J1-110	7.7 vdc	8.3 vdc	P1-105	P1-72	2.495	2.505	0.300	0.326
C.3	J1-131	J1-109	7.7 vdc	8.3 vdc	P1-127	P1-72	2.495	2.505	0.300 <	0.326
D.1	J1-59	J1-41	6.75 vac	8.25 vac	P1-88	P1-72	2.495	2.505	0.302 <	0.372
D.2	J1-60	J1-43	6.75 vac	8.25 vac	P1-107	P1-72	2.495	2.505	0.302	0.372
D.3	J1-77	J1-61	6.75 vac	8.25 vac	P1-128	P1-72	2.495	2.505	0.302	0.372
D.4	J1-19	J1-56	6.75 vac	8.25 vac	P1-39	P1-72	2.495	2.505	0.302	0.372
*E.1	J1-2	J1-3	19.30 vac	20.70 vac	P1-131	P1-72	2.495	2.505	0.121	0.130
E.2	J1-25	J1-44	19.30 vac	20.70 vac	P1-130	P1-72	2.495	2.505	0.121	0.130
E.3	J1-45	J1-27	19.30 vac	20.70 vac	P1-110	P1-72	2.495	2.505	0.121	0.130
E.4	J1-1	J1-23	19.30 vac	20.70 vac	P1-90	P1-72	2.495	2.505	0.121	0.130
E.5	J1-24	J1-42	19.30 vac	20.70 vac	P1-91	P1-72	2.495	2.505	0.121	0.130
E.6	J1-4	J1-26	19.30 vac	20.70 vac	P1-108	P1-72	2.495	2.505	0.121	0.130
F.1	J1-94	J1-93	5.0 vac	5.5 vac	P1-17	P1-72	2.495	2.505	0.454	0.500
F.2	J1-112	J1-93	5.0 vac	5.5 vac	P1-18	P1-72	2.495	2.505	0.454	0.500
F.3	J1-111	J1-93	5.0 vac	5.5 vac	P1-35	P1-72	2.495	2.505	0.454	0.500
**G.1	J1-97	J1-115	1580 ohms	1680 ohms	P1-50	P1-71	1.85	2.45	--	--
**G.2	J1-97	J1-116	1580 ohms	1680 ohms	P1-34	P1-71	1.85	2.45	--	--
**G.3	J1-97	J1-98	1580 ohms	1680 ohms	P1-15	P1-71	1.85	2.45	--	--
**G.4	J1-97	J1-90	1580 ohms	1680 ohms	P1-51	P1-71	1.85	2.45	--	--

TABLE II (Continued)

ASSEMBLY SECTION	INPUTS				OUTPUTS				OUTPUT SCALE FACTOR	
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)			
	Hi	Lo	Min	Max	Hi	Lo	Min	Max	Min	Max
*H	J1-79	J1-78	19.8 vdc	20.2 vdc	P1-55	J1-65	11.35	12.65	0.562	0.637
I	J1-66	J1-83	-26 vdc	-30 vdc	P1-89	P1-71	2.495	2.505	0.454	0.500
J	J1-24	J1-36	119 vdc	121 vdc	P1-128	P1-71	2.495	2.505	0.454	0.500
**K.1	J1-95	J1-114	5.0 vac	5.5 vac	P1-83	P1-66	4.995	5.005	0.91	1.0
***K.2	J1-96	J1-114	5.0 vac	5.5 vac	P1-101	P1-100	4.995	5.005	0.91	1.0
***K.3	J1-113	J1-114	5.0 vac	5.5 vac	P1-119	P1-120	4.995	5.005	0.91	1.0
***L.1	J1-20	J1-56	5.0 vac	5.5 vac	P1-58	P1-72	2.495	2.505	0.454	0.500
***L.2	J1-57	J1-56	5.0 vac	5.5 vac	P1-40	P1-72	2.495	2.505	0.454	0.500
***L.3	J1-21	J1-56	5.0 vac	5.5 vac	P1-56	P1-72	2.495	2.505	0.454	0.500
***L.4	J1-73	J1-56	5.0 vac	5.5 vac	P1-20	P1-72	2.495	2.505	0.454	0.500
***L.5	J1-74	J1-56	5.0 vac	5.5 vac	P1-22	P1-72	2.495	2.505	0.454	0.500

* Section E leads 5° reference.

** Set up for input condition.

*** Lagging 45° reference.

Sections D and E ac input voltage frequency is 800 cps, and sections F, K, and L ac input voltage frequencies are 3200 cps.

TABLE III

CALIBRATION

SCALAR CALIBRATION CURVE							
INPUT				OUTPUT			
Connector 30A1 Pin Number		Voltage	Nomenclature	Connector 30A1 Pin Number		Voltage (vdc)	Nomenclature
Hi	Lo			Hi	Lo		
J1-49	J1-41	28.0±0.1 vdc	+28 VDC IMU	J1-59	J1-41		IMU OPERATE
J1-47	J1-41		+28 VDC IMU STDY	J1-60	J1-42		IMU STANDBY
J1-64	J1-63		+28 VDC AGC	J1-62	J1-63		AGC OPERATE
J1-6	J1-5		+28 VDC OPTICS	J1-61	J1-5		OPTICS OPERATE
J1-85	J1-68		GIMBAL LOCK	J1-45	J1-68		GIMBAL LOCK
J1-84	J1-68		G&N ERROR LIGHT	J1-44	J1-68		ERROR DETECTOR
J1-86	J1-68	28.0±0.1 vdc	IMU TEMP CONT LIGHT FAIL	J1-79	J1-68		IMU TEMP FAIL
J1-69	J1-68		IMU DELAY LIGHT	J1-63	J1-68		IMU DELAY
J1-67	J1-68	28.0±0.1 vdc	AGC POWER SUPPLY FAIL	J1-46	J1-68		AGC POWER FAIL
GIMBAL RESOLVER CALIBRATION							
J1-4	J1-26	800.0±0.8 cps	SINE A OG 1X S4	P1-108	P1-72	0, 2.5, -1.5, -0.5 +0.5, +1.5, +2.5	OG 1X SIN
J1-24	J1-42		SINE A MG 1X	P1-91	P1-72		MG 1X SIN
J1-1	J1-23		SINE A IG 1X	P1-90	P1-72		IG 1X SIN
J1-45	J1-27		COS A OG 1X S3	P1-110	P1-72		OG 1X COS
J-25	J1-44		COS A MG 1X S3	P1-130	P1-72		MG 1X COS
J-2	J1-2[illegible]	800.0±0.8 cps	COS A IG 1X	P1-131	P1-72	0, 2.5, -1.5, -0.5, +0.5, +1.5, +2.5	IG 1X COS
TORQUE MOTOR CALIBRATION							
J1-92	J1-91		IG TORQUE MOTOR	P1-87	P1-72	0, -2.5 -1.5 -0.5 +0.5, +1.5 +2.5	IG TORQUE MOTOR
J1-132	J1-110		MG TORQUE MOTOR	P1-105	P1-72		MG TORQUE MOTOR
J1-131	J1-109		OG TORQUE MOTOR	P1-127	P1-72	0, -2.5, -1.5, -0.5 +0.5, +1.5, +2.5	OG TORQUE MOTOR
SERVO MOTOR CALIBRATION							
J1-94	J1-93		IMU IG & Y GYRO ERROR	P1-17	P1-72	0, -2.5, -1.5, -0.5 +0.5, +1.5, +2.5	IG SERVO ERROR
J1-112	J1-93		IMU MG ERROR	P1-18	P1-72		MG SERVO ERROR
J1-111	J1-93		IMU OG ERROR	P1-35	P1-72	0, -2.5 -1.5, -0.5 -0.5, +1.5, +2.5	OG SERVO ERROR
*J1-95	J1-114		X PIPA ERROR MONITOR	P2-16	P2-17	0, 1, 2, 3, 4, 5	X PIPA RECORDER
*J1-96	J1-114		Y PIPA ERROR MONITOR	P2-14	P2-15	0, 1, 2, 3, 4, 5	Y PIPA RECORDER

TABLE III Calibration (Continued)

*J1-113	J1-114		Z PIPA ERROR MONITOR	P2-18	P2-19	0, 1, 2, 3, 4, 5	Z PIPA RECORDER
J1-93	J1-56		SXT TRUNNION MDA IN BUFFERED	P1-20	P1-72	0, -2.5, -1.5, -0.5 +0.5, +1.5, +2.5	SXT TR MDA [illegible]
J1-74	J1-56		SXT SHAFT MDA IN BUFFERED	P1-22	P1-72		SXT SH MDA IN
J1-21	J1-56		SXT TRUNNION TACK FDBK BUFFERED	P1-56	P1-72	0, -2.5 -1.5, -0.5, +0.5, +1.5, +2.5	SX TR TACH OUT
J1-57	J1-56		SXT SHFT TACH FDBK BUFFERED	P1-40	P1-72	0, -2.5, -1.5, -0.5, +0.5, +1.5, +2.5	SXT SH TACH OUT
J1-20	J1-56		SHAFT CDU 16X ERROR BUFFERED	P1-58	P1-72	0, -2.5, -1.5, -0.5, +0.5, +1.5, +2.5	SH CDU 16X ERROR
			CDU RESOLVER CALIBRATION				
J1-59	J1-41		IG CDU 1X ERROR	P1-88	P1-72	0, -2.5, -1.5, -0.5, +0.5, +1.5, +2.5	IG CDU 1X ERROR
J1-60	J1-43		MG CDU 1X ERROR	P1-107	P1-72		MG CDU 1X ERROR
J1-77	J1-61		OG CDU 1X ERROR	P1-128	P1-72	0, -2.5, -1.5, -0.5, +0.5, +1.5, +2.5	OG CDU 1X ERROR

* A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table III except for (*) pins. The load resistor for these pins shall be 100K ±1.0 percent.

The ac input signals to the Servo Motor frequency is 3200 cps lagging the reference by 0° and 45°. The ac input signals to the resolvers and torque motor are 800 cps.

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Continuity	3.1.1	4.3.3
Insulation Resistance	3.1.2	4.3.4
Offset Voltage	3.1.3	4.3.6
Scale Factors	3.1.4	4.3.7
Output Ripple	3.1.5	4.3.8
Thermistor Control Circuit	3.1.6	4.3.9
Input Impedance	3.1.7	4.3.10
Drawing Compliance	3.2.1	4.3.1
Verification	3.2.2 and 3.2.3	4.3.2

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25° ±10°C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg

4.2.1.2 Test Power. The following test power is required for testing the assembly:

a. 28.0±0.1 vdc (adjustable)
b. 20.0±0.2 vdc (adjustable)
c. 8.0±0.3 vdc (adjustable)
d. 120.0±0.1 vdc (adjustable)
e. 7.50±0.75V rms, 800.0±0.8 cps (adjustable)
f. 28.0±2.8V rms, 800.0±0.8 cps (adjustable), 0° and 45° lagging reference
g. 5.0 +0.5, -0.0, 3200.0±3.2 cps (adjustable), 0° and 45° lagging reference
h. 20.0±0.7 vac, 800.0±0.8 cps (adjustable), 5° leading reference
i. -28±2 vdc

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3 TESTS

4.3.1 **Drawing Compliance.** The assembly shall be visually examined for compliance to the requirements of Drawing 1007700. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, pin misalignment, and legibility and appearance of markings.

4.3.2 **Verification.** Calibration records of data and weight measurement records shall be examined to verify that the requirements of 3.2.2 and 3.2.3 have been met.

4.3.3 **Continuity.** The continuity between the pins specified in Table I shall be measured with a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202.

4.3.4 **Insulation Resistance.** The resistance from each connector pin to the assembly frame shall be measured in accordance with Method 302 of Standard MIL-STD-202 using a megohmmeter having an output voltage of 225±75 vdc and limited to a short circuit current of 6.0 μa. The resistance shall be equal to or greater than 100 megohms.

4.3.5 **Workmanship-Vibration.** The assembly shall be mounted in the vibration fixture in a manner similar to the way it will be mounted in service and the test shall be performed as follows:

a. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a load resistor of 100K±1 percent connected across each pair of output pins specified in Table II.

b. The operating voltages and input signals specified in Tables IV and V shall be applied and the input signals adjusted to obtain the outputs specified in Table V.

c. The assembly shall be vibrated along the horizontal, vertical and lateral axes (see Figure 1) with a simple harmonic motion swept from 10 to 2000 cps at a rate of one octave per 15 seconds. The magnitude of vibration shall be 6.0g rms limited to a 0.4 inch pp constant displacement from 10 cps to the crossover frequency.

d. The continuity of the assembly shall be continuously monitored at the pins specified in Table VI. Any evidence of discontinuity shall be cause for rejection. The continuity monitoring circuitry shall have a response time of 10 μsec or less for any open circuit.

e. The output signals specified in Table V shall be continuously monitored during vibration. The electrical measuring equipment used to monitor the output signals shall be capable of measuring out-of-tolerance conditions that exist for a period greater than 1 msec.

f. During vibration, the amplitude shall have a tolerance of ±100 mv from the initial amplitude. The after-vibration amplitude shall have a tolerance of ±1.0 percent from the initial amplitude.

TABLE IV

OPERATING VOLTAGES

CONNECTOR 30A1 PINS		VOLTAGE	FREQUENCY (cps)
Hi	Lo		
J1-5	J1-6	20.0±0.2 vdc	—
J1-9	J1-8	28.00±0.28V rms	800.0±0.8
J1-59	J1-58	2.0±0.1V rms	3200.0±3.2
J1-45	J1-59	28.00±0.28V rms	800.0±0.8

TABLE V

INPUT-OUTPUT PINS AND VOLTAGES FOR WORKMANSHIP-VIBRATION

Assembly Section	INPUTS				OUTPUTS			
	Input Pins Connector 30A1		Input Parameters		Output Pins Connector 30A1		Output Voltage (vdc)	
	Hi	Lo	Min	Max	Hi	Lo	Min	Max
A.1	J1-6	J1-5	26.0 vdc	30.0 vdc	P1-61	J1-5	4.36	5.06
A.2	J1-64	J1-63	26.0 vdc	30.0 vdc	P1-62	J1-63	4.36	5.06
A.3	J1-49	J1-41	26.0 vdc	30.0 vdc	P1-59	J1-41	4.36<	5.06
A.4	J1-47	J1-41	26.0 vdc	30.0 vdc	P1-60	J1-41	4.36	5.06
B.1	J1-85	J1-68	26.95 vdc	29.05 vdc	P1-45	J1-68	3.92	4.22
B.2	J1-84	J1-68	26.95 vdc	29.05 vdc	P1-44	J1-68	3.92	4.22
B.3	J1-86	J1-68	26.95 vdc	29.05 vdc	P1-79	J1-68	3.92	4.22
B.4	J1-69	J1-68	26.95 vdc	29.05 vdc	P1-63	J1-68	3.92	4.22
B.5	J1-67	J1-68	26.95 vdc	29.05 vdc	P1-46	J1-68	3.92	4.22
C.1	J1-92	J1-91	7.7 vdc	8.3 vdc	P1-87	P1-72	2.485	25.5
C.2	J1-132	J1-110	7.7 vdc	8.3 vdc	P1-105	P1-72	2.485	25.5
C.3	J1-131	J1-109	7.7 vdc	8.3 vdc	P1-127	P1-72	2.485	25.5
D.1	J1-59	J1-41	6.75 vac	8.25 vac	P1-88	P1-72	2.485	2.515
D.2	J1-60	J1-43	6.75 vac	8.25 vac	P1-107	P1-72	2.485	2.515
D.3	J1-77	J1-61	6.75 vac	8.25 vac	P1-128	P1-72	2.485	2.515
D.4	J1-19	J1-56	6.75 vac	8.25 vac	P1-39	P1-72	2.485	2.515
*1 E.1	J1-2	J1-3	24.30 vac	25.40 vac	P1-131	P1-72	2.485	2.515
E.2	J1-25	J1-44	24.30 vac	25.40 vac	P1-130	P1-72	2.485	2.515
E.3	J1-45	J1-27	24.30 vac	25.40 vac	P1-110	P1-72	2.485	2.515
E.4	J1-1	J1-22	24.30 vac	25.40 vac	P1-90	P1-72	2.485	2.515
E.5	J1-24	J1-42	24.30 vac	25.40 vac	P1-91	P1-72	2.485	2.515
E.6	J1-4	J1-26	24.30 vac	25.40 vac	P1-108	P1-72	2.485	2.515
F.1	J1-94	J1-93	5.0 vac	5.5 vac	P1-17	P1-72	2.485	2.515
F.2	J1-112	J1-93	5.0 vac	5.5 vac	P1-18	P1-72	2.485	2.515
F.3	J1-111	J1-93	5.0 vac	5.5 vac	P1-35	P1-72	2.485	2.515
F.4	J1-33	J1-32	5.0 vac	5.5 vac	P1-38	P1-72	2.485	2.515
F.5	J1-43	J1-32	5.0 vac	5.5 vac	P1-21	P1-72	2.485	2.515
F.6	J1-44	J1-32	5.0 vac	5.5 vac	P1-57	P1-72	2.485	2.515
G.1	J1-97	J1-115	1580 ohms	1680 ohms	P1-50	P1-71	1.85	2.45
G.2	J1-97	J1-116	1580 ohms	1680 ohms	P1-34	P1-71	1.85	2.45
G.3	J1-97	J1-98	1580 ohms	1680 ohms	P1-15	P1-71	1.85	2.45
G.4	J1-97	J1-98	1580 ohms	1680 ohms	P1-51	P1-71	1.85	2.45
H	J1-79	J1-78	19.8 vdc	20.2 vdc	P1-55	P1-65	11.35	12.65
I	J1-66	J1-83	-26 vdc	-30 vdc	P1-89	P1-71	2.485	2.515
*2 K.1	J1-95	J1-114	5.0 vac	5.5 vac	P2-16	P2-17	4.985	5.905
*2 K.2	J1-96	J1-114	5.0 vac	5.5 vac	P2-14	P2-15	4.985	5.905
*2 K.3	J1-113	J1-114	5.0 vac	5.5 vac	P2-18	P2-19	4.985	5.905

*1 Section E leads 5° reference
*2 Lagging 45° reference

Sections D and E ac input voltage frequency is 800 cps, and sections F, K, and L ac input voltage frequencies are 3200 cps. K, F

TABLE VI

CONTINUITY

CONNECTOR 30A1		RESISTANCE (ohms)
From	To	Max
J1-107	P1-52	1.0
↑ 129	↑ 68	↑
127	69	
↓ 106	↓ 86	↓
J1-128	P1-71	1.0

g. After vibration, the following shall be performed:

(1) The assembly shall be examined in accordance with 4.3.1.

(2) The output signals shall be measured to assure compliance with Table V. The input signals shall have the same amplitude as the previbration input signals.

4.3.6 Offset Voltage. The offset voltage test shall be performed as follows:

a. A 1 megohm ±1 percent load resistor shall be connected across each pair of output pins specified in Table V, except assembly section K which shall have a 100K±1 percent load resistor connected across each pair of output pins specified in Table V.

b. Each input Hi pin specified in Table V shall be connected to its respective Lo pin.

c. The operating voltages specified in Table IV shall be applied to the assembly.

d. The dc voltage across the output pins specified in Table II shall be measured and shall meet the requirement specified in 3.1.3.

4.3.7 Scale Factor. The scale factor test shall be performed as follows:

a. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a 100K±1 percent load resistor connected across each pair of output pins specified in Table II.

b. The operating voltages and input signals specified in Tables II and IV shall be applied to the assembly.

c. The input voltages shall be adjusted within the ranges specified in Table II to obtain the outputs specified.

d. The voltage at each pair of input and output pins specified in Table II shall be measured.

e. With the input signal level maintained as in d, the phase of the 800 and 3200 cps inputs shall be shifted by 180.0° ±0.5°.

f. The voltage at each pair of output pins specified in Table II shall be measured. The scale factor shall be as specified in Table II. Reversing the phase of the ac signals shall reverse the polarity of the output and the dc level of the output shall be maintained within ±100 mv of that before phase reversal.

4.3.8 Output Ripple. The output ripple test shall be performed as follows:

a. The operating voltages specified in Table IV shall be applied to the assembly.

b. A 1 megohm ±1 percent resistor shall be connected across each pair of output pins specified in Table II, except assembly section K which shall have a 100K±1 percent load resistor connected across each pair of output pins specified in Table II.

c. The signal voltages specified in Table II shall be consecutively applied to the input pins; simultaneously the peak-to-peak ripple voltage test appearing across the corresponding output pins shall be measured. The maximum ripple voltage shall be as specified in 3.1.5.

4.3.9 Thermistor Control Circuit. With the load connected across the pins specified in Table II for section G, the outputs for section G shall be as specified in 3.1.6.

4.3.10 Input Impedance. With 20.0±0.2 vdc and a 800±8 cps sine wave with a maximum peak voltage of 10 volts applied to 30A1J1-5 (+) and 30A1J1-6 (-), the impedance measured at 30A1J1-5 and 30A1J1-6 shall be less than 1 ohm.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

GWK:efo

APOLLO G&N Specification
PS2016150 REV B
Original Issue Date: 22 MAR 66
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

SIGNAL CONDITIONER, FRAME ASSEMBLY

DRAWING NO. 1007670

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
Ⓜ 11/3/66	A	31803	2	EA	- -
11/3/66	B	31805	7-11 was 11 pages now 9 pages	EA	- -

This specification consists of page 1 to 9 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	22 Mar 66 MIT/IL	ACSP

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

SIGNAL CONDITIONER, FRAME ASSEMBLY

DRAWING NO. 1007670

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				MIT	NASA

This specification consists of page 1 to 11 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	W Kupfer 22 Mar 66 MIT/IL	ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Signal Conditioner, Frame Assembly, hereafter called the assembly, Part Number 1007670-021.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing, and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

1007670	Signal Conditioner, Frame Assembly

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Continuity and DC Resistance and Shorting	3.1.1	4.3.4
Insulation Resistance	3.1.2	4.3.5
Drawing Compliance	3.2.1	4.3.1
Verification	3.2.2	4.3.2

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25° ±10°C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3 TESTS

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 1007670. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, pin misalignment, and legibility and appearance of markings.

4.3.2 Verification. Weight measurement records shall be examined to verify that the requirement of 3.2.2 has been met.

4.3.3 Workmanship-Vibration. For spares only, the assembly shall be vibrated with dummy modules which simulate the respective module weight and connect the proper connector pins for continuity during the vibration test. The shorted pins for the dummy modules shall be as specified in Table II. The assembly shall be mounted in the vibration fixture in a

TABLE II

WORKMANSHIP-VIBRATION CONTINUITY CHECK

DUMMY MODULE SHORTED PINS		CONTINUITY FOR CONNECTOR	
From	To	From (+)	To (-)
J2-4	J2-3	J1-107	J1-9
J4-13	J4-15	↑ 13	↑
J7-18	J7-20	105	
J5-20	J5-17	16	↓
J6-13	J6-18	61	J1-9
J2-10	J2-8	108	J1-5
J5-13	J5-14	2	
J4-44	J4-41	53	↑
J4-34	J4-40	37	
J6-12	J6-21	60	↓
J7-6	J7-3	70	J1-5
J7-15	J7-19	96	J1-8
J5-12	J5-16	1	
J6-11	J6-19	50	↑
J2-2	J2-5	↓ 106	↓
J4-30	J4-33	J1-42	J1-8
J2-13	J2-11	J1-94	J1-7
J5-21	J5-18	J1-17	
J6-10	J6-5	J1-51	↑
J3-5	J3-2	J1-104	
J7-7	J7-4	J1-71	↓
—	—	P1-72	J1-7
P2-8	P2-11	P1-120	J1-6
J2-1	J2-7	J1-93	↑
J6-8	J6-16	P1-17	
J5-11	J5-15	J1-3	
J4-43	J4-49	J1-48	
J4-48	J4-42	J1-49	
J7-22	J7-25	P1-39	
J7-8	J7-2	J1-83	
J4-4	J4-3	J1-18	↓
J4-2	J4-1	J1-20	J1-6
—	—	P1-71	J1-21
—	—	J1-84	
J4-27	J4-47	J1-11	↑
J4-25	J4-45	J1-12	↓
J7-11	J7-12	P1-89	J1-21
J4-7	J4-20	J1-66	J1-19
P2-7	P2-10	P1-119	J1-19
J4-24	J4-26	J1-10	J1-23

TABLE II (continued)

DUMMY MODULE SHORTED PINS		CONTINUITY FOR CONNECTOR	
From	To	From (+)	To (-)
J4-31	J4-28	P1-50	J1-23
J4-32	J4-29	P1-46	
J4-19	J4-16	P1-59	
J4-9	J4-14	J1-46	J1-23
J3-6 J3-10 J7-23	J3-3 J3-15 J7-24	P1-56	J1-92
P2-4 J6-9	P2-16 J6-24	P1-101	J1-33
J6-7	J6-22	P1-18	J1-44
J2-14	J2-15	P1-127	J1-95
J2-12	J2-9	P1-87	P1-105
J7-13	J7-14	P1-88	J1-35
J7-9	J7-21	J1-72	J1-65
J4-5	J4-23	J1-4	J1-65
J3-18	J3-17	P1-40	J1-65
J3-14	J3-16	P1-58	J1-103
J7-16	J7-17	J1-82	J1-103
J6-6 P2-18 J6-14	J6-4 P2-19 J6-15	P1-35	J1-59
P2-2 J6-3	P2-15 J6-2	P1-66	J1-58
J7-5	J7-10	P1-107	P1-128
J3-9	J3-4	J1-90	J1-45
J3-12	J3-8	P1-20	J1-88
J3-7	J3-8	J1-102	J1-88
J3-11	J3-13	P1-22	J1-55
J4-51	J4-50	P1-34	J1-47
J4-18	J4-17	P1-51	J1-38
J4-35	J4-46	P1-15	J1-55
J4-11	J4-12	P1-63	P1-79
J4-10	J4-8	P1-44	P1-45
J4-6	J4-8	P1-61	P1-45
J4-21	J4-22	P1-60	P1-62
J5-2	J5-3	J1-31	J1-30
J5-7	J5-6	J1-28	J1-29
J5-5	J5-6	J1-40	J1-29
P2-5 J6-20	P2-17 J6-25	P1-100	J1-32
P2-1 J6-17	P2-14 J6-23	P1-83	J1-43

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

SIGNAL CONDITIONER, FRAME ASSEMBLY

DRAWING NO. 1007670

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
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This specification consists of page 1 to 10 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	22 Mar 66 MIT/IL	R Osberg | CO Pasche ACSP

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Continuity and DC Resistance and Shorting	3.1.1	4.3.4
Insulation Resistance	3.1.2	4.3.5
Drawing Compliance	3.2.1	4.3.1
Verification	3.2.2	4.3.2

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplisnment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25° ±10°C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3 TESTS

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 1007670. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, pin misaslingment, and legibility and appearance of markings.

4.3.2 Verification. Weight measurement records shall be examined to verify that the requirement of 3.2.2 has been met.

4.3.3 Workmanship–Vibration. For spares only, the assembly shall be vibrated with dummy modules which simulate the respective module weight and connect the proper connector pins for continuity during the vibration test. The shorted pins for the dummy modules shall be as specified in Table II. The assembly shall be mounted in the vibration fixture in a manner similar to the way it will be mounted in service so that it will be vibrated along the axes shown in Figure 1. The assembly shall be vibrated with simple harmonic motion swept from 10 to 2000 cps at a rate of one octave/15 sec. The magnitude of vibration shall be 3.5g rms limited to a 0.3 inch pp constant displacement from 10 cps to the crossover frequency. During vibration the continuity of the assembly shall be constantly monitored at the pins specified in Table II.

TABLE II

WORKMANSHIP-VIBRATION CONTINUITY CHECK

DUMMY MODULE SHORTED PINS		CONTINUITY FOR CONNECTOR	
From	To	From (+)	To (-)
J2-4	J2-3	J1-110	J1-11
J4-13	J4-15	J1-67	↑
J7-18	J7-20	J1-19	│
J6-13	J6-18	J1-94	↓
J5-20	J5-17	J1-26	J1-11
J2-10	J2-8	J1-132	J1-82
J5-13	J5-14	J1-3	↑
J4-34	J4-40	J1-98	│
J4-44	J4-41	J1-78	│
J7-6	J7-3	J1-60	↓
J6-12	J6-21	J1-112	J1-82
J2-2	J2-5	J1-92	J1-12
J4-30	J4-33	J1-79	↑
J6-11	J6-19	J1-111	│
J5-12	J5-16	J1-23	↓
J7-15	J7-19	J1-59	J1-12
J2-13	J2-11	J1-109	J1-81
J5-21	J5-18	J1-4	↑
J7-7	J7-4	J1-43	│
----	----	P1-72	│
J6-10	J6-5	J1-93	↓
J3-5	J3-2	J1-21	J1-81
J2-1	J2-7	J1-91	J1-83
J5-11	J5-15	J1-2	↑
J4-49	J4-43	J1-97	│
J4-48	J4-42	J1-115	│
J7-8	J7-2	J1-61	│
J7-22	J7-25	P1-39	↓
J6-8	J6-16	P1-17	J1-83
----	----	P1-17	J1-65
----	----	J1-128	↑
J4-27	J4-47	J1-86	│
J4-25	J4-45	J1-84	↓
J7-11	J7-12	P1-89	J1-65
J4-7	J4-20	J1-5	J1-49
P2-7	P2-10	P1-119	J1-49
J4-24	J4-26	J1-85	J1-68
J4-31	J4-28	P1-50	↑
J4-9	J4-14	J1-69	│
J4-19	J4-16	P1-59	↓
J4-32	J4-29	P1-46	J1-68
J7-9	J7-21	J1-77	J1-6
J4-5	J4-23	J1-64	J1-6
J3-18	J3-17	P1-40	J1-6
J3-8 J7-23 J3-10	J3-7 J7-24 J3-15	P1-56	J1-73

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
4/12/66	A	28005	2, 3, 4, 10, 12, 13, 15, 18, 19, 21,	WK	ACM
			23, 28		

This specification consists of page 1 to 32 inclusive.

APPROVALS	C. METZGER NASA/MSC	MIT/IL CCB	R. Temple ACSP A.E. Winberg

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Inertial Measuring Unit, Part Number 2018601-041.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002071	Process Specification, Soldering of Electrical Connections
ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
PS2010604	Procurement Specification, Product Configuration and Acceptance Test Requirements, APOLLO CM/LEM G&N System Requirement Items

North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

STANDARDS

Military

MIL-STD-202C	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2018601	Inertial Measuring Unit Assembly

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. - In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Inputs. The assembly shall function as specified herein when supplied with the following inputs:

a. Gimbal angle resolver: 28.00±0.42V rms, 800 ± 10^{-6} cps
b. Control heater: 22 to 33.5 vdc Standby; 24.5 to 33.5 vdc operate
c. Blower and IRIG wheel: ϕA28.0 ±1.4V rms ϕB 28.0 ±2.1V rms 800 ± 10^{-6} cps
d. Ducosyn: 28.60±0.43 V rms 3200 ± 10^{-6} cps at feedback
e. Gimbal Mounted Electronics: 24.5 to 33.5 vdc
f. GSE heater: 31V maximum from the GSE temperature control equipment

3.1.2 Characteristics

3.1.2.1 Heat Exchanger Leak Rate. The leak rate of the heat exchanger shall be 5 x 10^{-6} std cc/sec of helium, maximum, at a differential pressure of 77.5 + 4.0, -0.0 psig of helium.

3.1.2.2 Heat Exchanger Pressure Drop. The heat exchanger pressure drop shall be 1.2 to 1.6 inches of Hg at a water glycol coolant flow rate of 33±1 lb/hr at an inlet temperature of 45° ±2°F and an ambient temperature of 75° ±4°F.

3.1.2.3 PIPA Temperature. In the IMU operate mode (See 6.2) the temperature control point of the PIPA's shall be within the range of 129.2° to 131.2°F with ±0.5°F maximum instability under the following environment.

a. Ambient pressure: one atmosphere to a vacuum of 10^{-9} torr

b. Ambient temperature: 0° to 160°F in a vacuum of 10^{-9} torr, 20° to 107°F at one atmosphere pressure

c. Coolant temperature: 32° to 55°F

d. Coolant flow: 25 to 48 lb/hr (33±3 lb/hr nominal)

e. Gimbal position: Any

f. Supply voltage: As specified in 3.1.1.a through e

g. Temperature sensing element current:

   (1) PIPA: 6.00±0.12 ma dc
   (2) IRIG: 2.00±0.04 ma dc

3.1.2.4 IRIG Temperature. In the IMU operate mode, the temperature control point of the IRIG's shall be within the range of 133.5°to136.5°F with ±1.0°F max instability under the environment specified in 3.1.2.3.

TABLE VI(Continued)

FROM	TO	RESISTANCE (Ohms)	FROM	TO	RESISTANCE (Ohms)
J1-12	A16-6	<1.2	J2-16	P16-a	<1.1
A14-3	R5-2	<0.2	J2-17	A5-2	<1.2
J1-23	P17-R	<1.1	J2-18	A5-5	<1.2
J1-23	P16-R	<1.1	A5-9	P19-6	<0.2
J1-23	P15-R	<1.2	A5-7	P19-7	↑
J1-24	P16-B	<1.1.	A5-3	P19-21	↓
J1-24	P16-J	↑	A5-1	A6-1	<0.2
J1-25	P17-B		J2-19	P16-A	<1.1
J1-25	P17-J		J2-19	P16-S	<1.1
J2-1	P18-8		J2-20	P16-C	<1.1
J2-2	P18-2		J2-20	P17-C	<1.1
J2-2	P18-22	↓	J2-20	P15-C	<1.2
J2-3	P18-4	<1.1	J2-23	P15-A	<1.2
J2-4	P15-b	<1.2	J2-23	P15-d	<1.2
J2-5	P15-a	<1.2	J2-24	P17-A	<1.1
J2-6	A4-2	<1.1	J2-24	P17-d	<1.1
P18-6	A4-9	<0.2	J2-32	P17-a	↑
P18-7	A4-7	<0.2	J2-33	P17-b	
P18-21	A4-3	<0.2	J2-34	P17-Z	↓
J2-7	A4-5	<1.1	J2-34	P16-Z	<1.1
J2-8	T1-1	<1.1	J2-34	P15-Z	<1.2
J2-8	J2-10	<2.0	J2-35	A6-2	<1.1
J2-9	T1-2	<1.1	J2-36	A6-5	↑
J2-9	J2-11	<2.0	J2-37	A4-4	
T1-3	P20-25	0.05 to 0.15	J2-37	P17-H	↓
T1-3	P19-25	↑	J2-37	P16-H	<1.1
T1-3	P18-25		J2-37	P15-H	<1.2
T1-4	P20-9		J2-38	P17-c	<1.1
T1-4	P19-9	↓	↑	P16-c	<1.1
T1-4	P18-9	0.05 to 0.15		P15-c	<1.2
T1-5	P15-W	0.1 to 0.2	↓	A4-1	<1.1
T1-5	P16-W	↑	J2-38	A6-1	<1.1
T1-5	P17-Y		J2-59	P20-8	↑
T1-6	P15-Y		J2-60	P20-2	
T1-6	P16-Y	↓	J2-60	P20-22	↓
T1-6	P17-W	0.1 to 0.2	J2-61	P20-4	<1.1
T1-6	T1-7	<0.2	P20-6	A6-9	<0.2
T1-7	A4-4	<0.2	P20-7	A6-7	<0.2
T1-7	A6-4	<0.2	P20-21	A6-3	<0.2
T1-7	A5-4	<0.2	P20-1	P19-14	<0.25
J2-12	P19-8	<1.3	P20-14	P18-1	<0.25
J2-13	P19-2	↑	P20-23	P19-23	<0.35
J2-13	P19-22	↓	↑	P18-23	<0.2
J2-14	P19-4	<1.3	↓	A13-4	<0.2
J2-15	P16-b	<1.1	P20-23	R4-1	<0.35
			J2-26	A13-3	<1.1

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Heat Exchanger Leak Rate	3.1.2.1	4.3.2
Heat Exchanger Pressure Drop	3.1.2.2	4.3.3
PIPA Temperature	3.1.2.3	4.3.5.5
IRIG Temperature	3.1.2.4	4.3.5.5.
Standby to Operate Time	3.1.2.5	4.3.5.6
Standby to Operate Temperature Change	3.1.2.6	4.3.5.7
Temperature Alarm	3.1.2.7	4.3.5.1
Blower Operation	3.1.2.8	4.3.5.2
Blower, Fixed Heater and Bias Heater Current	3.1.2.9	4.3.5.3
Temperature Control Current	3.1.2.10	4.3.5.4
Coolant Composition	3.1.2.11	4.3.18
Torque Motor Phasing	3.1.2.12	4.3.6
1X and 16X Resolver Phasing	3.1.2.13	4.3.7
Precision Resolver Alignment Module	3.1.2.14	4.3.8
PIP Phasing	3.1.2.15	4.3.9
IRIG and Gyro Error Resolver Phasing	3.1.2.16	4.3.10
Balance	3.1.2.17	4.3.11
Gimbal Torque	3.1.2.18	4.3.12
Pressure	3.1.2.19	4.3.13
Telemetry Signal Outputs	3.1.2.20	4.3.14
PTC Interlock	3.1.2.21	4.3.15
Resistance	3.1.2.22	4.3.4
Drawing Compliance	3.2.1	4.3.1
Continuity and DC Resistance	3.2.2.1	4.3.17
Insulation Resistance	3.1.2.23	4.3.16
Selection of Heater Padding Resistors	3.2.2.2	4.3.17

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Inertial Component Temperature. Unless otherwise specified, the inertial component temperatures shall be maintained as follows:

a. IRIG: 135.0° ±5.0°F
b. PIP: 130.5° ±5.0°F

TABLE V

RESISTANCE

SIGNAL	PINS		RESISTANCE VALUE (Ohms)	
	From (+)	To (-)	Minimum	Maximum
Chassis Ground	J1-1	Case	0.0	0.5
PIP & IRIG Control Htr	J1-2	J1-4	4 K	34K
PTCInterlock (GSE)	J1-2	J1-19	4949	5051
PIP & IRIG Control Htr	J1-3	J1-5	4K	34K
PIP & IRIG Control Htr (GSE)	J1-6	J1-8	9	13
PIP & IRIG Control Htr (GSE)	J1-7	J1-9	9	13
Blowers	J1-11	J1-12	14	20
PIP Temp Sensor	J1-14	J1-15	1542	1578
Temp Sensor Common	J1-15	J1-26	1.0	2.0
Temp Sensor Common	J1-16	J1-18	1.0	2.0
IRIG Temp Sensor	J1-17	J1-18	2300	2670
X IRIG Wheel (ØA)	J1-22	J1-21	40	55
Y IRIG Wheel (ØA)	J1-22	J1-24	↑	↑
Z IRIG Wheel (ØA)	J1-22	J1-25		
X IRIG Wheel (ØB)	J1-23	J1-21		
Y IRIG Wheel (ØB)	J1-23	J1-24	↓	↓
Z IRIG Wheel (ØB)	J1-23	J1-25	40	55
Resolver Excitation	J1-27	J1-28	6	31
PIP Temp Sensor (Tele)	J1-29	J1-30	1542	1578
IRIG Temp Sensor (Tele)	J1-31	J1-32	2300	2670
COS A_{IG} 16X	J1-33	J1-34	47	115
SIN A_{IG} 16X	J1-35	J1-36	47	115
COS A_{IG} 1X	J1-37	J1-38	72	119
SIN A_{IG} 1X	J1-39	J1-40	72	119
COS A_{MG} 16X	J1-41	J1-42	47	115
SIN A_{MG} 16X	J1-43	J1-44	47	115
COS A_{MG} 1X	J1-45	J1-46	72	119
SIN A_{MG} 1X	J1-47	J1-48	72	119
COS A_{OG} 16X	J1-51	J1-52	47	115
SIN A_{OG} 16X	J1-53	J1-54	47	115
COS A_{OG} 1X	J1-55	J1-56	72	119
SIN A_{OG} 1X	J1-57	J1-58	72	119
X IRIG Torque +	J2-4	J2-34	160	210
X IRIG Torque -	J2-5	J2-34	160	210
X PIP Error	J2-6	J2-7	30K	33K
Ducosyn Excitation	J2-8	J2-9	1	5
Ducosyn Feedback	J2-10	J2-11	1	5
Y IRIG Torque +	J2-15	J2-34	160	210
Y IRIG Torque -	J2-16	J2-34	160	210
Y PIP Error	J2-17	J2-18	30K	33K

TABLE V (Continued)

SIGNAL	PINS		RESISTANCE VALUE (Ohms)	
	From (+)	To (-)	Minimum	Maximum
IG Error	J2-19	J2-20	78	140
MG Error	J2-21	J2-20	77	230
OG Error	J2-22	J2-20	77	230
X IRIG Error	J2-23	J2-20	27	62
Z IRIG Error	J2-24	J2-20	27	62
Control Htr (Tele)	J2-25	J1-2	9.5K	10.5K
Z IRIG Torque +	J2-32	J2-34	160	210
Z IRIG Torque -	J2-33	J2-34	160	210
Z PIP Error	J2-35	J2-36	30K	33K
IG Motor	J2-39	J2-40	20	72
MG Motor	J2-41	J2-42	20	72
OG Motor	J2-51	J2-52	10	40
Sensor Common	J1-16	J1-26	0.0	1

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5/24/66	D	29158	7, 8, 25 RDG/AC	MGM	---

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3.1.2.14 Precision Resolver Alignment Module. The 16X resolver sine outputs, at the pins specified in Table III, shall increase 0.36V rms, minimum, in-phase, with respect to the resolver excitation when the precision resolver alignment module potentiometers are rotated fully cw from the extreme ccw position for each axis.

TABLE III

PRECISION RESOLVER ALIGNMENT MODULE SENSITIVITY

AXIS	16X RESOLVER OUTPUT TERMINALS*	
	Hi	Lo
Inner	J1-35	J1-36
Middle	J1-43	J1-44
Outer	J1-53	J1-54

*The gimbals shall be locked such that the 16X resolver outputs at the terminals shown shall be 0 to 0.6 volt in phase with respect to the resolver excitation.

3.1.2.15 PIP Phasing

a. The "X" PIP shall be approximately at null when the gimbals and stable member are at the normal zero positions (see Figure 1). The "X" PIP output at pins J2-6 (Hi) and J2-7 (Lo) shall increase in phase when the float is driven away from null with a ccw rotation of the stable member as viewed from the resolver end of the IGA.

b. The "Y" PIP shall be approximately at null when the gimbals and stable member are at the normal zero positions. The "Y" PIP output at pins J2-17 (Hi) and J2-18 (Lo) shall increase in phase when the float is driven away from null with a cw rotation of the OG as viewed from the resolver end of the OGA.

c. The "Z" PIP shall be approximately at null when the MG and stable member are at their normal zero positions and the OG is 90° ccw from its normal zero position. The "Z" PIP output at pins J2-35 (Hi) and J2-36 (Lo) shall increase in phase when the float is driven away from null by a cw rotation of the OG as viewed from the resolver end of the OGA.

3.1.2.16 IRIG and Gyro Error Resolver Phasing. The IRIG and gyro error resolver outputs shall be as specified in Table IV when torqued electrically from null.

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5/18/66	C	29028	2	MGM	--
5/24/66	D	29158	7, 8, 25	MGM	---
6/14/66	E	29665	12	MGM	—

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5/18/66	C	29028	2 RDG/AC	MGM	--
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selection of the proper resistor. Allow for stabilization after any adjustment.

b. With the control heater duty cycle at 20±5 percent the average PIPA temperature shall be within 0.25°F of the values obtained in 3.2.2.2.2.a and 3.2.2.2.3.a. If the requirement is not met, repeat 3.2.2.2.2.a and 3.2.2.2.3.a.

3.2.2.2.4 Selection of PIPA Fixed Heater Padding Resistor (R3). With the control heater duty cycle at 20±5 percent, allow for stabilization and record ΔT. If the ΔT is equal to or less than 4.9°F, a 1020 ohm resistor shall be selected for the PIPA fixed heater padding resistor (R3); and if the ΔT is greater than 4.9°F the resistor shall be selected to achieve a ΔT of 4.8°F ±0.1°F. Allow for stabilization after any adjustment. Record the current through R3 after selection of the proper resistor.

3.2.2.2.5 Selection of Thermostat Bias Heater Padding Resistor (R5). With the control heater duty cycle at 20±5 percent, the thermostat bias heater padding resistor (R5) shall be selected to set the average PIPA temperature at 130.20° ±0.15°F. Allow for stabilization after any adjustment.

3.2.2.2.6 Selection of Blower Control Thermostat Bias Heater Padding Resistor (R6). With the control heater duty cycle at 43 +0,-5 percent, the blower control thermostat bias heater padding resistor (R6) shall be selected to just turn OFF the blowers. Allow for repeatable cycling after any adjustment and record the total blower current.

3.2.2.2.7 GSE Heater Padding Resistor (R2). The GSE heater padding resistor (R2) shall be of the value selected in 3.2.2.2.2.b.

3.2.2.2.8 Selection of Alarm Thermostat Anticipatory Heater Padding Resistor R10. Select a resistor which will result in double the current through R10 as measured through R4 when the control heaters switch on. Use the resistor called out on the drawing which most closely approximates this requirement.

3.2.2.2.9 Selection of Alarm Thermostat Bias Heater Padding Resistor (R9). Select a resistor which will result in the current specified in Figure 2 through R9 as determined by the current measured through R3. Use the resistor called out on the drawing which most closely approximates this requirement.

4.2.1.2 Environmental. Unless otherwise specified, the unsealed assemblies shall be tested under the following ambient conditions.

a. Temperature: 75° ±4°F

b. Relative Humidity: 50 percent max

c. Pressure Differential: Internal positive 0.01 inch H_2O.

d. Partial Count Tolerance: Maximum of 100,000 particles/cu ft. of air between 1 and 10 microns. Maximum of 25,000 particles/cu ft. of air greater than 10 microns.

e. Atmospheric Pressure: 14.7±1.0 psia

4.2.1.3 Test Power. The following electrical inputs are necessary to perform the tests specified herein:

a. Gimbal angle resolver: 28.0±2.5V rms, 800±80 cps
b. Control heater: 22.0 to 33.5 vdc standby, 24.5 to 33.5 vdc operate
c. Blower and IRIG wheel: ϕA28.0 ±1.4V ϕB 28.0±2.5V 800±80 cps
d. Ducosyn: 28.60±0.3V rms, 3200±32 cps at feedback.
e. Gimbal Mounted Electronics 24.5 to 33.5 vdc
f. GSE heater: 31V maximum from the GSE temperature control equipment

4.2.1.4 Test Setup. Unless otherwise specified herein, the tests in 4.3.5 shall be performed with the following conditions established. The IMU shall be in the standby mode when power is applied as specified in c and d, and shall be in the operate mode when power is applied as specified in c through h.

a. Padding resistors installed as selected in 3.2.2.2.

b. IMU completely assembled

c. 22.0±0.2 vdc (standby) 24.5±0.2 vdc (operate) applied to the PIPA and IRIG control heaters at pins J1-2 (Hi), J1-3 (Hi), J1-4 (Lo), and J1-5 (Lo).

d. Excitation applied to the ducosyns at pins J2-8 (Hi) and J2-9 (Lo) so that 28.6±0.3 V rms 3200±32 cps is measured at the feedback pins J2-10 (Hi) and J2-11 (Lo).

e. ϕA26.6±0.2V rms ϕB25.9±0.2V rms 800±8 cps applied to the IRIG wheels at pins J1-22 (ϕA), J1-23 (ϕB), J1-21 (com), J1-24 (com), and J1-25 (com). (See 6.3).

f. 28.00±2.5V rms; 800±80 cps applied to the gimbal angle resolvers at pins J1-27 (Hi) and J1-28 (Lo).

g. 24.5±0.2 vdc applied to the gimbal mounted electronics at pins J2-36 (Hi) and J2-37 (Lo).

4.3.14 Telemetry Signal Output. With the inputs specified in 4.2.1.4.c (24.5 vdc), g, and h (26.9±1.6V rms) applied, the telemetry signals shall be as follows:

a. When the blowers switch off the blower telemetry signal voltage at pins J1-20 (Hi) and J1-12 (Lo) shall be 26.9±1.1V rms.

b. When the control heaters switch on, the control heater telemetry signal voltage at pins J1-2 (Hi) and J2-25 (Lo) shall be 22.0±2.0 vdc.

4.3.15 PTC Interlock. With the input specified in 4.2.1.4.c (24.5 vdc) applied, the PTC Interlock signal voltage at pins J1-19 (Hi) and J1-4 (Lo) shall be 24.5±0.5 vdc.

4.3.16 Insulation Resistance. The insulation resistance shall be as specified in Table VII. when measured with a megohmmeter limited to a short circuit current of one milliampere at an output voltage of 50 +0 -5.0 vdc in accordance with Standard MIL-STD-202 Method 302.

4.3.17 Verification. Test or examination data shall be examined to verify that the requirements of 3.2.2.1 and 3.2.2.2 have been met.

4.3.18 Coolant Composition. The coolant composition used in the liquid coolant loop shall be as specified in 3.1.2.11.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES

6.1 Indicating Sensor Resistance to Degrees Conversion. Tables IX and X may be used to convert the measured PIP and IRIG indicating sensor resistance to degrees fahrenheit.

6.2 MODES OF OPERATION

6.2.1 Standby. The IMU shall be in the standby mode when power is applied as specified in 3.1.1.b and d.

6.2.2 Operate. The IMU shall be in the operate mode when power is applied as specified in 3.1.1.a through e.

6.3 IRIG TURN ON PROCEDURE. With the wheels excited with the required voltage for a minimum of three minutes, turn the wheel excitation off for a minimum of five minutes and then turn on. Repeat the turn-off procedure a minimum of three times prior to testing. The wheel voltage shall be within limits before proceeding when checked after the first turn-off. Adjust if necessary.

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6/14/66	E	29665	12	MGM	—
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be positioned at 90° ±10° ccw from zero as viewed from the resolver end of the IGA. Coolant shall be circulated through the heat exchanger.

a. Apply 28.0±0.5v dc to the PIPA and IRIG control heaters at pins J1-2 (Hi), J1-3 (Hi), J1-4 (Lo), and J1-5 (Lo).

b. Apply excitation to the ducosyns at pins J2-8 (Hi),, and J2-9 (Lo) so that 28.6±0.3V rms, 3200±32 cps is measured at the feedback pins J2-10 (Hi) and J2-11 (Lo).

c. Apply 28.0±0.1V rms, 800±8 cps to the IRIG wheels at pins J1-22 (ϕA), J1-23 (ϕB), J1-21 (com), J1-24 (com), and J1-25 (com). The wheel voltage shall be constant within 0.1V throughout the heater control calibration. (See 6.3).

d. Apply 28.00±2.5V rms, 800±80 cps to the gimbal angle resolvers at pins J1-27 (Hi) and J1-28 (Lo).

e. Apply 28.0±1.4 vdc to the gimbal mounted electronics at pins J2-38 (Hi) and J2-37 (Lo).

f. Apply 28.0±0.5V rms. 800±8 cps to the blowers at pins J1-11 (Hi) and J1-12 (Lo). The blowers shall be on throughout the padding resistor selection procedure., unless otherwise specified.

g. [illegible]

3.2.2.2.2 Selection of Control Heater Padding Resistor (R1). The control heater padding resistor (R1) shall be selected as follows:

a. The inertial component temperatures shall be stabilized with control heater duty cycle at 7±2 percent. The average PIPA temperature shall be 130.2±3.0°F and the ΔT (difference between the PIPA and IRIG indicated temperature) shall be ≥4.0°F.

b. With the control heater duty cycle increased to 50±5 percent, the control heater padding resistor (R1) shall be selected to achieve a ΔT within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment. Remove the +28 vdc at J1-59 if necessary, to obtain 50±5 percent control heater duty cycle.

NOTE: During stabilization, the PIPA and IRIG indicating sensors shall be monitored and data continuously recorded. The PIPA and IRIG temperatures are stabilized when they have not changed by more than 0.10°F over a one hour period. The measured average PIPA and IRIG indicating sensor data shall be converted to degrees Fahrenheit (See 6.1).

3.2.2.2.3 Selection of Thermostat Anticipatory Heater Padding Resistor (R4). The thermostat anticipatory heater padding resistor (R4) shall be selected as follows:

a. With the control heater duty cycle at 50±5 percent, the control thermostat anticipatory heater padding resistor (R4) shall be selected to achieve an average PIPA temperature within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment.

b. With the control heater duty cycle at 20±5 percent the average PIPA temperature shall be within 0.25°F of the values obtained in 3.2.2.2.2.a and 3.2.2.2.3.a. If the requirement is not met, repeat 3.2.2.2.2.a and 3.2.2.2.3.a.

3.2.2.2.4 Selection of PIPA Fixed Heater Padding Resistor (R_3). With the control heater duty cycle at 20±5 percent, allow for stabilization and record ΔT. If the ΔT is equal to or less than 4.9°F, a 1020 ohm resistor shall be selected for the PIPA fixed heater padding resistor (R_3); and if the ΔT is greater than 4.9°F the resistor shall be selected to achieve a ΔT of 4.8°F ±0.1°F. Allow for stabilization after any adjustment.

3.2.2.2.5 Selection of Thermostat Bias Heater Padding Resistor (R_5). With the control heater duty cycle at 20±5 percent, the thermostat bias heater padding resistor (R_5) shall be selected to set the average PIPA temperature at 130.20° ±0.15°F. Allow for stabilization after any adjustment.

3.2.2.2.6 Selection of Blower Control Thermostat Bias Heater Padding Resistor (R_6). With the control heater duty cycle at 43 +0, -5 percent, the blower control thermostat bias heater padding resistor (R_6) shall be selected to just turn OFF the blowers. Allow for repeatable cycling after any adjustment and record the total blower current.

3.2.2.2.7 GSE Heater Padding Resistor (R2). The GSE heater padding resistor (R2) shall be of the value selected in 3.2.2.2.2.b.

3.2.2.2.8 Selection of Alarm Thermostat Anticipatory Heater Padding Resistor R_{10}. The thermostat anticipatory heater padding resistor (R10) shall be selected as follows:

a. With the control heater duty cycle at 7±2 percent and R10 set at 30Ω, R_9 shall be adjusted so that the alarm signal cycles on and off at a 7±5 percent duty cycle.

$$\text{Alarm duty cycle} = \frac{\text{Alarm Time on}}{\text{Alarm Time on} + \text{Alarm Time Off}} \times 100$$

Allow for stabilization after any adjustment. If this requirement cannot be met, proceed to paragraphs 3.2.2.2.10 and 3.2.2.2.11.

b. With the control heater duty cycle increased to 50±5 percent, the anticipatory heater padding resistor (R10 shall be selected to achieve a 50±5 percent alarm duty cycle. Allow for stabilization after any adjustment.

c. Measure the current (I_1) through R9 as selected in 3.2.2.2.8.a. Calculate power $P_1 = 98\ I_1^2$.

3.2.2.2.9 Selection of Alarm Thermostat Bias Heater Padding Resistor (R9). Select a resistor which will result in 4.0 watts less power (P_2) in the bias heaters than was calculated in 3.2.2.2.8.c. Use the resistor called out on the drawing which most closely approximates the required current I_2.

$$P_2 = P_1 - 4.0 \quad I_2 = \sqrt{\frac{P_2}{98}}$$

3.2.2.2.10 Alternate Selection of Alarm Thermostat Anticipatory Heater Padding Resistor (R10). The alarm thermostat anticipatory heater padding resistor (R10) shall be selected as follows:

a. Interchange all leads at pins 1 and 2 of the Temperature Alarm Thermostat (A16) with all leads at pins 1 and 2 of the Temperature Control Thermostat (A14) respectively.

b. The inertial component temperatures shall be established with a control heater duty cycle at 7±2 percent, and the average PIPA temperature shall be 126.2° ±3.0°F.

c. With a control heater duty cycle at 40±5 percent, the alarm thermostat anticipatory heater padding resistor (R10) shall be selected to achieve an average PIPA temperature within 0.25°F of the values obtained in 3.2.2.2.10.b. Allow for stabilization after any adjustments.

d. With a control heater duty cycle at 20±5 percent, the average PIPA temperature shall be within 0.25°F of the values obtained in 3.2.2.2.10.b and c. If the requirement is not met, repeat 3.2.2.2.10.b and c.

3.2.2.2.11 Alternate Selection of Alarm Thermostat Bias Heater Padding Resistor (R_9). With 3.2.2.2.10 performed and a control heater duty cycle at 20±5 percent, the alarm thermostat bias heater padding resistor (R_9) shall be selected to set the average PIPA temperature at 126.20° ±0.25°F. Allow for stabilization after any adjustment.

4.3.5.1.2 Low Alarm Standby. With the IMU in the standby mode, the low alarm test shall be performed as follows:

a. With pins J1-4 and J2-26 shorted and the IMU temperature allowed to decrease from a stabilized heater control duty cycle of 40±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 126.0° ±2.5°F.

b. With the short in 4.3.5.1.2.a removed immediately after the temperature alarm indication and the IMU temperature allowed to increase, the PIPA temperature shall be within +1.0° , -0.5°F of the value recorded at the temperature alarm point when the alarm turns off.

4.3.5.1.3 High Alarm Operate. With pins J1-4 and J2-26 shorted and the IMU in the operate mode, the high alarm test shall be performed as follows:

a. With the voltage specified in 4.2.1.3.f applied to the GSE control heaters at pins J1-6 (Hi), J1-7 (Hi), J1-8 (Lo), and J1-9 (Lo) and the IMU temperature allowed to increase from a stabilized heater control duty cycle of 20±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 135.2° ±2.5°F.

   NOTE: Control heaters and GSE heaters shall not be energized simultaneously.

b. With the GSE heater voltage in 4.3.5.1.3.a removed immediately after the temperature alarm indication and the IMU temperature allowed to decrease, the PIPA temperature shall be within +0.5° , -1.0°F of the value recorded at the temperature alarm point when the alarm turns off.

c. With the voltages specified in 4.2.1.4.c and g increased to 33.5±0.2 vdc and the voltage specified in 4.1.1.4.e and h increased to ØA 29.4 ±0.2V rms, ØB 30.5±0.2V rms, the duty cycle shall be set at 30±10 percent with the middle gimbal and stable member at 0±10 percent and the outer gimbal positioned at 90° ±10° ccw (Y_{sm} Up) an alarm shall not occur. Allow for stabilization. (See 6.3)

4.3.5.1.4 High Alarm Standby. With pins J1-4 and J2-26 shorted and the IMU in the standby mode, the high alarm test shall be performed as follows:

a. With the voltage specified in 4.2.1.3.f applied to the GSE control heaters at pins J1-6 (Hi), J1-7 (Hi) J1-8 (Lo), J1-9 (Lo) and the IMU temperature allowed to increase from a stabilized heater control duty cycle of 40±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 136.0° ±2.5°F.

   NOTE: Control heaters and GSE heaters shall not be energized simultaneously.

b. With the GSE heater voltage in 4.3.5.1.4.a removed immediately after the temperature alarm indication and the IMU temperature allowed to decrease, the PIPA temperature shall be within +0.5° , -1.0°F of the value recorded at the temperature alarm point when the alarm turns off.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals MIT	Approvals NASA
4/12/66	A	28005	2, 3, 4, 10, 12, 13, 15, 18, 19, 21,	WK	ACM
			23, 28 RDG/AC		
5/17/66	B	28922	10, 11 JH/AC	MGM	--
5/18/66	C	29028	2 RDG/AC	MGM	--
5/24/66	D	29158	7, 8, 25 RDG/AC	MGM	---
6/14/66	E	29665	12 JH/AC	MGM	—
7/5/66	F	30016	15, 16, 19, 21, 22, 23, 28 RDG/AC	MGM	---
9/22/66	G	31235	4, 15, 16, 17, 21, 22, 23 RDG/AC	MGM EA	---
9/29/66	H	31357	4, 8, 12, 13, 21, 23 RDG/AC	MGM EA	--

This specification consists of page 1 to 32 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	W Trageser 3/3/65 MIT/IL CCB	R. Temple ACSP A.E. Winberg

3.1.2.5 Standby to Operate Time. Within 15 minutes for the PIPA's and within 30 minutes for the IRIG's after switching from standby (see 6.2) to the operate mode; the PIPA and IRIG temperatures shall be within ±0.5°F of the temperature control points specified in 3.1.2.3 and 3.1.2.4 under the environment specified in 3.1.2.3.

3.1.2.6 Standby to Operate Temperature Change. The change in steady state temperature of the PIPA's when switching from standby to the operate mode, shall be a maximum of 1.0°F. under the environment specified in 3.1.2.3.

3.1.2.7 Temperature Alarm

3.1.2.7.1 Operate Mode. A temperature alarm signal shall be generated when the PIPA temperature is less than 126.2° ±2.5°F or greater than 135.2° ±2.5°F under the environment specified in 3.1.2.3.

3.1.2.7.2 Standby Mode. A temperature alarm signal shall be generated when the PIPA temperature is less than 126° ±2.5°F or greater than 136.0° ±2.5°F under the environment specified in 3.1.2.3.

3.1.2.8 Blower Operation. The blowers shall be on or cycling on and off at a control heater duty cycle of 25 percent to 65 percent and shall remain off at all higher duty cycles under the environment specified in 3.1.2.3. The blowers shall be on at all lower duty cycles under the environment specified in 3.1.2.3 and the air flow through to the blowers shall be from the middle gimbal to the case. The control heater duty cycle shall be determined as follows:

$$\text{DUTY CYCLE in percent} = \frac{\text{time on}}{\text{time on} + \text{time off}} \times 100$$

3.1.2.9 Blower, Fixed Heater, and Bias Heater Current. The combined blower, fixed heater, and bias heater current shall be 0.7±0.3 amp under the environment specified in 3.1.2.3 with the blowers running.

3.1.2.10 Temperature Control Current. The temperature control current shall be 3.4±1.4 amp under the environment specified in 3.1.2.3.

3.1.2.11 Coolant Composition. The coolant composition used in the liquid coolant loop shall be in accordance with Specification MH01-01349-416.

3.1.2.12 Torque Motor Phasing. Application of dc voltage in accordance with Table I shall cause the stable member and the middle and outer gimbals to rotate ccw, when viewed along the axis of rotation from the resolver end.

TABLE IV

IRIG AND GYRO ERROR RESOLVER OUTPUTS

IRIG	STABLE MEMBER POSITION ±5°	INPUT TERMINALS		OUTPUT TERMINALS		MAGNITUDE	PHASE*
		Hi	Lo	Hi	Lo		
X	0°	J2-5	J2-34	J2-23	J2-20	Increasing	Inphase
	0°	J2-5	J2-34	J2-22	J2-20	↑	Inphase
	90° CCW	J2-5	J2-34	J2-21	J2-20		Inphase
	0°	J2-4	J2-34	J2-23	J2-20		Out-of-phase
Y	0°	J2-16	J2-34	J2-19	J2-20		Inphase
	0°	J2-15	J2-34	J2-19	J2-20		Out-of-phase
Z	0°	J2-33	J2-34	J2-24	J2-20		Inphase
	0°	J2-33	J2-34	J2-21	J2-20		Inphase
	90° CCW	J2-33	J2-34	J2-22	J2-20	↓	Out-of-phase
	0°	J2-32	J2-34	J2-24	J2-20	Increasing	Out-of-phase

*NOTES:

1. The direction of rotation is defined as viewed along the axis of rotation from the resolver end.
2. The inertial component signal generator outputs are phased with respect to the signal generator excitation at pins J2-8 (Hi) and J2-9 (Lo).

3.1.2.17 Balance. The unbalance of each gimbal and stable member about their respective axes shall not exceed 0.25 oz-inch (0.50 oz-inch peak to peak).

TABLE VI

CONTINUITY AND DC RESISTANCE

FROM	TO	RESISTANCE (Ohms)	FROM	TO	RESISTANCE (Ohms)
J1-1	E10	<0.5	J1-8	P17-N	<0.7
↕	E19	<0.8	↕	P16-N	<0.7
↕	E11 thru E18	<1.0	↕	A10-4	<1.0
J1-1	E20 thru E23	<1.0	↕	A11-4	↕
J1-2	S1-1	<0.7	↕	A12-4	↕
↕	A14-5	<0.8	↕	P15-N	<1.0
↕	A16-1	<0.8	↕	P18-10	<0.8
↕	A16-5	<0.8	↕	P19-10	<0.8
↕	A19-1	<0.8	J1-8	P20-10	<0.8
↕	A19-5	<0.8	J1-9	P17-N	<0.7
↕	A13-2	<0.7	J1-11	B8-2	<0.8
↕	P17-F	<1.0	J1-11	B9-2	↕
↕	P16-F	↕	J1-12	B8-3	↕
↕	A10-1	↕	J1-12	B9-3	<0.8
↕	A11-1	↕	B8-1	C1-2	<0.2
↕	A12-1	<1.0	B8-2	C1-1	↕
↕	P15-F	<0.8	B9-1	C2-2	↕
J1-2	R1-1	<0.7	B9-2	C2-1	<0.2
J1-59	A17-2	1750 to 3410	J1-12	R6-1	<1.1
R1-2	P18-13	<0.2	A18-6	R6-2	<0.2
R1-2	P19-13	<0.2	A14-6	R6-1	<0.2
R1-2	P20-13	<0.2	J1-12	P18-11	<1.1
J1-3	S1-1	<0.7	J1-12	P19-11	<1.2
J1-4	A13-1	<0.7	J1-12	P20-11	<1.2
J1-4	A14-1	<0.8	J1-13	A15-2	<1.2
J1-4	A15-4	<0.8	J1-14	P18-14	<1.1
J1-2	J1-19	4949 to 5051	J1-15	J1-16	<2.0
J1-20	K1-3	4949 to 5051	J1-15	J1-18	<2.0
J1-5	A13-1	<0.7	J1-15	P19-1	<1.2
J1-6	S2-1	<0.7	J1-17	P17-D	<1.1
↕	P17-L	<0.7	J1-18	P15-K	<1.2
↕	P16-L	<0.8	J1-21	P15-B	<1.2
↕	A10-3	<1.0	J1-21	P15-J	<1.2
↕	A11-3	<1.0	J1-22	P17-P	<1.1
↕	A12-3	<1.0	↕	P16-P	<1.1
↕	P15-L	<1.0	↕	P15-P	<1.2
J1-6	R2-1	<0.7	J1-22	R3-1	<1.1
R2-2	P18-24	<0.2	P18-12	R3-2	<0.2
R2-2	P19-24	<0.2	P19-12	R3-2	<0.2
R2-2	P20-24	<0.2	P20-12	R3-2	<0.2
J1-7	S2-1	<0.7	R3-1	A18-3	<1.1
J1-1	E1	<0.2	J1-1	E2	<0.2

TABLE VI (Continued)

FROM	TO	RESISTANCE (Ohms)	FROM	TO	RESISTANCE (Ohms)
J1-12	A16-6	<1.2	J2-16	P16-a	<1.1
A14-3	R5-2	<0.2	J2-17	A5-2	<1.2
J1-23	P17-R	<1.1	J2-18	A5-5	<1.2
J1-23	P16-R	<1.1	A5-9	P19-6	<0.2
J1-23	P15-R	<1.2	A5-7	P19-7	↕
J1-24	P16-B	<1.1	A5-3	P19-21	↕
J1-24	P16-J	↕	A5-1	A6-1	<0.2
J1-25	P17-B	↕	J2-19	P16-A	<1.1
J1-25	P17-J	↕	J2-19	P16-S	<1.1
J2-1	P18-8	↕	J2-20	P16-C	<1.1
J2-2	P18-2	↕	J2-20	P17-C	<1.1
J2-2	P18-22	↕	J2-20	P15-C	<1.2
J2-3	P18-4	<1.1	J2-23	P15-A	<1.2
J2-4	P15-b	<1.2	J2-23	P15-d	<1.2
J2-5	P15-a	<1.2	J2-24	P17-A	<1.1
J2-6	A4-2	<1.1	J2-24	P17-d	<1.1
P18-6	A4-9	<0.2	J2-32	P17-a	↕
P18-7	A4-7	<0.2	J2-33	P17-b	↕
P18-21	A4-3	<0.2	J2-34	P17-Z	↕
J2-7	A4-5	<1.1	J2-34	P16-Z	<1.1
J2-8	T1-1	<1.1	J2-34	P15-Z	<1.2
J2-8	J2-10	<2.0	J2-35	A6-2	<1.1
J2-9	T1-2	<1.1	J2-36	A6-5	↕
J2-9	J2-11	<2.0	J2-37	A4-4	↕
T1-3	P20-25	0.05 to 0.15	J2-37	P17-H	↕
T1-3	P19-25	↕	J2-37	P16-H	<1.1
T1-3	P18-25	↕	J2-37	P15-H	<1.2
T1-4	P20-9	↕	J2-38	P17-c	<1.1
T1-4	P19-9	↕	↕	P16-c	<1.1
T1-4	P18-9	0.05 to 0.15	↕	P15-c	<1.2
T1-5	P15-W	0.1 to 0.2	↕	A4-1	<1.1
T1-5	P16-W	↕	J2-38	A6-1	<1.1
T1-5	P17-Y	↕	J2-59	P20-8	↕
T1-6	P15-Y	↕	J2-60	P20-2	↕
T1-6	P16-Y	↕	J2-60	P20-22	↕
T1-6	P17-W	0.1 to 0.2	J2-61	P20-4	<1.1
T1-6	T1-7	<0.2	P20-6	A6-9	<0.2
T1-7	A4-4	<0.2	P20-7	A6-7	<0.2
T1-7	A6-4	<0.2	P20-21	A6-3	<0.2
T1-7	A5-4	<0.2	P20-1	P19-14	<0.25
J2-12	P19-8	<1.3	P20-14	P18-1	<0.25
J2-13	P19-2	↕	P20-23	P19-23	<0.35
J2-13	P19-22	↕	↕	P18-23	<0.2
J2-14	P19-4	<1.3	↕	A13-4	<0.2
J2-15	P16-b	<1.1	P20-23	R4-1	<0.35
			J2-26	A13-3	<1.1

j. The IRIG serial numbers shall be recorded in the system history book.

k. The total time that the IRIG wheel power was applied shall be recorded in the systems history log book.

4.3.2 Heat Exchanger Leak Rate. When tested with a differential pressure of 77.5, +4.0 -0 psi of helium, the leak rate of the heat exchanger shall be 5×10^{-6} std. cc/sec of helium maximum.

4.3.3 Heat Exchanger Pressure Drop. When tested with the quick disconnect couplings, the associated "O" rings installed, and water glycol coolant flowing at 33±1 lb/hr (3.6±0.1 gal/hr) at 45° ±2°F inlet temperature, the heat exchanger pressure drop shall be 1.2 to 1.6 inches of Hg. The pressure drop shall be calculated by use of the following formula utilizing a differential mercury manometer to obtain H_1 and H_2:

Pressure Drop = 0.92 $(H_1 - H_2)$ inch

Where: H_1 = High pressure side of the differential mercury manometer
H_2 = Low pressure side of the differential mercury manometer

4.3.4 Resistance. The resistance between pins shall be as specified in Table V when measured with an ohmmeter limited to an open circuit voltage of 10 mv in accordance with Standard MIL-STD-202, Method 303. The IMU shall be maintained at 130±3°F for the resistance measurements. The ohmmeter "low" shall be connected to the IMU chassis when taking resistance measurements.

4.3.5 Temperature Control

4.3.5.1 Temperature Alarms

4.3.5.1.1 Low Alarm - Operate. - With the IMU in the operate mode, the low alarm test shall be performed as follows:

a. With pins J1-4 and J2-26 shorted and the IMU temperature allowed to decrease from a stabilized heater control duty cycle of 20±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 126.2° ±2.5°F.

b. With the short in 4.3.5.1.1.a removed immediately after the temperature alarm indication and the IMU temperature allowed to increase, the PIPA temperature shall be within +1.0°, -0.5°F of the value recorded at the temperature alarm point when the alarm turns off.

c. With the voltages specified in 4.2.1.4.c and g increased to 33.5±0.2 vdc and the voltage specified in 4.1.1.4.e and h increased to ØA 29.4±0.2V rms, ØB 30.5±0.2V, 4.3.5.1.1.a and b shall be repeated. (See 6.3).

d. With the voltages specified in 4.2.1.4.c and g decreased to 24.5±0.2 vdc and the voltage specified in 4.1.1.4.e and h decreased to ØA 26.6±0.2V rms, ØB 25.9±0.2V rms, the duty cycle shall be set at 50±10 percent. With the middle gimbal and stable member at 0° ±10° and the outer gimbal positioned at 90° ±10° cw (Y_{sm} down) an alarm shall not occur. Allow for stabilization (see 6.3).

4.3.5.2 Blower Operation. The blower operation test shall be performed as follows:

a. With a control heater duty cycle of 57± 5 percent, the blowers shall turn on remain on at lower duty cycles, and turn off at higher duty cycles. (Cycling of the blowers will occur at the 57± 5 percent point).

b. With a control heater duty cycle of 31± 5 percent the voltages specified in 4.2.1.4.c and g increased to 33.5±0.2 vdc, and the voltage specified in 4.2.1.4.e and h increased to ØA 29.4±0.2V rms and ØB 30.5±0.2V rms, the blowers shall turn on, remain on, at lower duty cycles, and turn off at higher duty cycles. (See 6.3). (Cycling of the blowers will occur at the 31± 5 percent point)

c. The air flow direction through the blowers shall be from the middle gimbal to the case.

4.3.5.3 Wheel Power, Blower, Fixed Heater, and Bias Heater Current. With the blowers turned off the total current of fixed heaters, and bias heaters at pin J1-12, shall be 0.45±0.35 amp. With the blowers turned on, the total current at pin J1-11, shall be 0.58±0.15 amp. The total wattage for ØA at Pin J1-22, and ØB at pin J1-23, shall be measured and recorded.

4.3.5.4 Temperature Control Current. With the control heaters turned on, the current shall be 2.5±0.5 amp. With the voltage in 4.2.1.4.c increased to 33.5±0.2 vdc, the current shall be 3.8±1.0 amp.

4.3.5.5 PIPA and IRIG Temperatures. With the IMU in the operate mode, the PIPA and IRIG temperature test shall be performed as follows:

a. With a control heater duty cycle of 7±2 percent, the average PIPA temperature shall be 130.2° ±0.4°F with a max instability of ±0.2°F and the average IRIG temperature shall be a point within the range of 133.5° and 136.5°F with ±0.2°F max instability. Allow for stabilization.

b. Repeat 4.3.5.5.a with control heater duty cycles of 20± 5 percent and 50± 5 percent.

c. With the voltage specified in 4.2.1.4.c and g increased to 33.5±0.2 vdc and the voltages specified in 4.2.1.4.e and h increased to ØA 29.4±0.2V rms, ØB 30.5±0.2V, 4.3.5.5.a shall be repeated at 7±2 percent and 30± 5 percent duty cycles. (See 6.3).

d. A temperature alarm shall not occur when stabilized per 4.3.5.5.a, b, c.

e. The blowers shall function as specified in 3.1.2.8 when stabilized per 4.3.5.5.a, b, c.

4.3.5.6 Standby to Operate Time. With the IMU in the standby mode, set the control heater duty cycle to 40± 5 percent. (The control heater duty cycle will change to a lower level in the operate mode). Within 15 minutes for the PIPA's and within 30 minutes for the IRIG's after switching from standby to the operate mode; the PIPA and IRIG temperatures shall be within 0.5°F of their respective temperature control points established when stabilization is reached in the operate mode.

4.3.5.7 Standby to Operate Temperature Change. The change in temperature of the PIPA's when switching from standby to the operate mode, shall be a maximum of 1.0°F. Allow for stabilization in each mode.

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5/17/66	B	28922	10, 11 JH/AC	MGM	--
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5/24/66	D	29158	7, 8, 25 RDG/AC	MGM	---
6/14/66	E	29665	12 JH/AC	MGM	—
7/5/66	F	30016	15, 16, 19, 21, 22, 23, 28 RDG/AC	MGM	---
9/22/66	G	31235	4, 15, 16, 17, 21, 22, 23 RDG/AC	MGM EA	---
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5/4/67	J	33712	2, 16 RDG/AC	MGM EA	—

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APPROVALS	A. C. METZGER NASA/MSC	A. J. B.	W Kupfer 3/3/66 MIT/IL CCB	R. Temple	R. R. Olsen ACSP A. E. Winberg

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Inertial Measuring Unit, Part Number 2018601-041. and -051.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002071	Process Specification, Soldering of Electrical Connections
ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
PS2010604	Procurement Specification, Product Configuration and Acceptance Test Requirements, APOLLO CM/LEM G&N System Requirement Items

North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

STANDARDS

Military

MIL-STD-202C	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2018601	Inertial Measuring Unit Assembly
2018605	Stable Member Assembly

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. - In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

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5/17/66	B	28922	10, 11	JH/AC	MGM	--
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6/14/66	E	29665	12	JH/AC	MGM	—
7/5/66	F	30016	15, 16, 19, 21, 22, 23, 28	RDG/AC	MGM	---
9/22/66	G	31235	4, 15, 16, 17, 21, 22, 23	RDG/AC	MGM EA	---
9/29/66	H	31357	4, 8, 12, 13, 21, 23	RDG/AC	MGM EA	--
5/4/67	J	33712	2, 16	RDG/AC	MGM EA	—
6/8/67	K	33928	22	RDG/AC	MGM EA	—
2/23/68	L	35734	2-32 Was 32 pages now 33 pages.		MGM EA	--

This specification consists of page 1 to 33 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A.J.B.	W. Kupfer 3/3/66 MIT/IL CCB	R. Temple AC A.E. Winberg

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete indentification and acceptance of the Inertial Measuring Unit Assemblies.

1.2 CLASSIFICATION. The requirements for the equipment covered by this specification shall be classified as follows. Unless identified by the respective type, all requirements of this specification are applicable to all types.

a. TYPE I. The requirements for Part Number 2018601-151 shall be designated as Type I in this specification.

b. TYPE II. The requirements for Part Numbers 2018601-041, -051, -071 and -111 shall be designated as Type II in this specification.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002071	Process Specification, Soldering of Electrical Connections
ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
PS2010604	Procurement Specification, Product Configuration and Acceptance Test Requirements, APOLLO CM/LEM G&N System Requirement Items

North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

STANDARDS

Military

MIL-STD-202C	Test Methods for Electronic and Electrical Component Parts

TABLE V

RESISTANCE

SIGNAL	PINS		RESISTANCE VALUE (Ohms)	
	From (+)	To (-)	Minimum	Maximum
Chassis Ground	J1-1	Case	0.0	0.5
PIP & IRIG Control Htr	J1-2	J1-4	4 K	34K
PTCInterlock (GSE)	J1-2	J1-19	4949	5051
PIP & IRIG Control Htr	J1-3	J1-5	4K	34K
PIP & IRIG Control Htr (GSE)	J1-6	J1-8	9	13
PIP & IRIG Control Htr (GSE)	J1-7	J1-9	9	13
Blowers (Tele)	J1-11	J1-12	14	20
PIP Temp Sensor	J1-14	J1-15	1542	1578
Temp Sensor Common	J1-15	J1-26	1.0	2.0
Temp Sensor Common	J1-16	J1-18	1.0	2.0
IRIG Temp Sensor	J1-17	J1-18	2300	2670
X IRIG Wheel (øA)	J1-22	J1-21	40	55
Y IRIG Wheel (øA)	J1-22	J1-24	↑	↑
Z IRIG Wheel (øA)	J1-22	J1-25		
X IRIG Wheel (øB)	J1-23	J1-21		
Y IRIG Wheel (øB)	J1-23	J1-24	↓	↓
Z IRIG Wheel (øB)	J1-23	J1-25	40	55
Resolver Excitation	J1-27	J1-28	6	31
PIP Temp Sensor (Tele)	J1-29	J1-30	1542	1578
IRIG Temp Sensor (Tele)	J1-31	J1-32	2300	2670
COS A_{IG} 16X	J1-33	J1-34	47	115
SIN A_{IG} 16X	J1-35	J1-36	47	115
COS A_{IG} 1X	J1-37	J1-38	72	119
SIN A_{IG} 1X	J1-39	J1-40	72	119
COS A_{MG} 16X	J1-41	J1-42	47	115
SIN A_{MG} 16X	J1-43	J1-44	47	115
COS A_{MG} 1X	J1-45	J1-46	72	119
SIN A_{MG} 1X	J1-47	J1-48	72	119
COS A_{OG} 16X	J1-51	J1-52	47	115
SIN A_{OG} 16X	J1-53	J1-54	47	115
COS A_{OG} 1X	J1-55	J1-56	72	119
SIN A_{OG} 1X	J1-57	J1-58	72	119
X IRIG Torque +	J2-4	J2-34	160	210
X IRIG Torque -	J2-5	J2-34	160	210
X PIP Error	J2-6	J2-7	30K	33K
Ducosyn Excitation	J2-8	J2-9	1	5
Ducosyn Feedback	J2-10	J2-11	1	5
Y IRIG Torque +	J2-15	J2-34	160	210
Y IRIG Torque -	J2-16	J2-34	160	210
Y PIP Error	J2-17	J2-18	30K	33K

TABLE V (Continued)

SIGNAL	PINS		RESISTANCE VALUE (Ohms)	
	From (+)	To (-)	Minimum	Maximum
IG Error	J2-19	J2-20	78	140
MG Error	J2-21	J2-20	77	230
OG Error	J2-22	J2-20	77	230
X IRIG Error	J2-23	J2-20	27	62
Z IRIG Error	J2-24	J2-20	27	62
Control Htr (Tele)	J2-25	J1-2	9.5K	10.5K
Z IRIG Torque +	J2-32	J2-34	160	210
Z IRIG Torque -	J2-33	J2-34	160	210
Z PIP Error	J2-35	J2-36	30K	33K
IG Motor	J2-39	J2-40	20	72
MG Motor	J2-41	J2-42	20	72
OG Motor	J2-51	J2-52	10	40
Sensor Common	J1-16	J1-26	0.0	1

be positioned at 90° ±10° ccw from zero as viewed from the resolver end of the IGA. Coolant shall be circulated through the heat exchanger.

a. Apply 28.0±0.8v dc to the PIPA and IRIG control heaters at pins J1-2 (Hi), J1-3 (Hi), J1-4 (Lo), and J1-5 (Lo).

b. Apply excitation to the ducosyns at pins J2-8 (Hi),, and J2-9 (Lo) so that 28.6±0.3V rms, 3200±32 cps is measured at the feedback pins J2-10 (Hi) and J2-11 (Lo).

c. Apply 28.0±0.1V rms, 800±8 cps to the IRIG wheels at pins J1-22 (ϕA), J1-23 (ϕB), J1-21 (com), J1-24 (com), and J1-25 (com). The wheel voltage shall be constant within 0.1V throughout the heater control calibration. (See 6.3).

d. Apply 28.00±2.5V rms, 800±80 cps to the gimbal angle resolvers at pins J1-27 (Hi) and J1-28 (Lo).

e. Apply 28.0±1.4 vdc to the gimbal mounted electronics at pins J2-38 (Hi) and J2-37 (Lo).

f. Apply 28.0±0.5V rms. 800±8 cps to the blowers at pins J1-11 (Hi) and J1-12 (Lo). The blowers shall be on throughout the padding resistor selection procedure., unless otherwise specified.

g. [illegible]

3.2.2.2.2 Selection of Control Heater Padding Resistor (R1). The control heater padding resistor (R1) shall be selected as follows:

a. The ~~inertial~~ component temperatures shall be stabilized with control heater duty cycle at 7±4 percent. The average PIPA temperature shall be ~~130.~~±3.0°F and the ΔT (difference between the PIPA and IRIG indicated temperature) shall be ≥4.0°F.

b. With the control heater duty cycle increased to 50±5 percent, the control heater padding resistor (R1) shall be selected to achieve a ΔT within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment. Remove the +28 vdc at J1-59 if necessary, to obtain 50±5 percent control heater duty cycle.

NOTE: During stabilization, the PIPA and IRIG indicating sensors shall be monitored and data continuously recorded. The PIPA and IRIG temperatures are stabilized when they have not changed by more than 0.10°F over a one hour period. The measured average PIPA and IRIG indicating sensor data shall be converted to degrees Fahrenheit (See 6.1).

3.2.2.2.3 Selection of Thermostat Anticipatory Heater Padding Resistor (R4). The thermostat anticipatory heater padding resistor (R4) shall be selected as follows:

a. With the control heater duty cycle at 50±5 percent, the control thermostat anticipatory heater padding resistor (R4) shall be selected to achieve an average PIPA temperature within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any ter adjustment.

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Inertial Measuring Unit Assemblies.

1.2 CLASSIFICATION. The requirements for the equipment covered by this specification shall be classified as follows. Unless identified by the respective type, all requirements of this specification are applicable to all types.

a. TYPE I. The requirements for Part Numbers 2018601-151, -191 and -211 shall be designated as Type I in this specification.

b. TYPE II. The requirements for Part Numbers 2018601-041, -051,-071 and -111 shall be designated as Type II in this specification.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002071	Process Specification, Soldering of Electrical Connections
ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
PS2010604	Procurement Specification, Product Configuration and Acceptance Test Requirements, APOLLO CM/LEM G&N System Requirement Items

North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

STANDARDS

Military

MIL-STD-202C	Test Methods for Electronic and Electrical Component Parts

APOLLO G&N Specification
PS2016152 REV N
Original Issue Date: 3/3/66
Release Authority: TDRR 26854
Class A Release

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
2/23/68	N	35748	2	MGM EA	--

This specification consists of page 1 to 33 inclusive.

APPROVALS	A.C. Metzger **NASA/MSC**	**A.J.B.**	W. Kupfer 3/3/66 **MIT/IL** CCB	**R. Temple**	**R. R. Olson** **AC** A.E. Winberg

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete indentification and acceptance of the Inertial Measuring Unit Assemblies.

1.2 CLASSIFICATION. The requirements for the equipment covered by this specification shall be classified as follows. Unless identified by the respective type, all requirements of this specification are applicable to all types.

a. TYPE I. The requirements for Part Numbers 2018601-151, -191, -211 and -221 shall be designated as Type I in this specification.

b. TYPE II. The requirements for Part Numbers 2018601-041, -051,-071 and -111 shall be designated as Type II in this specification.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002071	Process Specification, Soldering of Electrical Connections
ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
PS2010604	Procurement Specification, Product Configuration and Acceptance Test Requirements, APOLLO CM/LEM G&N System Requirement Items

North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

STANDARDS

Military

MIL-STD-202C	Test Methods for Electronic and Electrical Component Parts

APOLLO G&N Specification
PS2016152 REV P
Original Issue Date: 3/3/66
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

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Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
Ⓝ 2/23/68	N	35748	2	MGM EA	--
11/29/68	P	37071	11, 12	MGM EA	--

This specification consists of page 1 to 33 inclusive.

APPROVALS	A.C. Metzger **NASA/MSC**	**A.J.B.**	W. Kupfer 3/3/66 **MIT/IL** CCB	R. Temple	R. R. Olson **AC** A.E. Winberg

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

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Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
Ⓝ 2/23/68	N	35748	2	MGM EA	--
(N 11/29/68	P	37071	11, 12	MGM EA	--
12/27/68	R	37159	16	MGM EA	--

This specification consists of page 1 to 33 inclusive.

APPROVALS	A. C. Metzger **NASA/MSC**	A. J. B.	W. Kupfer 3/3/66 **MIT/IL** CCB	R. Temple	R. R. Olson **AC** A. E. Winberg

APOLLO G&N Specification
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Original Issue Date: 3/9/66
Release Authority: TDRR 27015
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CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST SPECIFICATION

ANNUNCIATOR PANEL AND EYEPIECE STOWAGE ASSEMBLY

DRAWING NO. 1021255

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
5/13/66	A	28806	6	MGM	ACM

This specification consists of page 1 to 6 inclusive.

APPROVALS	C. METZGER NASA/MSC	3/9/66 R Boos 3/9/66 MIT/IL	ACSP

4.3.2 Workmanship-Vibration. With the assembly mounted in the same manner which it mounts in the spacecraft, it shall be subjected to vibration along each of the spacecraft axes. The vibration shall be simple harmonic motion swept from 10 to 2000 cps at a rate of 1 octave/15 seconds. The magnitude of vibration shall be 1.5g rms limited to a 0.15 inch pp constant displacement from 10 cps to the crossover frequency.

The assembly shall be tested in accordance with 4.3.2.1 and 4.3.2.2 during the 10 to 2000 cps vibration.

After vibration the assembly shall be visually examined as specified in 4.3.1 and tested in accordance with 4.3.3 through 4.3.6.

4.3.2.1 Indicators-Caution/Warning. With voltage in accordance with Table I applied to P1, the lamps shall be illuminated without flickering during vibration as determined by visual observation.

4.3.2.2 Continuity. Continuity shall exist between the pins of connector P1 and connectors J1, J2, and J3 as defined in Table II. The resistance measurement is not required during vibration.

4.3.3 Continuity and DC Resistance. The dc resistance between the pins listed in Table II shall be as specified therein, when measured in accordance with Method 303 of Standard MIL-STD-202.

4.3.4 Insulation Resistance. The resistance between the pins of connector P1 and the chassis of the Annunciator Panel Assembly shall be as specified in 3.1.3 when measured in accordance with Method 302 of Standard MIL-STD-202. The megohmmeter used shall have an output of 100±10 vdc, limited to a short circuit current of 6 μa.

4.3.5 Maximum Weight. The assembly shall be weighed to the nearest hundredth pound.

4.3.6 Indicators-Caution/Warning. The indicators shall be illuminated in accordance with Table I.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

APOLLO G&N Specification
PS2016153 REV – B
Original Issue Date: 3/9/66
Release Authority: TDRR 27015
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST SPECIFICATION

ANNUNCIATOR PANEL AND EYEPIECE STOWAGE ASSEMBLY

DRAWING NO. 1021255

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
5/13/66	A	28806	6	MGM	ACM
8/18/66	B	30717	2	EA	--

This specification consists of page 1 to 6 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	J. Sirocco 3/9/66 R. Boos 3/9/66 MIT/IL	ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Annunciator Panel and Eyepiece Stowage Assembly Part Number 1021255-021 or 1021255-041 hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

1021255	Annunciator Panel and Eyepiece Stowage Assembly

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract.
b. This specification.
c. Documents listed in this section.

APOLLO G&N Specification
PS2016153 REV C
Original Issue Date: 3/9/66
Release Authority: TDRR 27015
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST SPECIFICATION

ANNUNCIATOR PANEL AND EYEPIECE STOWAGE ASSEMBLY

DRAWING NO. 1021255

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
Ⓜ 5/13/66	A	28806	6 RK/AC	MGM	ACM
Ⓜ 8/18/66	B	30717	2 JH/AC	EA	--
11/28/66	C	32084	2-6. Specification was 6	MGM EA	--
			pages, now 7 pages. WS/AC		

This specification consists of page 1 to 7 inclusive.

APPROVALS	C. METZGER NASA/MSC	J. Sirocco 3/9/66 | R. Boos 3/9/66 | [illegible] MIT/IL	R. Olsen ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Annunciator Panel and Eyepiece Stowage Assembly Part Number 1021255 hereafter called the assembly.

1.2 CLASSIFICATION. The requirements for the equipment covered by this specification shall be classified as follows. Unless identified by the respective type, all requirements of this specification are applicable to all types.

a. Type I: The requirements for Part Number 1021255-021 shall be designated as Type I.

b. Type II: The requirements for Part Number 1021255-041 shall be designated as Type II.

c. Type III: The requirements for Part Number 1021255-061 shall be designated as Type III.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

1021255	Annunciator Panel and Eyepiece Stowage Assembly

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract.
b. This specification.
c. Documents listed in this section.

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Indicators-Caution/Warning. The assembly indicators shall be illuminated in accordance with Table I.

TABLE I

INDICATORS

INDICATOR	INPUT VOLTAGE	INPUT (P1)		CONDITION
		HI	LO	
MASTER ALARM	28.0±0.5 vdc	54	53	Illuminated
(blank)	↑	15	17	↑
ZERO ENCODER		41	30	
IMU DELAY		42	31	
IMU FAIL		60	61	
AGC PWR FAIL		71	82	
PGNS		51	52	
(blank)		50	70	
GIMBAL LOCK		18	19	
IMU TEMP		62	63	
ACCEL. FAIL	↓	73	84	↓
CDU FAIL	28.0±0.5 vdc	72	83	Illuminated

3.1.2 Continuity and DC Resistance. Continuity and dc resistance shall be in accordance with Table II.

3.1.3 Insulation Resistance. The insulation resistance between pins of P1 and the chassis shall not be less than 100 megohms.

TABLE II

OPTICS EYEPIECE HEATER CIRCUIT

PINS		RESISTANCE (ohms)
FROM	TO	
P1-92	J1-4	<0.1
P1-67	J1-7	↑
P1-92	J2-4	
P1-67	J2-7	
P1-92	J3-4	↓
P1-67	J3-7	<0.1

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with APOLLO G&N Drawing 1021255 and all drawings and engineering data referenced thereon.

3.2.2 Maximum Weight. The maximum weight of the assembly shall be 7.0 pounds.

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Indicator-Caution/Warning	3.1.1	4.3.6
Continuity and DC Resistance	3.1.2	4.3.3
Insulation Resistance	3.1.3	4.3.4
Drawing Compliance	3.2.1	4.3.1
Maximum Weight	3.2.2	4.3.5

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25° ±10°C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg

4.2.1.2 Inputs. The assembly shall be tested with an input of 28.0±0.5 vdc.

[illegible]
[illegible]

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3 TESTS

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 1021255. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, pin misalignment, and legibility and appearance of markings.

4.3.2 Workmanship-Vibration. With the assembly mounted in the same manner which it mounts in the spacecraft, it shall be subjected to vibration along each of the spacecraft axes. The vibration shall be simple harmonic motion swept from 10 to 2000 cps at a rate of 1 octave/15 seconds. The magnitude of vibration shall be 1.5g rms limited to a 0.15 inch pp constant displacement from 10 cps to the crossover frequency.

The assembly shall be tested in accordance with 4.3.2.1 and 4.3.2.2 during the 10 to 2000 cps vibration.

After vibration the assembly shall be visually examined as specified in 4.3.1 and tested in accordance with 4.3.3 through 4.3.6.

4.3.2.1 Indicators-Caution/Warning. With voltage in accordance with Table I applied to P1, the lamps shall be illuminated without flickering during vibration as determined by visual observation.

4.3.2.2 Continuity. Continuity shall exist between the pins of connector P1 and connectors J1, J2, and J3 as defined in Table II. The resistance measurement is not required during vibration.

4.3.3 Continuity and DC Resistance. The dc resistance between the pins listed in Table II shall be as specified therein, when measured in accordance with Method 303 of Standard MIL-STD-202.

4.3.4 Insulation Resistance. The resistance between the pins of connector P1 and the chassis of the Annunciator Panel Assembly shall be as specified in 3.1.3 when measured in accordance with Method 302 of Standard MIL-STD-202. The megohmmeter used shall have an output of 100±10 vdc, limited to a short circuit current of 6 μa.

4.3.5 Maximum Weight. The assembly shall be weighed to the nearest hundredth pound.

4.3.6 Indicators-Caution/Warning. The indicators shall be illuminated in accordance with Table I.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

RO:jls

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST SPECIFICATION

ANNUNCIATOR PANEL AND EYEPIECE STOWAGE ASSEMBLY

DRAWING NO. 1021255

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 6 inclusive.

APPROVALS	C. METZGER NASA/MSC	J. Siroco 3/9/66 R. Boos 3/9/66 MIT/IL	R. Olsen ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Annunciator Panel and Eyepiece Stowage Assembly Part Number 1021255-021 hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

1021255	Annunciator Panel and Eyepiece Stowage Assembly

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract.
b. This specification.
c. Documents listed in this section.

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Indicators-Caution/Warning. The assembly indicators shall be illuminated in accordance with Table I.

TABLE I

INDICATORS

INDICATOR	INPUT VOLTAGE	INPUT (P1)		CONDITION
		HI	LO	
MASTER ALARM	28.0±0.5 vdc	54	53	Illuminated
(blank)	↑	15	17	↑
ZERO ENCODER		41	30	
IMU DELAY		42	31	
IMU FAIL		60	61	
AGC PWR FAIL		71	82	
PGNS		51	52	
(blank)		50	70	
GIMBAL LOCK		18	19	
IMU TEMP		62	63	
ACCEL. FAIL	↓	73	84	↓
CDU FAIL	28.0±0.5 vdc	72	83	Illuminated

3.1.2 Continuity and DC Resistance. Continuity and dc resistance shall be in accordance with Table II.

3.1.3 Insulation Resistance. The insulation resistance between pins of P1 and the chassis shall not be less than 100 megohms.

TABLE II

OPTICS EYEPIECE HEATER CIRCUIT

PINS		RESISTANCE (ohms)
FROM	TO	
P1-92	J1-4	<0.1
P1-67	J1-7	↑
P1-92	J2-4	
P1-67	J2-7	
P1-92	J3-4	↓
P1-67	J3-7	<0.1

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with APOLLO G&N Drawing 1021255 and all drawings and engineering data referenced thereon.

3.2.2 Maximum Weight. The maximum weight of the assembly shall be 7.0 pounds.

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Indicator-Caution/Warning	3.1.1	4.3.6
Continuity and DC Resistance	3.1.2	4.3.3
Insulation Resistance	3.1.3	4.3.4
Drawing Compliance	3.2.1	4.3.1
Maximum Weight	3.2.2	4.3.5

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25° ±10°C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg

4.2.1.2 Inputs. The assembly shall be tested with an input of 28.0±0.5 vdc.

a. 5.0±0.1 vdc
b. 28.0±0.5 vdc

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3 TESTS

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 1021255. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, pin misalignment, and legibility and appearance of markings.

4.3.2 Workmanship-Vibration. With the assembly mounted in the same manner which it mounts in the spacecraft, it shall be subjected to vibration along each of the spacecraft axes. The vibration shall be simple harmonic motion swept from 10 to 2000 cps at a rate of 1 octave/15 seconds. The magnitude of vibration shall be 3.5g rms limited to a 0.3 inch pp constant displacement from 10 cps to the crossover frequency.

The assembly shall be tested in accordance with 4.3.2.1 and 4.3.2.2 during the 10 to 2000 cps vibration.

The values specified in 4.3.2.2 shall be continuously monitored during vibration as applicable and the specified parameters shall not be exceeded for more than 10 milliseconds. After vibration the assembly shall be visually examined as specified in 4.3.1 and tested in accordance with 4.3.3 through 4.3.6.

4.3.2.1 Indicators-Caution/Warning. With voltage in accordance with Table I applied to P1, the lamps shall be illuminated without flickering during vibration as determined by visual observation.

4.3.2.2 Continuity. Continuity shall exist between the pins of connector P1 and J1, J2 and J3 in accordance with Table II.

4.3.3 Continuity and DC Resistance. The dc resistance between the pins listed in Table II shall be as specified therein, when measured in accordance with Method 303 of Standard MIL-STD-202.

4.3.4 Insulation Resistance. The resistance between the pins of connector P1 and the chassis of the Annunciator Panel Assembly shall be as specified in 3.1.3 when measured in accordance with Method 302 of Standard MIL-STD-202. The megohmmeter used shall have an output of 225±75 vdc, limited to a short circuit current of 6 μa.

4.3.5 Maximum Weight. The assembly shall be weighed to the nearest hundreth pound.

4.3.6 Indicators-Caution/Warning. The indicators shall be illuminated in accordance with Table I.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

RO:jls

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
5/17/66	A	28922	11 JH/AC	MGM	—

This specific consists of page 1 to 33 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce 3-17-66 A [illegible] 3/21/66 W [illegible] 3/22/66	John E Miller MIT/IL 3/21/66	R. Temple 3-16-66 ACSP A. E. [illegible]

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5/24/66	C	29158	8, 9, 26 RDG/AC	MGM	--

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6/14/66	D	29665	13 JH/AC	MGM	--

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Ⓜ 5/24/66	C	29158	8, 9, 26 RDG/AC	MGM	--
Ⓜ 6/14/66	D	29665	13 GH/AC	MGM	--
ⓒ 7/5/66	E	30016	5, 16, 17, 20, 22, 23, 24, 29 SC/AC	MGM	--
9/22/66	F	31234	5, 16, 17, 18, 23, 24, 25 RDG/AC	MGM EA	--

This specification consists of page 1 to 33 inclusive.

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d. With the voltages specified in 4.2.1.4.c and g decreased to 24.5±0.2 vdc and the voltage specified in 4.1.1.4.e and h decreased to ØA 26.6±0.2V rms, ØB 25.9±0.2V rms, the duty cycle shall be set at 50±10 percent. With the middle gimbal and stable member at 0° ±10° and the outer gimbal positioned at 90° ±10° cw (Y_{sm} down) an alarm shall not occur. Allow for stabilization. (See 6.3)

4.3.5.1.2 Low Alarm Standby. With the IMU in the standby mode, the low alarm test shall be performed as follows:

a. With pins J1-4 and J2-26 shorted and the IMU temperature allowed to decrease from a stabilized heater control duty cycle of 40±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 126.0° ±2.5°F.

b. With the short in 4.3.5.1.2.a removed immediately after the temperature alarm indication and the IMU temperature allowed to increase, the PIPA temperature shall be within +1.0°, -0.5°F of the value recorded at the temperature alarm point when the alarm turns off.

4.3.5.1.3 High Alarm Operate. With pins J1-4 and J2-26 shorted and the IMU in the operate mode, the high alarm test shall be performed as follows:

a. With the voltage specified in 4.2.1.3.f applied to the GSE control heaters at pins J1-6 (Hi), J1-7 (Hi), J1-8 (Lo), and J1-9 (Lo) and the IMU temperature allowed to increase from a stabilized heater control duty cycle of 20±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 134.2±2.5°F.

NOTE: Control heaters and GSE heaters shall not be energized simultaneously.

b. With the GSE heater voltage in 4.3.5.1.3.a removed immediately after the temperature alarm indication and the IMU temperature allowed to decrease, the PIPA temperature shall be within +0.5°, -1.0°F of the value recorded at the temperature alarm point when the alarm turns off.

c. With the voltages specified in 4.2.1.4.c and g increased to 33.5±0.2 vdc and the voltage specified in 4.1.1.4.e and h increased to ØA 29.4±0.2V rms, ØB 30.5±0.2V rms, the duty cycle shall be set at 30±10 percent. With the middle gimbal and stable member at 0±10 percent and the outer gimbal positioned at 90° ±10° ccw (Y_{sm} up) an alarm shall not occur. Allow for stabilization (See 6.3).

4.3.5.1.4 High Alarm Standby. With pins J1-4 and J2-26 shorted and the IMU in the standby mode, the high alarm test shall be performed as follows:

a. With the voltage specified in 4.2.1.3.f applied to the GSE control heaters at pins J1-6 (Hi), J1-7 (Hi), J1-8 (Lo), J1-9 (Lo) and the IMU temperature allowed to increase from a stabilized heater control duty cycle of 40±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 136.0° ±2.5°F.

NOTE: Control heaters and GSE heaters shall not be energized simultaneously.

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(M) 6/14/66	D	29665	13 JH/AC	MGM	--
(M) 7/5/66	E	30016	5, 16, 17, 20, 22, 23, 24, 29 [illegible]	MGM	--
(M) 9/22/66	F	31234	5, 16, 17, 18, 23, 24, 25 RDG/AC	MGM EA	--
9/29/66	G	31357	4-12, 16, 17, 19-23, 28-33 RDG/AC	MGM EA	--

This specification consists of page 1 to 32 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce 3-17-66 A [illegible] 3/21/66 W [illegible] 3/22/66	John E Miller MIT/IL 3/21/66	R. Temple 3-16-66 ACSP A. E. [illegible]

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Inputs. The assembly shall function as specified herein when supplied with the following inputs:

- a. Gimbal angle resolver: 28.00±0.42V rms, 800±10^{-6} cps
- b. Control heater: 25.0 to 30.0 vdc.
- c. Blower and IRIG wheel: ϕA28.0±1.4V rms ϕB 28.0±2.1V rms 800±10^{-6} cps
- d. Ducosyn: 28.60±0.43V rms 3200±10^{-6} cps at feedback
- e. Gimbal Mounted Electronics: 24.5 to 33.5 vdc
- f. GSE heater: 31V maximum from the GSE temperature control equipment

3.1.2 Characteristics

3.1.2.1 Heat Exchanger Leak Rate. The leak rate of the heat exchanger shall be 5×10^{-6} std cc/sec of helium, maximum, at a differential pressure of 77.5 + 4.0, −0.0 psig of helium.

3.1.2.2 Heat Exchanger Pressure Drop. The heat exchanger pressure drop shall be 1.2 to 1.6 inches of Hg at a water glycol coolant flow rate of 33±1 lb/hr at an inlet temperature of 45° ±2°F and an ambient temperature of 75° ±4°F.

3.1.2.3 PIPA Temperature. In the IMU operate mode (See 6.2) the temperature control point of the PIPA's shall be within the range of 128.2° to 130.2°F with ±0.5°F maximum instability under the following environment.

- a. Ambient pressure: one atmosphere to a vacuum of 10^{-9} torr
- b. Ambient temperature: 0° to 160°F in a vacuum of 10^{-9} torr, 20° to 107°F at one atmosphere pressure
- c. Coolant temperature: 32° to 55°F
- d. Coolant flow: 25 to 48 lb/hr (33±3 lb/hr nominal)
- e. Gimbal position: Any
- f. Supply voltage: As specified in 3.1.1.a through e
- g. Temperature sensing element current:
  - (1) PIPA: 6.00±0.12 ma dc
  - (2) IRIG: 2.00±0.04 ma dc

3.1.2.4 IRIG Temperature. In the IMU operate mode, the temperature control point of the IRIG's shall be within the range of 133.5° to 136.5°F with ±1.0°F max instability under the environment specified in 3.1.2.3.

TABLE V

RESISTANCE

SIGNAL	PINS		RESISTANCE VALUE (Ohms)	
	From (+)	To (-)	Minimum	Maximum
Chassis Ground	J1-1	Case	0.0	0.5
PIP & IRIG Control Htr	J1-2	J1-4	4K	34K
PTC Interlock (GSE)	J1-2	J1-19	4949	5051
PIP & IRIG Control Htr	J1-3	J1-5	4K	34K
PIP & IRIG Control Htr (GSE)	J1-6	J1-8	9	13
PIP & IRIG Control Htr (GSE)	J1-7	J1-9	9	13
Blowers	J1-11	J1-12	14	20
PIP Temp Sensor	J1-14	J1-15	1542	1578
Temp Sensor Common	J1-15	J1-26	1.0	2.0
Temp Sensor Common	J1-16	J1-18	1.0	2.0
IRIG Temp Sensor	J1-17	J1-18	2300	2670
X IRIG Wheel (ϕA)	J1-22	J1-21	40	55
Y IRIG Wheel (ϕA)	J1-22	J1-24	↑	↑
Z IRIG Wheel (ϕA)	J1-22	J1-25	│	│
X IRIG Wheel (ϕB)	J1-23	J1-21	│	│
Y IRIG Wheel (ϕB)	J1-23	J1-24	↓	↓
Z IRIG Wheel (ϕB)	J1-23	J1-25	40	55
Resolver Excitation	J1-27	J1-28	6	31
PIP Temp Sensor (Tele)	J1-29	J1-30	1542	1578
IRIG Temp Sensor (Tele)	J1-31	J1-32	2300	2670
COS A_{IG} 16X	J1-33	J1-34	47	115
SIN A_{IG} 16X	J1-35	J1-36	47	115
COS A_{IG} 1X	J1-37	J1-38	72	119
SIN A_{IG} 1X	J1-39	J1-40	72	119
COS A_{MG} 16X	J1-41	J1-42	47	115
SIN A_{MG} 16X	J1-43	J1-44	47	115
COS A_{MG} 1X	J1-45	J1-46	72	119
SIN A_{MG} 1X	J1-47	J1-48	72	119
COS A_{OG} 16X	J1-51	J1-52	47	115
SIN A_{OG} 16X	J1-53	J1-54	47	115
COS A_{OG} 1X	J1-55	J1-56	72	119
SIN A_{OG} 1X	J1-57	J1-58	72	119
X IRIG Torque +	J2-4	J2-34	160	210
X IRIG Torque -	J2-5	J2-34	160	210
X PIP Error	J2-6	J2-7	30K	33K
Ducosyn Excitation	J2-8	J2-9	1	5
Ducosyn Feedback	J2-10	J2-11	1	5
Y IRIG Torque +	J2-15	J2-34	160	210
Y IRIG Torque -	J2-16	J2-34	160	210
Y PIP Error	J2-17	J2-18	30K	33K

TABLE V (Continued)

SIGNAL	PINS		RESISTANCE VALUE (Ohms)	
	From (+)	To (-)	Minimum	Maximum
IG Error	J2-19	J2-20	78	140
MG Error	J2-21	J2-20	77	230
OG Error	J2-22	J2-20	77	230
X IRIG Error	J2-23	J2-20	27	62
Z IRIG Error	J2-24	J2-20	27	62
Control Htr (Tele)	J2-25	J1-2	9.5K	10.5K
Z IRIG Torque +	J2-32	J2-34	160	210
Z IRIG Torque -	J2-33	J2-34	160	210
Z PIP Error	J2-35	J2-36	30K	33K
IG Motor	J2-39	J2-40	20	72
MG Motor	J2-41	J2-42	20	72
OG Motor	J2-51	J2-52	10	40
Sensor Common	J1-16	J1-26	0.0	1

a. Apply 28.0±0.5V dc to the PIPA and IRIG control heaters at pins J1-2 (Hi), J1-3 (Hi), J1-4 (Lo), and J1-5 (Lo).

b. Apply excitation to the ducosyns at pins J2-8 (Hi), and J2-9 (Lo) so that 28.6±0.3V rms, 3200±32 cps is measured at the feedback pins J2-10 (Hi) and J2-11 (Lo).

c. Apply 28.0±0.1V rms, 800±8 cps to the IRIG wheels at pins J1-22 (ϕA), J1-23 (ϕB), J1-21 (com), J1-24 (com), and J1-25 (com). The wheel voltage shall be constant within 0.1V throughout the heater control calibration (see 6.3).

d. Apply 28.00±2.5V rms, 800±80 cps to the gimbal angle resolvers at pins J1-27 (Hi) and J1-28 (Lo).

e. Apply 28.0±1.4 vdc to the gimbal mounted electronics at pins J2-38 (Hi) and J2-37 (Lo).

f. Apply 28.0±0.5V, 800±8 cps to the blowers at pins J1-11 (Hi) and J1-12 (Lo). The blowers shall be on throughout the padding resistor selection procedure, unless otherwise specified.

3.2.2.2.2 Selection of Control Heater Padding Resistor (R1). The control heater padding resistor (R1) shall be selected as follows:

a. The inertial component temperatures shall be stabilized with control heater duty cycle at 7±2 percent. The average PIPA temperature shall be 129.2±3.0°F and the ΔT (difference between the PIPA and IRIG indicated temperature) shall be $\geq$4.0°F.

b. With the control heater duty cycle increased to 50±5 percent, the control heater padding resistor (R1) shall be selected to achieve a ΔT within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment. Remove the +28 vdc at J1-59 if necessary, to obtain a 50±5 percent control heater duty cycle.

NOTE: During stabilization, the PIPA and IRIG indicating sensors shall be monitored and data continuously recorded. The PIPA and IRIG temperatures are stabilized when they have not changed by more than 0.10°F over a one hour period. The measured average PIPA and IRIG indicating sensor data shall be converted to degrees Fahrenheit (See 6.1).

3.2.2.2.3 Selection of Thermostat Anticipatory Heater Padding Resistor (R4). The thermostat anticipatory heater padding resistor (R4) shall be selected as follows:

a. With the control heater duty cycle at 50±5 percent, the control thermostat anticipatory heater padding resistor (R4) shall be selected to achieve an average PIPA temperature within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment. [illegible]

b. With the control heater duty cycle at 20±5 percent the average PIPA temperature shall be within 0.25°F of the values obtained in 3.2.2.2.2.a and 3.2.2.2.3.a. If the requirement is not met, repeat 3.2.2.2.2.a and 3.2.2.2.3.a.

3.2.2.2.4 Selection of PIPA Fixed Heater Padding Resistor (R_3). With the control heater duty cycle at 20±5 percent, allow for stabilization and record ΔT. If the ΔT is equal to or less than 5.9°F, a 1430 ohm resistor shall be selected for the PIPA fixed heater padding resistor (R_3); and if the ΔT is greater than 5.9°F, the resistor shall be selected to achieve a ΔT of 5.8°F±0.1°F. Allow for stabilization after any adjustment.

3.2.2.2.5 Selection of Thermostat Bias Heater Padding Resistor (R_5). With the control heater duty cycle at 20±5 percent, the thermostat bias heater padding resistor (R_5) shall be selected to set the average PIPA temperature at 129.20° ±0.15°F. Allow for stabilization after any adjustment.

3.2.2.2.6 Selection of Blower Control Thermostat Bias Heater Padding Resistor (R_6). With the control heater duty cycle at 43 +0, -5 percent, the blower control thermostat bias heater padding resistor (R_6) shall be selected to just turn OFF the blowers. Allow for repeatable cycling after any adjustment and record the total blower current.

3.2.2.2.7 GSE Heater Padding Resistor (R_2). The GSE heater padding resistor (R_2) shall be of the value selected in 3.2.2.2.2.b.

3.2.2.2.8 Selection of Alarm Thermostat Anticipatory Heater Padding Resistor R10. The thermostat anticipatory heater padding resistor (R10) shall be selected as follows:

a. With the control heater duty cycle at 7±2 percent and R10 set at 30Ω, R9 shall be adjusted so that the alarm signal cycles on and off at a 7±2 percent duty cycle.

$$\text{Alarm duty cycle} = \frac{\text{Alarm Time On}}{\text{Alarm Time On} + \text{Alarm Time Off}} \times 100$$

Allow for stabilization after any adjustment. If this requirement cannot be met, proceed to paragraphs 3.2.2.2.10 and 3.2.2.2.11.

b. With the control heater duty cycle increased to 50±5 percent, the anticipatory heater padding resistor (R10) shall be selected to achieve a 50±5 percent alarm duty cycle. Allow for stabilization after any adjustment.

c. Measure the current (I_1) through R9 as selected in 3.2.2.2.8.a. Calculate power $P_1 = 98\ I_1^2$.

3.2.2.2.9 Selection of Alarm Thermostat Bias Heater Padding Resistor (R9). Select a resistor which will result in 4.0 watts less power (P2) in the bias heaters than was calculated in 3.2.2.2.8.c. Use the resistor called out on the drawing which most closely approximates the required current I_2.

j. The IRIG serial numbers shall be recorded in the system history book.

k. The total time that the IRIG wheel power was applied shall be recorded in the systems history log book.

4.3.2 Heat Exchanger Leak Rate. When tested with a differential pressure of 77.5, +4.0 -0 psi of helium, the leak rate of the heat exchanger shall be 5 x 10^{-6} std. cc/sec of helium maximum.

4.3.3 Heat Exchanger Pressure Drop. When tested with the quick disconnect couplings, the associated "O" rings installed, and water glycol coolant flowing at 33±1 lb/hr (3.6±0.1 gal/hr) at 45° ±2°F inlet temperature, the heat exchanger pressure drop shall be 1.2 to 1.6 inches of Hg. The pressure drop shall be calculated by use of the following formula utilizing a differential mercury manometer to obtain H_1 and H_2:

Pressure Drop = 0.92 $(H_1 - H_2)$ inch

Where:

H_1 = High pressure side of the differential mercury manometer.

H_2 = Low pressure side of the differential mercury manometer.

4.3.4 Resistance. The resistance between pins shall be as specified in Table V when measured with an ohmmeter limited to an open circuit voltage of 10 mv in accordance with MIL-STD-202 method 303. The IMU shall be maintained at 130±3°F for the resistance measurements. The ohmmeter "low" shall be connected to the IMU chassis when taking resistance measurements.

4.3.5 Temperature Control

4.3.5.1 Temperature Alarms

4.3.5.1.1 Low Alarm - Operate. With the IMU in the operate mode, the low alarm test shall be performed as follows:

a. With pins J1-4 and J2-26 shorted and the IMU temperature allowed to decrease from a stabilized heater control duty cycle of 20±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 125.2° ±2.5°F.

b. With the short in 4.3.5.1.1.a removed immediately after the temperature alarm indication and the IMU temperature allowed to increase, the PIPA temperature shall be within +1.0°, -0.5°F of the value recorded at the temperature alarm point when the alarm turns off.

c. With the voltages specified in 4.2.1.4.c and g increased to 33.5±0.2 vdc and the voltage specified in 4.1.1.4.e and h increased to φA 29.4±0.2V rms, φB 30.5±0.2V, 4.3.5.1.1.a and b shall be repeated (see 6.3).

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
Ⓜ 5/17/66	A	28922	11 JH/AC	MGM	--
5/18/66	B	29028	2 RDG/AC	MGM	--
Ⓜ 5/24/66	C	29158	8, 9, 26 RDG/AC	MGM	--
Ⓜ 6/14/66	D	29665	13 JH/AC	MGM	--
Ⓜ 7/5/66	E	30016	5, 16, 17, 20, 22, 23, 24, 29	MGM	--
Ⓜ 9/22/66	F	31234	5, 16, 17, 18, 23, 24, 25 RDG/AC	MGM EA	--
Ⓜ 9/29/66	G	31357	4-12, 16, 17, 19-23, 28-33 RDG/AC	MGM EA	--
5/4/67	H	33712	2, 17 RDG/AC	MGM EA	--

This specification consists of page 1 to 33 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce 3-17-66 A [illegible] 3/21/66 W Kaffer 3/22/66	John E Miller MIT/IL 3/21/66	-	R. Temple 3-16-66 AC A. E. Nisley

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Inertial Measuring Unit, Part Number 2018601-021and -061.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002071	Process Specification, Soldering of Electrical Connections
ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
PS2010604	Procurement Specification, Product Configuration and Acceptance Test Requirements, APOLLO CM/LEM G&N System Requirement Items

North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO

2018601	Inertial Measuring Unit Assembly
2018605	Stable Member Assembly

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

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Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
Ⓜ 5/17/66	A	28922	11 JH/AC	MGM	--
5/18/66	B	29028	2 RDG/AC	MGM	--
Ⓜ 5/24/66	C	29158	8, 9, 26 RDG/AC	MGM	--
Ⓜ 6/14/66	D	29665	13 JH/AC	MGM	--
Ⓜ 7/5/66	E	30016	5, 16, 17, 20, 22, 23, 24, 29 RDG/AC	MGM	--
Ⓜ 9/22/66	F	31234	5, 16, 17, 18, 23, 24, 25 RDG/AC	MGM EA	--
Ⓜ 9/29/66	G	31357	4-12, 16, 17, 19-23, 28-33 RDG/AC	MGM EA	--
Ⓜ 5/4/67	H	33712	2, 17 RDG/AC	MGM EA	--
6/8/67	J	33929	23 RDG/AC	MGM EA	--

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APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce 3-?-66 3/21/66 3/22/66	John E Miller MIT/IL 3/21/66		R. Temple 3-16-66 AC

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PROCUREMENT SPECIFICATION

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Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
Ⓜ 5/17/66	A	28922	11 JH/AC	MGM	--
5/18/66	B	29028	2 RDG/AC	MGM	--
Ⓜ 5/24/66	C	29158	8, 9, 26 RDG/AC	MGM	--
Ⓜ 6/14/66	D	29665	13 JH/AC	MGM	--
Ⓜ 7/5/66	E	30016	5, 16, 17, 20, 22, 23, 24, 29	MGM	--
Ⓜ 9/22/66	F	31234	5, 16, 17, 18, 23, 24, 25 RDG/AC	MGM EA	--
Ⓜ 9/29/66	G	31357	4-12, 16, 17, 19-23, 28-33 RDG/AC	MGM EA	--
Ⓜ 5/4/67	H	33712	2, 17 RDG/AC	MGM EA	--
Ⓜ 6/8/67	J	33929	23 RDG/AC	MGM EA	--
2/23/68	K	35735	2, 3, 14, 15	MGM EA	--

This specification consists of page 1 to 33 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce 3-17-66 A. [illegible] 3/21/66 W. [illegible] 3/22/66	John E Miller MIT/IL 3/21/66	R. Temple 3-16-66 AC A. E. [illegible]

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Inertial Measuring Unit Assemblies.

1.2 CLASSIFICATION. The requirements for the equipment covered by this specification shall be classified as follows. Unless identified by the respective type, all requirements of this specification are applicable for all types.

a. TYPE I. The requirements for Part Numbers 2018601-161 and -181 shall be designated as Type I in this specification.

b. Type II. The requirements for Part Numbers 2018601-021, -061, -081, -091, -121, and -141 shall be designated as Type II in this specification.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002071	Process Specification, Soldering of Electrical Connections
ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
PS2010604	Procurement Specification, Product Configuration and Acceptance Test Requirements, APOLLO CM/LEM G&N System Requirement Items

North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

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5/17/66	A	28922	11 JH/AC	MGM	--
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5/24/66	C	29158	8, 9, 26 RDG/AC	MGM	--
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9/29/66	G	31357	4-12, 16, 17, 19-23, 28-33 RDG/AC	MGM EA	--
5/4/67	H	33712	2, 17 RDG/AC	MGM EA	--
6/8/67	J	33929	23 RDG/AC	MGM EA	--
2/23/68	K	35735	2, 3, 14, 15 [illegible]/AC	MGM EA	--
2/23/68	L	35742	2 [illegible] AC	MGM EA	--

This specification consists of page 1 to 33 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce 3-17-66 A [illegible] 3/21/66 W Kaufe 3/22/66	John E Miller MIT/IL 3/21/66		R. Temple 3-16-66 AC R. E. Nixley

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1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Inertial Measuring Unit Assemblies.

1.2 CLASSIFICATION. The requirements for the equipment covered by this specification shall be classified as follows. Unless identified by the respective type, all requirements of this specification are applicable for all types.

a. TYPE I. The requirements for Part Numbers 2018601-161, -181 and -201 shall be designated as Type I in this specification.

b. Type II. The requirements for Part Numbers 2018601-021, -061, -081, -091, -121, and -141 shall be designated as Type II in this specification.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

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PS2010604	Procurement Specification, Product Configuration and Acceptance Test Requirements, APOLLO CM/LEM G&N System Requirement Items

North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

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				AC	NASA
5/17/66	A	28922	11 JH/AC	MGM	--
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5/4/67	H	33712	2, 17 RDG/AC	MGM EA	--
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2/23/68	K	35735	2, 3, 14, 15 /AC	MGM EA	--
2/23/68	L	35742	2 /AC	MGM EA	--
2/23/68	M	35749	2 /AC	MGM EA	--

This specification consists of page 1 to 33 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce 3/21/66 W. 3/22/66	John E. Miller MIT/IL 3/21/66	R. Temple 3-16-66 AC A. E.

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Inertial Measuring Unit Assemblies.

1.2 CLASSIFICATION. The requirements for the equipment covered by this specification shall be classified as follows. Unless identified by the respective type, all requirements of this specification are applicable for all types.

a. TYPE I. The requirements for Part Numbers 2018601-161, -181, -201 and -231 shall be designated as Type I in this specification.

b. Type II. The requirements for Part Numbers 2018601-021, -061, -081, -091, -121, and -141 shall be designated as Type II in this specification.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

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North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

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				AC	NASA
5/17/66	A	28922	11 JH/AC	MGM	--
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6/8/67	J	33929	23 RDG/AC	MGM EA	--
2/23/68	K	35735	2, 3, 14, 15 [illegible]/AC	MGM EA	--
2/23/68	L	35742	2 [illegible]/AC	MGM EA	--
2/23/68	M	35749	2 [illegible]/AC	MGM EA	--
8/28/68	N	36469	4, 22 [illegible]/AC	MGM EA	--

This specification consists of page 1 to 33 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce 3/21/66 3/22/66	John E Miller MIT/IL 3/21/66	AC R. Temple 3-16-66

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
Ⓜ 5/17/66	A	28922	11 JH/AC	MGM	--
5/18/66	B	29028	2 RDG/AC	MGM	--
Ⓜ 5/24/66	C	29158	8, 9, 26 RDG/AC	MGM	--
Ⓜ 6/14/66	D	29665	13 JH/AC	MGM	--
Ⓜ 7/5/66	E	30016	5, 16, 17, 20, 22, 23, 24, 29 [illegible]/AC	MGM	--
Ⓜ 9/22/66	F	31234	5, 16, 17, 18, 23, 24, 25 RDG/AC	MGM EA	--
Ⓜ 9/29/66	G	31357	4-12, 16, 17, 19-23, 28-33 RDG/AC	MGM EA	--
Ⓜ 5/4/67	H	33712	2, 17 RDG/AC	MGM EA	--
Ⓜ 6/8/67	J	33929	23 RDG/AC	MGM EA	--
Ⓜ 2/23/68	K	35735	2, 3, 14, 15 [illegible]/AC	MGM EA	--
Ⓜ 2/23/68	L	35742	2 [illegible] AC	MGM EA	--
Ⓜ 2/23/68	M	35749	2 [illegible]/AC	MGM EA	--
Ⓜ 6/28/68	N	36469	4, 22 [illegible]/AC	MGM EA	--
11/29/68	P	37071	11, 12 [illegible]/AC	MGM EA	--

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce 3-17-66 A [illegible] 3/21/66 W[illegible] 3/22/66	John E Miller MIT/IL 3/21/66	R. Temple 3-16-66 AC A. E. [illegible]

APOLLO G&N Specification
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PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

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Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 33 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce 3-17-66 A [illegible] 3/21/66 W Kupfer 3/22/66	John E Miller MIT/IL 3/21/66		R. Temple 3-16-66 ACSP R. E. [illegible]

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Inertial Measuring Unit, Part Number 2018601-021.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

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North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO

2018601	Inertial Measuring Unit Assembly

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

TABLE VI(Continued)

FROM	TO	RESISTANCE (Ohms)	FROM	TO	RESISTANCE (Ohms)
J1-12	A16-6	<1.2	J2-16	P16-a	<1.1
A14-3	R5-2	<0.2	J2-17	A5-2	<1.2
J1-23	P17-R	<1.1	J2-18	A5-5	<1.2
J1-23	P16-R	<1.1	A5-9	P19-6	<0.2
J1-23	P15-R	<1.2	A5-7	P19-7	↕
J1-24	P16-B	<1.1.	A5-3	P19-21	
J1-24	P16-J	↕	A5-1	A6-1	<0.2
J1-25	P17-B		J2-19	P16-A	<1.1
J1-25	P17-J		J2-19	P16-S	<1.1
J2-1	P18-8		J2-20	P16-C	<1.1
J2-2	P18-2		J2-20	P17-C	<1.1
J2-2	P18-22		J2-20	P15-C	<1.2
J2-3	P18-4	<1.1	J2-23	P15-A	<1.2
J2-4	P15-b	<1.2	J2-23	P15-d	<1.2
J2-5	P15-a	<1.2	J2-24	P17-A	<1.1
J2-6	A4-2	<1.1	J2-24	P17-d	<1.1
P18-6	A4-9	<0.2	J2-32	P17-a	↕
P18-7	A4-7	<0.2	J2-33	P17-b	
P18-21	A4-3	<0.2	J2-34	P17-Z	
J2-7	A4-5	<1.1	J2-34	P16-Z	<1.1
J2-8	T1-1	<1.1	J2-34	P15-Z	<1.2
J2-8	J2-10	<2.0	J2-35	A6-2	<1.1
J2-9	T1-2	<1.1	J2-36	A6-5	↕
J2-9	J2-11	<2.0	J2-37	A4-4	
T1-3	P20-25	0.05 to 0.15	J2-37	P17-H	
T1-3	P19-25	↕	J2-37	P16-H	<1.1
T1-3	P18-25		J2-37	P15-H	<1.2
T1-4	P20-9		J2-38	P17-c	<1.1
T1-4	P19-9		↕	P16-c	<1.1
T1-4	P18-9	0.05 to 0.15		P15-c	<1.2
T1-5	P15-W	0.1 to 0.2		A4-1	<1.1
T1-5	P16-W	↕	J2-38	A6-1	<1.1
T1-5	P17-Y		J2-59	P20-8	↕
T1-6	P15-Y		J2-60	P20-2	
T1-6	P16-Y		J2-60	P20-22	
T1-6	P17-W	0.1 to 0.2	J2-61	P20-4	<1.1
T1-6	T1-7	<0.2	P20-6	A6-9	<0.2
T1-7	A4-4	<0.2	P20-7	A6-7	<0.2
T1-7	A6-4	<0.2	P20-21	A6-3	<0.2
T1-7	A5-4	<0.2	P20-1	P19-14	<0.25
J2-12	P19-8	<1.3	P20-14	P18-1	<0.25
J2-13	P19-2	↕	P20-23	P19-23	<0.35
J2-13	P19-22		↕	P18-23	<0.2
J2-14	P19-4	<1.3		A13-4	<0.2
J2-15	P16-b	<1.1	P20-23	R4-1	<0.35
			J2-26	A13-3	<1.1

TABLE VI (Continued)

FROM	TO	RESISTANCE (Ohms)
P15-D	P16-K	<0.2
P16-D	P17-K	↑
J1-26	E57	
J1-29	E55	
J1-30	E56	
J1-31	E58	↓
J1-32	E59	<0.2
J2-25	A13-5	<1.2
T1-8	P20-20	0.05 to 0.15
T1-8	P19-20	0.05 to 0.15
T1-8	P18-20	0.05 to 0.15
T1-8	T1-3	<0.1
A13-2	A18-5	<0.2
A13-3	A14-2	↑
A13-4	P17-T	
↑	P16-T	
	A10-2	
	A11-2	
	A12-2	↓
↓	R10-1	<0.2
A13-4	P15-T	<0.3
A14-4	R4-2	<0.2
A14-6	A16-6	↑
A15-1	A19-2	
A15-3	A16-2	
A16-3	R9-2	↓
A16-3	A19-3	<0.2
A16-4	R10-2	<0.2
A16-4	A19-4	↑
A16-6	A19-6	
A17-1	A18-2	
A17-3	A6-4	
A17-4	A18-1	↓
A17-4	A6-1	<0.2
A18-3	R5-1	<0.25
A18-4	A13-4	<0.2
R5-1	R9-1	<0.2
A8-Red	A10-1	Visual
A8-Red	A10-2	↑
A8-Blu	A10-3	
A8-Blu	A10-4	
A9-Red	A11-1	
A9-Red	A11-2	
A9-Blu	A11-3	
A9-Blu	A11-4	
SHLD ON A4-3, -7-9	A4-3	
SHLD ON A5-3, -7-9	A5-3	
SHLD ON A6-3, -7-9	A6-3	
E61	E22	↓
E62	E23	Visual

TABLE VII.

INSULATION RESISTANCE

FROM	TO	RESISTANCE (megohms)
All pins on J1 except J1-1	Chassis	≥100
All pins on J2	Chassis	≥100
All circuits on J1 and J2	All other circuits on J1-J2	≥100

APOLLO G&N Specification
PS2016156 REV B
Original Issue Date: 16 MAR 66
Release Authority: TDRR 27307
Class A Release

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

HEADER ASSEMBLY PSA (C/M)

DRAWING NO. 2007093

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
8/11/66	A	30609	5, 6	EA	--
3/17/67	B	33292	2	MGM EA	—

This specification consists of page 1 to 9 inclusive.

APPROVALS
A. C. METZGER
NASA/MSC
MIT/IL
D. Jensen
9 MAR 66 AC

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Header Assembly PSA (C/M), hereafter called the assembly, Part Numbers 2007093-021 and -051.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified. Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007093	Header Assembly PSA (C/M)
2014679	Interconnect List for PSA Header

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

APOLLO G&N Specification
PS2016155 REV —
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Class A Release

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

HEADER ASSEMBLY PSA (C/M)

DRAWING NO. 2007093

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 9 inclusive.

APPROVALS
A. C. METZGER
NASA/MSC
John Green 3/16/66
MIT/IL
J. Ramsay R. Mura
D. Jensen
9 MAR 66 ACSP

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Continuity and DC Resistance	3.1.1	4.3.3
Grounding Pin Resistance	3.1.2	4.3.4
Insulation Resistance	3.1.3	4.3.5
Mounting Screw Insert Resistance	3.1.4	4.3.6
Drawing Compliance	3.2.1	4.3.1

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25° ±10°C
b. Relative Humidity: 90% max
c. Barometric Pressure: 28 to 32 inches of Hg.

4.2.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.3 TESTS

4.3.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Drawing 2007093. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, pin misalignment, and legibility and appearance of markings.

4.3.2 Workmanship-Vibration. For spare units only, the assembly shall be vibrated with dummy modules which simulate the respective module weight. The proper connector pins shall be wired and monitored for continuity during the vibration test. The assembly shall be mounted on the vibration fixture in a manner similar to the way it will be mounted in service so that it will be vibrated along the simulated command module X, Y, and Z axes. The assembly shall be vibrated with simple harmonic motion swept from 10 to 2000 cps at a rate of one octave/15 sec. The magnitude of vibration shall be 3.5g rms limited to a 0.3 inch pp constant displacement from 10 cps to the crossover frequency. During vibration the continuity of the assembly shall be constantly monitored per Drawing 2014679. Any evidence of discontinuity shall be recorded and shall be cause for rejection. The monitoring circuitry shall have a response of 10 μseconds or less for any open circuit. Workmanship-vibration testing shall be performed on all units other than spares, at the higher assembly level with operational modules installed.

4.3.3 Continuity and DC Resistance. Continuity and dc resistance shall be measured using a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202. Measurements shall be made from each individual pin to all other pins electrically connected, but duplicate tests of pins previously tested need not be made. All readings for pins electrically connected per Drawing 2014679 shall be less than 0.5 ohm, with the exception of pins 45J1-55 and 45J1-56. Any readings greater than 0.5 ohm for pins electrically connected as per Drawing 2014679 shall be recorded and shall be cause for rejection. The dc resistance measured from pin 45J1-55 to 45J1-56 shall be 1.5K ohms to 16.0K ohms when measured with a low current resistance measuring device. This measurement shall be made by passing 2.50 ma or less current through pins 45J1-55 and 45J1-56. The dc resistance of the pins listed in Table I shall be as specified in Table I.

4.3.4 Grounding Pin Resistance. With a dc current of 3.0±2.5 amperes passed through the frame and the pin being tested, and the dc voltage measured across the pin and the frame as shown in Figure 1, the dc resistance between each individual pin listed in Table II and the frame shall be calculated and recorded. The resistance shall be calculated using the equation specified in 6.2 and the value shall be as specified in 3.1.2. To ensure good electrical connections when measuring the voltage and current the protective finish of the frame may be penetrated.

4.3.5 Insulation Resistance. The insulation resistance between each electrically connected network and all other networks shall be as specified in 3.1.3 when measured in accordance with Method 302 of Standard MIL-STD-202. The megohmmeter used shall have an output voltage of 500±100 vdc limited to a short circuit current of 2.0 milliamperes or less. Any reading of less than 100 megohms shall be recorded and shall be cause for rejection. Spare pins shall be included as individual networks. Megger voltage shall not be applied to the pins specified in 6.1.

4.3.6 Mounting Screw Insert Resistance. With a dc current of 3.0±2.5 amperes passed through each mounting screw insert as shown in Figure 2, the dc current and voltage drop shall be measured and the mounting screw insert resistance shall be calculated using the formula specified in 6.3.a. To insure a good electrical connection to the header frame, the module guide pins may be used as a connection point. The parallel resistance of all the inserts surrounding each connector shall be calculated using the formula specified in 6.3.b and shall be equal to or less than 10 milliohms.

APOLLO G&N Specification
PS2016158 REV A
Original Issue Date: 24 May 1966
Release Authority: TDRR 29160
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

HEADER ASSEMBLY PSA (C/M)

DRAWING NO. 2007093

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
8/11/66	A	30613	2, 4, 5	EA	---

This specification consists of page 1 to 5 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	MIT/IL	D Jensen 18 Apr 66 ACSP

3. REQUIREMENTS

3.1 Same as basic specification.

3.1.1 Continuity and DC Resistance. Continuity shall be as specified on Drawings 2014794 and 2014758. All pins electrically connected except 45J1-55, 45J1-56 and those listed in Table I shall exhibit dc resistance of 0.5 ohm or less. The dc resistance from 45J1-55 to 45J1-56 shall be 1.5K ohms to 16.0K ohms. The dc resistance between the pins listed in Table I shall be as specified in Table I.

3.1.2 Same as basic specification.

3.1.3 Same as basic specification.

3.1.4 Same as basic specification.

3.2 Same as basic specification.

3.2.1 Same as basic specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 Same as basic specification.

4.2 Same as basic specification.

4.2.1 Same as basic specification.

4.2.1.1 Same as basic specification.

4.2.2 Same as basic specification.

4.3 Same as basic specification.

4.3.1 Same as basic specification.

4.3.2 Continuity and DC Resistance. Continuity and dc resistance shall be measured using a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202. Measurements shall be made from each individual pin to all other pins electrically connected, but duplicate tests of pins previously tested need not be made. All readings for pins electrically connected per Drawings 2014734 and 2014758, with the exception of pins 45J1-55 and 45J1-56, shall be less than 0.5 ohm. Any readings greater than 0.5 ohm shall be recorded and shall be cause for rejection. The dc resistance measured from pin 45J1-55 to 45J1-56 shall be 1.5K ohms to 16.0K ohms when measured with a low current resistance measuring device. This measurement shall be made by passing 2.50 ma or less through pins 45J1-55 and 45J1-56. The dc resistance of the pins listed in Table I shall be as specified therein.

4.3.3 Same as basic specification.

4.3.4 Same as basic specification.

4.3.5 Same as basic specification.

5. PREPARATION FOR DELIVERY

5.1 Same as basic specification.

6. NOTES

6.1 Same as basic specification.

6.2 Same as basic specification.

6.3 Same as basic specification.

ETP:jls

APOLLO G&N Specification
PS2016158 REV B
Original Issue Date: 24 May 1966
Release Authority: TDRR 29160
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

HEADER ASSEMBLY PSA (C/M)

DRAWING NO. 2007093

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
8/11/66	A	30613	2, 4, 5	EA	---
9/22/66	B	31162	3	MGM EA	ACM

This specification consists of page 1 to 5 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	5-19-66 MIT/IL	D. Jensen 18 Apr 66 ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Header Assembly PSA (C/M), Part Numbers 2007093-031, and 2007093-041, hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007093	Header Assembly PSA (C/M)
2014758	Lead Set CC, Electrical-PSA C/M
2014794	Lead Set BB, Electrical-PSA C/M

(Copies of specifications, standards, drawings, bulletins and publications required by suppliers in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Same as basic specification.

APOLLO G&N Specification
PS2016158 REV C
Original Issue Date: 24 May 1966
Release Authority: TDRR 29160
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

HEADER ASSEMBLY PSA (C/M)

DRAWING NO. 2007093

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
8/11/66	A	30613	2, 4, 5 RDG/AC	EA	---
9/22/66	B	31162	3 JH/AC	MGM EA	ACM
4/24/67	C	33666	3 RDG/AC	MGM EA	---

This specification consists of page 1 to 5 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	5 10 66 MIT/IL	D Jensen 18 Apr 66 AC

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Header Assembly PSA (C/M), Part Numbers 2007093-031, 2007093-041, and 2087093-061, hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Sub-assemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007093	Header Assembly PSA (C/M)
2014758	Lead Set CC, Electrical-PSA C/M
2014794	Lead Set BB, Electrical-PSA C/M

(Copies of specifications, standards, drawings, bulletins and publications required by suppliers in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Same as basic specification.

APOLLO G&N Specification
PS2016158 REV D
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Release Authority: TDRR 29100
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

HEADER ASSEMBLY PSA (C/M)

DRAWING NO. 2007093

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
8/11/66	A	30613	2, 4, 5	EA	---
9/22/66	B	31162	3	MGM EA	ACM
4/24/67	C	33666	3	MGM EA	---
11/17/67	D	35109	3	MGM EA	---

This specification consists of page 1 to 5 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	MIT/IL	D Jensen 18 Apr 66 AC

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Header Assembly PSA (C/M), Part Numbers 2007093-031, 2007093-041, 2007093-061, and 2007093-071, hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment.

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007093	Header Assembly PSA (C/M)
2014758	Lead Set CC, Electrical-PSA C/M
2014794	Lead Set BB, Electrical-PSA C/M

(Copies of specifications, standards, drawings, bulletins and publications required by suppliers in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Same as basic specification.

APOLLO G&N Specification
PS2016158 REV E
Original Issue Date: 24 May 1966
Release Authority: TDRR 29160
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

HEADER ASSEMBLY PSA (C/M)

DRAWING NO. 2007093

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
8/11/66	A	30613	2, 4, 5 RDW/AC	EA	---
9/22/66	B	31162	3 JH/AC	MGM EA	ACM
4/24/67	C	33666	3 RDW/AC	MGM EA	---
11/17/67	D	35109	3	MGM EA	---
11/17/67	E	35114	3	MGM EA	---

This specification consists of page 1 to 5 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	5-19-66 MIT/IL	D Jensen 18 Apr 66 AC

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Header Assembly PSA (C/M), Part Numbers 2007093-031, 2007093-041, 2007093-061, 2007093-071, 2007093-081, and 2007093-091, hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment.

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007093	Header Assembly PSA (C/M)
2014758	Lead Set CC, Electrical-PSA C/M
2014794	Lead Set BB, Electrical-PSA C/M

(Copies of specifications, standards, drawings, bulletins and publications required by suppliers in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Same as basic specification.

APOLLO G&N Specification
PS2016158 REV - F
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Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

HEADER ASSEMBLY PSA (C/M)

DRAWING NO. 2007093

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				AC	NASA
8/11/66	A	30613	2, 4, 5 RDW/AC	EA	---
9/22/66	B	31162	3 JH/AC	MGM EA	ACM
4/24/67	C	33666	3 RDW/AC	MGM EA	---
11/17/67	D	35109	3 [illegible]/AC	MGM EA	---
11/17/67	E	35114	3 [illegible]/AC	MGM EA	---
9/13/68	F	36828	4 [illegible]/AC	MGM EA	---

This specification consists of page 1 to 5 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	5 16 66 MIT/IL	D Jensen 18 Am 66 AC

3. REQUIREMENTS

3.1 Same as basic specification.

3.1.1 Continuity and DC Resistance. Continuity shall be as specified on Drawings 2014794 and 2014758. All pins electrically connected except 45J1-55, 45J1-56 and those listed in Table I shall exhibit dc resistance of 0.5 ohm or less. The dc resistance from 45J1-55 to 45J1-56 shall be 5.75K ohms ±0.85K ohms at a temperature of 22.5±2.5°C. The dc resistance between the pins listed in Table I shall be as specified in Table I.

3.1.2 Same as basic specification.

3.1.3 Same as basic specification.

3.1.4 Same as basic specification.

3.2 Same as basic specification.

3.2.1 Same as basic specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 Same as basic specification.

4.2 Same as basic specification.

4.2.1 Same as basic specification.

4.2.1.1 Same as basic specification.

4.2.2 Same as basic specification.

4.3 Same as basic specification.

4.3.1 Same as basic specification.

4.3.2 Continuity and DC Resistance. Continuity and dc resistance shall be measured using a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202. Measurements shall be made from each individual pin to all other pins electrically connected, but duplicate tests of pins previously tested need not be made. All readings for pins electrically connected per Drawings 2014734 and 2014758, with the exception of pins 45J1-55 and 45J1-56, shall be less than 0.5 ohm. Any readings greater than 0.5 ohm shall be recorded and shall be cause for rejection. The dc resistance measured from pin 45J1-55 to 45J1-56 shall be 5.75K ohms ±0.85K ohms at a temperature of 22.5±2.5°C when measured with a low current resistance measuring device. This measurement shall be made by passing 2.50 ma or less through pins 45J1-55 and 45J1-56. The dc resistance of the pins listed in Table I shall be as specified therein.

APOLLO G&N Specification
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CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

HEADER ASSEMBLY PSA (C/M)

DRAWING NO. 2007093

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 5 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	5-10-66 MIT/IL	D. Jensen 18 Apr 66 ACSP

ADDENDUM NOTICE

This specification has been prepared as an addendum to:

Specification No.: 2016155
Revision: -
Release Date: 16 March 1966

FOR

HEADER ASSEMBLY PSA (C/M)

Used With

The APOLLO G&N System

The exact content of Specification PS2016155 used as the basic document for this addendum is the revision referenced above plus the following specification change notices to Specification PS2016155.

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Header Assembly PSA (C/M), Part Number 2007093-031, hereafter called the assembly.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, military standards and specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

APOLLO G&N

2007093	Header Assembly PSA (C/M)
2014758	Lead Set CC, Electrical-PSA C/M
2014794	Lead Set BB, Electrical-PSA C/M

(Copies of specifications, standards, drawings, bulletins and publications required by suppliers in conjunction with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Same as basic specification.

3. REQUIREMENTS

3.1 Same as basic specification.

3.1.1 Continuity and DC Resistance. Continuity shall be as specified on Drawings 2014794 and 2014758. All pins electrically connected except 45J1-55, 45J1-56 and those listed in Table I shall exhibit dc resistance of 0.5 ohm or less. The dc resistance from 45J1-55 to 45J1-56 shall be 1.5K ohms to 16.0K ohms. The dc resistance between the pins listed in Table I shall be as specified in Table I.

3.1.2 Same as basic specification.

3.1.3 Same as basic specification.

3.1.4 Same as basic specification.

3.2 Same as basic specification.

3.2.1 Same as basic specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 Same as basic specification.

4.2 Same as basic specification.

4.2.1 Same as basic specification.

4.2.1.1 Same as basic specification.

4.2.2 Same as basic specification.

4.3 Same as basic specification.

4.3.1 Same as basic specification.

4.3.2 Workmanship-Vibration. For spare units only, the assembly shall be vibrated with dummy modules which simulate the respective module weight. The proper connector pins shall be wired and monitored for continuity during the vibration test. The assembly shall be mounted on the vibration fixture in a manner similar to the way it will be mounted in service so that it will be vibrated along the simulated Command Module X, Y, and Z axes. The assembly shall be vibrated with simple harmonic motion swept from 10 to 2000 cps at a rate of one octave per 15 sec. The magnitude of vibration shall be 3.5g rms limited to a 0.3 inch pp constant displacement from 10 cps to the crossover frequency. During vibration the assembly shall be constantly monitored per Drawings 2014794 and 2014758. Any evidence of discontinuity shall be recorded and shall be cause for rejection. The monitoring circuitry shall have a response of 10μsec or less for any open circuit.

Workmanship-vibration testing shall be performed on all units other than spares, at a higher assembly level with operational modules installed.

4.3.3 Continuity and DC Resistance. Continuity and dc resistance shall be measured using a low voltage resistance measuring device in accordance with Method 303 of Standard MIL-STD-202. Measurements shall be made from each individual pin to all other pins electrically connected, but duplicate tests of pins previously tested need not be made. All readings for pins electrically connected per Drawings 2014794 and 2014758, with the exception of pins 45J1-55 and 45J1-56, shall be less than 0.5 ohm. Any readings greater than 0.5 ohm shall be recorded and shall be cause for rejection. The dc resistance measured from pin 45J1-55 to 45J1-56 shall be 1.5K ohms to 16.0K ohms when measured with a low current resistance measuring device. This measurement shall be made by passing 2.50 ma or less through pins 45J1-55 and 45J1-56. The dc resistance of the pins listed in Table I shall be as specified therein.

4.3.4 Same as basic specification.

4.3.5 Same as basic specification.

4.3.6 Same as basic specification.

5. PREPARATION FOR DELIVERY

5.1 Same as basic specification.

6. NOTES

6.1 Same as basic specification.

6.2 Same as basic specification.

6.3 Same as basic specification.

RM:efo

APOLLO G&N Specification
PS 2016206
Original Issue Date: 1 Feb. 66
Release Authority: TDRR 25874
Class A Release

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

DRAWING NO. 2011000

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
3/15/66	A	27196	9	W. K.	PP-65-612

This specification consists of page 1 to 27 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. Saltzman 1/31/66	MIT/IL W Kupfer 1 Feb 66	1/5/66	1/5/66 KIC

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-031.

1.1 Product Configuration and Baseline Acceptances

1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. unless formally approved otherwise as required by ANA Bulletin No. 445.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein.

2.1 Effective Issues.

2.1.1 Military Standards and Specifications shall be the issue in effect on the date of contract.

SPECIFICATIONS

APOLLO G & N

ND 1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment.
ND 1002023	Serialization, General Specification for
PS 2010606	Procurement Specification Product Configuration and Acceptance Test Requirements for the Precision Test Fixture.

less than 10 mv with 0 volts AC applied to the Motor-Generator control windings.

3.2.11 Dynamic Friction Level. Dynamic friction shall be less than .03 inch-ounces on the SXT and SCT drive motor shafts as measured by the voltages on their respective motor control phases.

3.2.12 Reticle Lighting. The SXT and SCT reticle lamps shall draw a current that is within 10% of measurements made while the lamp illumination was observable. In addition the respective reticles shall appear illuminated when viewed via the eyepiece.

3.3 Product Performance and Repeatability. The Assembly shall meet the Functional Requirements of Section 3.2 and furthermore shall withstand specified environmental stresses without degradation of performance characteristics. This performance characteristic repeatability shall be demonstrated by subjecting the OUA to the following test procedures.

NOTE: The following sequence of test procedures is mandatory except that the sequence of the Pressure Leak Rate and the Functional Performance tests may be interchanges.

1. Baseline Performance Tests
2. Environmental Tests
    a) Mechanical Integrity
    b) Thermal Vacuum
3. Luminous Transmittance
4. Final Visual and Mechanical Inspection
5. Pressure Leak Rate Test
6. Functional Performance Tests (exclusive of Luminous Transmittance)

TABLE II

Test	Performance Requirement	Maximum allowable difference between Baseline and Final Test
SDA Orientation (3.2.1)		
SXT SDA	10 arc sec.	6 arc sec.
SCT SDA	40 arc sec.	25 arc sec.
Orientation TDA Meas. Plane to SDA (3.2.2)		
SXT	20 arc sec.	6 arc sec.
SCT (not applicable)		
Parallelism of Optical Axis to SDA Axis (Reticle Eccentricity (3.2.4)		
SXT reticle	10 arc sec.	4 arc sec.
SCT reticle	50 arc sec.	25 arc sec.
Luminous Transmittance (3.2.8)		
SXT SLOS	greater than 25%	10% of measured value at Final Test
SXT LLOS	greater than 3.2%	10% of measured value at Final Test
SCT LOS	greater than 30%	10% of measured value at Final Test

NOTE: The allowable difference between baseline and final test does not represent changes in the Assembly characteristics, but rather allowable errors in measurement accuracy and stability.

The luminous transmittance of the SCT to CIE illuminate "C" shall not be less than 30%.

The luminous transmittance of the SXT SLOS shall be tested as specified above while monitoring the light intensity at the SXT Indexing Mirror. The luminous transmittance of the SXT SLOS to CIE illuminate "C" shall not be less than 25%.

If the assembly configuration includes an eyepiece polaroid filter then the following test shall be performed.

The ratio of the luminous transmittance of the SXT SLOS and SXT LLOS shall not be less than 12 to 1 for CIE illuminant "C" when the eyepiece polaroid filter is positioned for minimum transmission through the LLOS.

4.2.1.13 Freedom of Motion. Unscrew and pop out the SCT Shaft Manual Input Adapter and rotate control. SCT Shaft shall move freely. Unscrew and pop out the SCT Trunnion Manual Input Adapter and rotate control. SCT Trunnion shall move freely.

4.2.1.14 SXT TDA and SDA Dynamic Friction, Stiction, and Rate Generator Phasing. With a variable AC, 800 cps, input voltage applied to the Motor-Generator control windings, the voltage shall be increased until the SXT Shaft or trunnion starts to rotate. The input voltage shall not exceed 5.3 VAC. The input voltage shall then be decreased to the lowest level required to maintain rotation. The input voltage shall not exceed 4.2 VAC.

With the use of a phase sensitive voltmeter, the generator output voltage, for an increasing angular rotation of the shaft (SDA) shall cause the meter to deflect in a negative direction and in a positive direction for a decreasing angular rotation of the shaft. The generator output voltage for an increasing angular rotation of the trunnion (TDA) shall cause the meter to deflect in a positive direction and in a negative direction for decreasing angular rotation of the trunnion.

With 0 volts AC applied to the Motor-Generator control windings the TDA and SDA tachometer output shall be less than 10 mv with special hook-up using PAV when measured at OUA base connector.

4.2.1.15 SCT TDA and SDA Dynamic Friction, Stiction, and Rate Generator Phasing. With a variable AC 800 cps, input voltage applied to the Motor-Generator control windings the voltage shall be increased until the SCT shaft or trunnion starts to rotate. The input voltage shall not exceed 6.6 VAC when the shaft or trunnion is at the shade flip position, or 5.3 VAC at all other positions. The input voltage shall then be decreased to the lowest level required to maintain rotation. The input voltage shall not exceed 4.2 VAC.

With the use of a phase sensitive voltmeter, the generator output voltage for an increasing angular rotation of the shaft (SDA), shall cause the meter to deflect in a positive direction and the generator output for a decreasing angular rotation of the shaft shall cause the meter to deflect in a negative direction. The generator output voltage for an increasing angular rotation of the trunnion (TDA) shall cause the meter to deflect in a negative direction and in a positive direction for a decreasing angular rotation of the trunnion.

With 0 volts AC applied to the Motor-Generator control windings the TDA and SDA tachometer output shall be less than 10 mv with special hook-up using PAV when measured at OUA base connector.

4.2.1.16 Reticle Lighting. Reticle lamp operation shall be determined by means of their current drain and visual check. The current shall be measured by means of a milliammeter when 5.0 VAC is applied across each bank of 4 parallel lamps that illuminate the SXT and SCT reticles. The current drain shall be within 10% of the current measurements previously made while the lamp illumination could be observed and a visual check will be performed to show that the reticle appears illuminated when viewed via the eyepieces.

4.2.1.17 Baseline Performance. See applicable portions of Section 4.

4.2.1.18 Environmental Tests. See paragraph 3.3.2.

4.2.1.19 Final Visual Mechanical Inspection. See paragraph 3.3.3.

4.2.1.20 Pressure Leak Rate. The Leak Detector shall be calibrated prior to testing. The external side of the OUA shall be evacuated and backfilled with a 10% Helium mixture of 5 psi. The leak rate shall be determined using the following formula. The leak rate shall not exceed 9.99×10^{-5} st'd/cc/sec.

$$\text{Unit Leak Rate St'd cc/sec-He} = \frac{\text{Leak Detector Reading}}{\text{Calibrated Leak Detector reading}} \; \frac{\text{Calibration St'd Leak Rate}}{\frac{\%\text{ He in Mixture}}{100}} \; \frac{\text{St'd cc He}}{\text{Sec}}$$

4.2.1.30 Functional Performance and Repeatability. Same as Section 3.3.5.

4.2.2 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Apollo G and N Drawing 2011000. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulants, defects, contaminants, pin misalignment, and legibility and appearance of markings.

5. PREPARATION FOR DELIVERY

5.1 General. Preparation for delivery shall be in accordance with Specification ND 1002214, General Specification for Preservation Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment.

The assembly shall be installed in or removed from its shipping container (P/N 1019720) only under Class II or better clean room conditions in accordance with MIL-STD-209, Clean Room and Work Station Requirements Controlled, Environment.

6. NOTES.

6.1 The Precision Test Fixture (PTF) used to test the Optical Unit Assembly (OUA) shall be certified according to PS 2010606. Certification of the PTF is required before and after each final test. The certification shall be completed not more than 50 hours before or after the tests are performed. If the PTF does not recalibrate after a final test, the affected tests shall be rerun.

APOLLO G&N Specification
PS 2016206
Original Issue Date: 1 Feb. 66
Release Authority: TDRR 25874
Class A Release

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

DRAWING NO. 2011000

Record of Revisions

M

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
3/15/66	A	27196	9	W. K.	PP-65-612
6/17/66	B	29493	2, ,8,11,24,25,26	M.G.M.	PP7-65-612

This specification consists of page 1 to 27 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	MIT/IL W Kupfer 1 Feb 66	1/5/66 KIC

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-031 and 2011000-032.

1.1 Product Configuration and Baseline Acceptances

1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. unless formally approved otherwise as required by ANA Bulletin No. 445.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein.

2.1 Effective Issues.

2.1.1 Military Standards and Specifications shall be the issue in effect on the date of contract.

SPECIFICATIONS

APOLLO G & N

ND 1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment.
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APOLLO G&N Specification
PS 2016206
Original Issue Date: 1 FEB66
Release Authority: TDRR 25874
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

DRAWING NO. 2011000

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 27; inclusive.

APPROVALS
A. C. METZGER
NASA/MSC
D. Saltzman 1/28/66 S. R.
MIT/IL W Kupfer 1 Feb 66
1/5/66
1/5/66 KIC
A 1/5/66

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-031.

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1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. unless formally approved otherwise as required by ANA Bulletin No. 445.

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The following documents form a part of this specification to the extent specified herein.

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SPECIFICATIONS

APOLLO G & N

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PS 2010606	Procurement Specification Product Configuration and Acceptance Test Requirements for the Precision Test Fixture.

STANDARDS

Military

MIL-STD-209	Clean Room and Work Station Requirements, Controlled Environment
MIL-STD-150A	Photographic Lenses

DRAWINGS

APOLLO G & N

1019720	Optics Navigation Base Shipping Container
2011000	Optical Unit Assembly

Copies of Specifications, Standards, Drawings, Bulletins and Publications required by suppliers in connection with specific procurement functions should be obtained from the Procuring Activity or as directed by the contracting officer.

2.2 Conflicting Requirements. In the event of conflict between the requirements of the contract, this document and the documents listed in this section, the following order of precedence shall apply and the Contractor shall notify MIT Apollo Management of conflict as soon as it is determined.

a. The contract

b. This specification

c. Documents listed in this section

3. REQUIREMENTS

The Primary Performance Requirements described in Section 3.1 are derived from the Apollo mission analysis. These requirequirements will be demonstrated by the ability of the Assembly to meet the Functional Performance Requirements.

Functional Performance Requirements described in Section 3.2 are derived in order to demonstrate the ability of the Assembly to perform the Primary Performance Requirements.

3.1 Primary Performance Requirements. The Assembly shall meet the environmental tests specified for nominal Apollo missions and have the following accuracies. These are not Functional Performance Requirements, but are the bases from which the Functional Performance Requirements will be derived.

3.1.1 SXT LLOS to SLOS Measurement Accuracy. At the center of the field of view, the Sextant (SXT) shall be capable of measuring the Trunnion Drive Axis (TDA) angle between the star line of sight (SLOS) and landmark line of sight (LLOS) to within 10 seconds of arc.

3.1.2 SXT SLOS Positioning Accuracy. The SXT SLOS shall be perpendicular to the mounting plane to within 40 seconds of arc at zero trunnion angle.

3.1.3 SCT LOS Positioning Accuracy. The Scanning Telescope (SCT) line of sight (LOS) shall be perpendicular to the mounting plane to within six minutes of arc at zero trunnion angle.

3.2 Functional Performance Requirements. The Assembly shall perform as specified herein under the following conditions to verify its ability to perform the Primary Performance Requirements.

Drive Motor Fixed Excitation	28VAC ± 5%	800 cps ± 1% ∠90°
Resolver Excitation	28VAC ± 1%	800 cps ± 1%
Tachometer Excitation	28VAC ± 1%	800 cps ± 1%

3.2.1 SDA Orientation. The Shaft Drive Axis (SDA) shall be perpendicular with respect to the mounting plane between the Assembly and the Navigation Base within 10 seconds of arc for the SXT and to 40 sec. of arc for the SCT.

3.2.2 Orientation of the TDA Measuring Plane to the Shaft Axis. The sum of the errors resulting from the lack of perpendicularity between Trunnion Drive Axis (TDA) and SDA and the lack of perpendicularity of the SLOS and the TDA shall not exceed 20 arc seconds for the SXT and 2 arc minutes for the SCT.

TABLE I

RESOLVER ALIGNMENT

FUNCTION	COMPONENT	REFERENCE	TOLERANCE (LOS)
SEXTANT TRUNNION (SXT TDA)	64X RSVR (Prior to Trimming)	SXT SLOS Angle (2 times TDA angle)	± 2 min Zero Error
	2X RSVR		± 6 min Zero Error
	1X RSVR		± 6 min Zero Error
	Trimmed 64X RSVR		± 3 sec Zero Error 24 sec Max error spread
SEXTANT SHAFT	16X RSVR	SXT SDA ANGLE	± 1 min Zero Error
	1X (SHAFT)		± 3 min Zero Error
	1X (GEARBOX)		± 2 min Zero Error
	1/2X RSVR		± 8 min Zero Error
	Trimmed 16X RSVR		± 10 sec Zero Error 44 sec Max error spread
TELESCOPE TRUNNION (SCT TDA)	1X RSVR	SCT LOS ELEVATION ANGLE (2 times TDA ANGLE)	± 2 min Zero Error* 16 min Max error spread
	Trunnion TPAC		4 min Max error spread
TELESCOPE SHAFT (SCT SDA)	1X RSVR	SCT SDA ANGLE	8 min Max error spread** ± 1 min Zero Error
	Shaft TPAC		4 min Max error spread

* This tolerance represents the differences between the SCT LOS Elevation angle (2 times the TDA angle) and the Trimmed SXT 64X Trunnion Resolver.

** This tolerance represents the differences between the SCT TDA angle and the Trimmed SXT 16X Shaft Resolver.

TPAC = Telescope Panel Angle Counter

3.2.3 Orientation of SLOS to TDA. The error resulting from the lack of perpendicularity between the TDA and SLOS for the SXT as when the SLOS is internally autocollimated shall not exceed 10 arc seconds.

3.2.4 Parallelism of Optical Axis to SDA Axis. (Reticle Eccentricity). The parallelism of the optical axis to SDA axis shall be within 10 seconds of arc for the SXT and 50 seconds of arc for the SCT.

3.2.5 Resolver Alignment. The SXT SDA and TDA resolvers and the SCT SDA TDA resolvers and counters shall be within the LOS tolerances specified in Table 1 when aligned to the specified references.

3.2.6 Resolving Power. The resolving power for all lines of sight of the SXT and SCT shall be determined with the eyepiece adjusted for optimum focus at the center of the respective fields using black and white targets as defined by MIL-STD-150A, Photographic Lenses.

The resolving power will be tested using either high contrast or low contrast targest depending upon whether the test equipment configuration includes high or low contrast target. The resolving power for high or low contrast targets shall be as follows or better:

	Resolving Power in arc seconds					
Approximate Position In Field	SXT				SCT	
	LLOS		SLOS		LOS	
Target Contrast	Low	High	Low	High	Low	High
Center	14.4	10.3	9.1	7.2	146	83.
1/3 Field Radius	*	*	14.4	11.5	230	115.0
2/3 Field Radius	*	*	28.7	23.0	328	184

*If the SXT SLOS resolution at the three field positions and the SXT LLOS resolution at field center are within the tolerance specified, it shall be assumed that the SXT LLOS resolution, at the field radii specified, is also within tolerance.

3.2.7 Air/Vacuum Focusing. The focus of each standard eyepiece upon the reticle plane shall be within the tolerance specified in the following chart for standard eyepieces. If the assembly configuration includes long eye-relief eyepieces then their focus shall be within the tolerances specified in the following chart for LER eyepieces.

Eyepiece	Air Reticle	Vacuum Reticle
SXT Standard	Adjustable between -2 and +2 Diopters	Adjustable between -2 and +2 Diopters
SXT LER	-1 ± .25 Diopters	-1 ± .25 Diopters
SCT Standard	-1 ± .25 Diopters	------------------
SCT LER	-1 ± .25 Diopters	------------------

3.2.8 Luminous Transmittance. The luminous transmittance of the SXT SLOS to CIE illuminant "C" (6500^{O}K) shall not be less than 25%.

The luminous transmittance of the SXT LLOS to CIE illuminant "C" shall not be less than 3.2%.

The luminous transmittance of the scanning telescope to CIE "C" shall not be less than 30%.

If the assembly configuration includes an eyepiece polaroid filter then the following shall be a requirement. The ratio of the luminous transmittance of the SXT SLOS to SXT LLOS shall not be less than 12 to 1 for CIE illuminant "C" when the eyepiece polaroid filter is positioned for minimum transmission through the LLOS.

3.2.9 Freedom of Motion. The SDA and TDA of the SCT shall move freely when rotated manually.

3.2.10 Static Friction. Breakaway friction shall be less than .04 inch-ounces on the SXT and SCT drive motor shafts as measured by the voltages on their respective motor control phases. Except that at 0° and 180° the breakaway friction shall be less than .052 inch-ounces on the SCT. The motor tachometer output shall be less than 10 mv with 0 volts AC applied to the Motor-Generator control windings.

3.2.11 Dynamic Friction Level. Dynamic friction shall be less than .03 inch-ounces on the SXT and SCT drive motor shafts as measured by the voltages on their respective motor control phases.

3.2.12 Reticle Lighting. The SXT and SCT reticle lamps shall draw a current that is within 10% of measurements made while the lamp illumination was observable. In addition the respective reticles shall appear illuminated when viewed via the eyepiece.

3.3 Product Performance and Repeatability. The Assembly shall meet the Functional Requirements of Section 3.2 and furthermore shall withstand specified environmental stresses without degradation of performance characteristics. This performance characteristic repeatability shall be demonstrated by subjecting the OUA to the following test procedures.

NOTE: The following sequence of test procedures is mandatory except that the sequence of the Pressure Leak Rate and the Functional Performance tests may be interchanged.

1. Baseline Performance Tests
2. Environmental Tests
    a) Mechanical Integrity
    b) Thermal Vacuum
3. Luminous Transmittance
4. Final Visual and Mechanical Inspection
5. Pressure Leak Rate Test
6. Functional Performance Tests (exclusive of Luminous Transmittance)

3.3.1 Baseline Performance Tests. These tests, as a minimum, shall demonstrate the following, Functional Performance Requirements from Section 3.2.

3.2.1 SDA Orientation
3.2.2 Orientation of the TDA Measuring Plane to the Shaft Axis
3.2.4 Parallelism of Optical Axis to SDA Axis (Reticle Eccentricity)
3.2.8 Luminous Transmittance (SDA & TDA zero)
3.2.8 Luminous Transmittance

3.3.2 Environmental Tests.

3.3.2.1 Mechanical Integrity. The Assembly shall be vibrated according to these requirements.

Random vibration with the indicated characteristics shall be applied along each of three mutually perpendicular axes for a period of one minute per axis.

Linear increase from $.0054g^2$/cps at 20 cps to $.02g^2$/cps at 70 cps and constant to 1000 cps; then linear decrease to $0.004g^2$/cps at 2000 cps with a -3db limit.

3.3.2.2 Thermal-Vacuum Test. The Assembly shall be subjected to simulated flight conditions in a Space Simulator chamber.

The command module conditions shall include the following:

Pressure -5 psi of air or greater.

Temperature - greater than 0°F
less than 160°F

The space side conditions shall include the following two conditions:

(1) Simultaneous cold wall and vacuum
(2) Simultaneous cold wall, vacuum and sun. Cold wall, vacuum and sun are defined as follows:

Cold Wall (temperature of wall) $-320°F \begin{smallmatrix} +10°F \\ -0°F \end{smallmatrix}$

Vacuum: less than 1 x 10^{-6} torr
Sun: A collimated radiation source simulating one sum in spectrum and intensity.

The SCT and SXT shall be successfully driven in the shaft and trunnion axes once during each hour of the simulation to insure proper general functioning. The focus of the SXT upon the vacuum reticle shall also be verified.

3.3.3 Final Visual and Mechanical Inspection. The eyepiece panels shall be removed and the assembly shall be inspected to ensure that it conforms to the highest quality standards of general workmanship, optical cleanliness and mechanical and operational integrity.

3.3.4 Pressure Leak Rate. With the optical head in vacuum, a differential pressure of 5 psi across the optic base shall not cause a leakage rate in excess of 9.99 x 10^{-5} st'd cc/sec of air.

3.3.5 Functional Performance and Repeatability. The Assembly will then be tested to show compliance to the Functional Performance Requirements of Section 3.2 by the procedures described in Section 4.2 of this Procurement Specification.

In order to demonstrate that there has been no measurable change in characteristics of the Assembly between Baseline Testing and Final Test, the data from these shall be compared. The maximum allowable differences between the two sets of data for corresponding tests shall be as specified in Table II. No alignments or adjustments shall be made between Baseline and Final Test, except for the following:

1) eyepiece focus adjustment
2) eyepiece removal and replacement
3) panel removal during Final Visual and Mechanical Inspection

3.4 Product Configuration

3.4.1 Drawings. The configuration of the assembly shall be in accordance with APOLLO G and N Drawing 2011000 and all drawings and engineering data referenced thereon.

TABLE II

Test	Performance Requirement	Maximum allowable difference between Baseline and Final Test
SDA Orientation (3.2.1)		
SXT SDA	10 arc sec.	6 arc sec.
SCT SDA	40 arc sec.	25 arc sec.
Orientation TDA Meas. Plane to SDA (3.2.2)		
SXT	20 arc sec.	6 arc sec.
SCT (not applicable)		
Parallelism of Optical Axis to SDA Axis (Reticle Eccentricity (3.2.4)		
SXT reticle	10 arc sec.	4 arc sec.
SCT reticle	50 arc sec.	25 arc sec.
Luminous Transmittance (3.2.8)		
SXT SLOS	greater than 25%	10% of measured value at Final Test
SXT LLOS	greater than 3.2%	10% of measured value at Final Test
SCT LOS	greater than 30%	10% of measured value at Final Test

NOTE: The allowable difference between baseline and final test does not represent changes in the Assembly characteristics, but rather allowable errors in measurement accuracy and stability.

3.4.2 **Nameplate and Serialization.** Each Assembly identified by General Arrangement (or Assembly) Drawing shall be identified by a serial number assigned in accordance with ND 1002323. This number shall be affixed to the optical base.

4. QUALITY ASSURANCE PROVISIONS

4.1 **General.** The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein. The failure of the end product to pass any examination or test of this section will automatically classify the unit as nonconforming. When nonconformance units are corrected by the contractor, the unit shall be reinspected. When corrective action has been taken, the reinspection of a nonconforming unit may be limited to the test or examination which defined the nonconformance or, when so directed by the cognizant inspector, a complete reexamination and retest of the unit may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.1.1 **Test Condition.**

4.1.1.1 **Environmental.** Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

(a) Temperature: 25% ± 10°C
(b) Relative Humidity: 90% maximum
(c) Barometric Pressure: 28 to 32 inches Hg.

4.2 **Tests.** The following chart shall be used to correlate between the Functional Performance Requirements specified in Section 3 and the tests specified in Section 4.

Paragraph Title	Section 3	Section 4
SDA Orientation	3.2.1	4.2.1.1 4.2.1.2
Orientation of the TDA Measuring Plane to the Shaft Axis	3.2.2	4.2.1.3
Orientation of SLOS to TDA	3.2.3	4.2.1.3.2
Parallelism of Optical Axis to SDA Axis (Reticle Eccentricity)	3.2.4	4.2.1.1 4.2.1.2
Resolver Alignment	3.2.5(Table 1)	4.2.1.4 4.2.1.5 4.2.1.6 4.2.1.7 4.2.1.8 4.2.1.9
Resolving Power	3.2.6	4.2.1.10
Air/Vacuum Focusing	3.2.7	4.2.1.11
Luminous Transmittance	3.2.8	4.2.1.12
Freedom of Motion	3.2.9	4.2.1.13
Static Friction	3.2.10	4.2.1.14 4.2.1.15
Dynamic Friction Level	3.2.11	4.2.1.14 4.2.1.15
Reticle Lighting	3.2.12	4.2.1.16
Baseline Performance	3.3.1	4.2.1.17
Environmental Tests	3.3.2	4.2.1.18
Final Visual Mechanical Inspection	3.3.3	4.2.1.19
Pressure Leak Rate	3.3.4	4.2.1.20
Functional Performance and Repeatability	3.3.5	4.2.1.21

4.2.1 Test Sequence. Except as noted in Section 3.3 the sequence of Functional testing as presented herein is optional and may be performed in any order which will permit most economical use of manpower and equipment.

4.2.1.1 SXT Parallelism of Optical Axis to SDA Axis (Reticle Eccentricity). The SXT reticle shall be observed through a certified reference LOS afforded by the Precision Test Fixture's SXT Vertical Autocollimator via the LLOS as shown schematically in Figure 1. A series of angular displacement measurements of the reticle through the complete excursion of SDA shall be taken with the autocollimator filar micrometers. The results shall be charted and analyzed to yield the reticle's eccentricity and SDA perpendicularity error with respect to the Assembly ball mount plane. Reticle eccentricity shall not exceed 10 seconds of arc and SDA perpendicularity shall be within 10 seconds of arc.

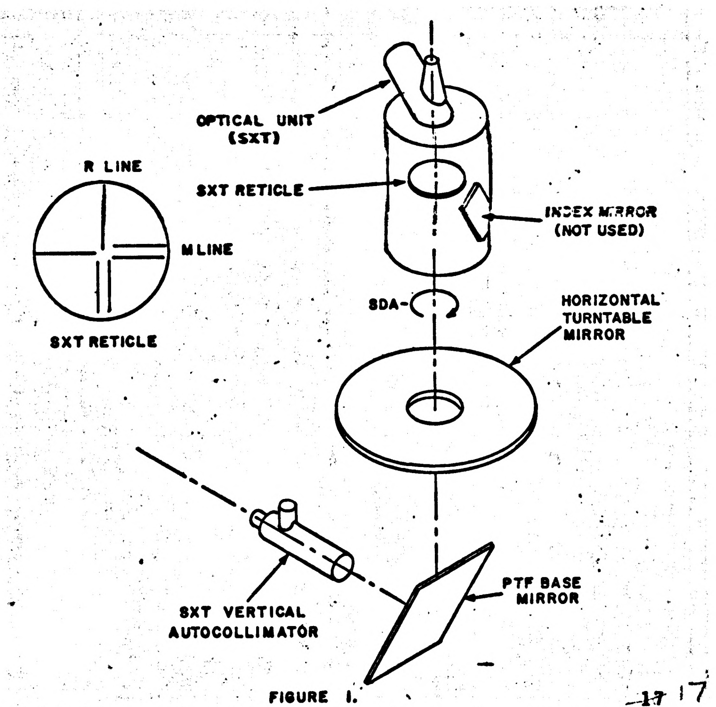
OPTICAL UNIT (SXT)
R LINE
SXT RETICLE
INDEX MIRROR (NOT USED)
M LINE
SXT RETICLE
SDA
HORIZONTAL TURNTABLE MIRROR
PTF BASE MIRROR
SXT VERTICAL AUTOCOLLIMATOR

FIGURE 1.

4.2.1.2 **SCT Parallelism of Optical Axis to SDA Axis (Reticle Eccentricity), and SDA Orientation.** The SCT reticle and PTF's SCT Vertical Collimator reticle shall be observed through the SCT eyepiece as shown schematically in Figure 2. A series of angular displacement measurements between the SCT reticle's "R" line (reference Figure 3) and the Collimator reticle's parallel component, at the cardinal angles of SDA rotation shall be made with reference to the reticle line thickness. The results shall be charted and analysed to yield the SCT reticle eccentricity and SDA perpendicularity error with respect to the Assembly ball mount plane. Reticle eccentricity shall be within 50 seconds of arc and the SDA shall be perpendicular to the ball plane mount to within 40 seconds of arc.

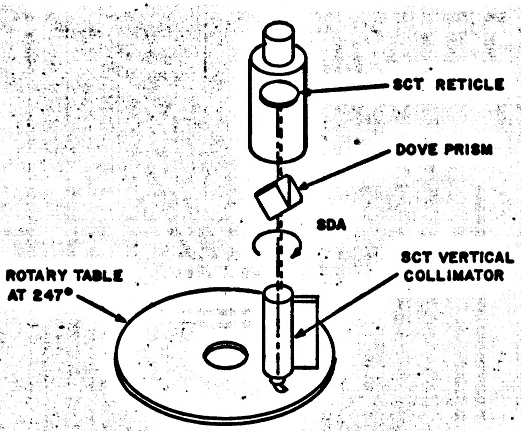
SCT RETICLE
DOVE PRISM
SDA
SCT VERTICAL COLLIMATOR
ROTARY TABLE AT 247°

FIGURE 2

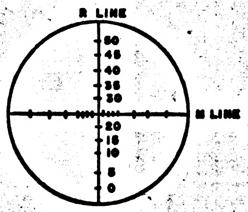
R LINE
50
45
40
35
30
20
15
10
5
0
M LINE

FIGURE 3

4.2.1.3 Orientation of the TDA Measuring Plane to the Shaft Axis.

4.2.1.3.1 SXT. The SXT reticle and its autocollimated SLOS reflection shall be observed through the SXT eyepiece as shown schematically in Figure 4. A series of angular displacement measurements between the reticle "R" line and its reflection, through the complete excursion of SDA, shall be made with reference to the reticle line pattern. The results shall be charted and analyzed to yield the parallelism error between the SLOS and LLOS and the eccentricity of the reflected SLOS reticle image to the SDA, both of which are related to the lack of perpendicularity between the TDA and SDA. The sum of the errors resulting from the lack of perpendicularity between the TDA and SDA and the lack of the SLOS and TDA shall not exceed 20 arc seconds.

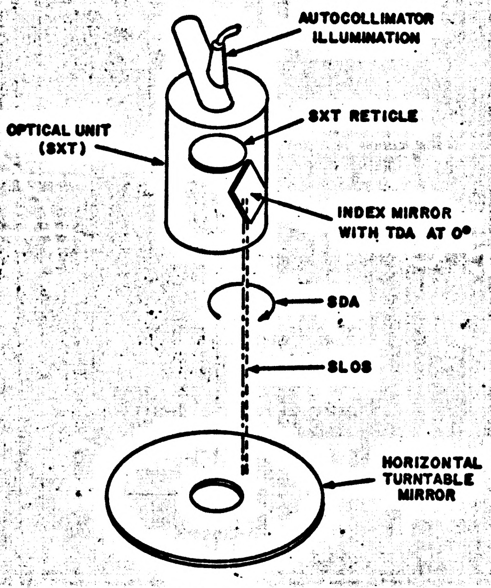
AUTOCOLLIMATOR ILLUMINATION
SXT RETICLE
OPTICAL UNIT (SXT)
INDEX MIRROR WITH TDA AT 0°
SDA
SLOS
HORIZONTAL TURNTABLE MIRROR

FIGURE 4

4.2.1.3.2 Orientation of SLOS to TDA. With the SXT TDA set to internally autocollimate the SLOS, the electrical angle corresponding to the coincidence of the "M" line and the reflection of the "M" line shall be recorded as the Self Collimation Angle. The position of the "R" line reflection shall be within 10 seconds of the "R" line at this position.

4.2.1.3.3 SCT. The SCT azimuth and elevation collimator shall be observed via the SCT eyepiece through an SCT TDA excursion as indicated in Figure 5. The lateral (normal to trunnion axis) displacement of the SCT reticle "R" line between the ends of its excursion shall be estimated utilizing the collimator reticle pattern as a reference. The variation of "R" line thus measured which results from a lack of perpendicularity between LOS and TDA and a lack of perpendicularity between TDA and SDA, shall not exceed 2 arc minutes.

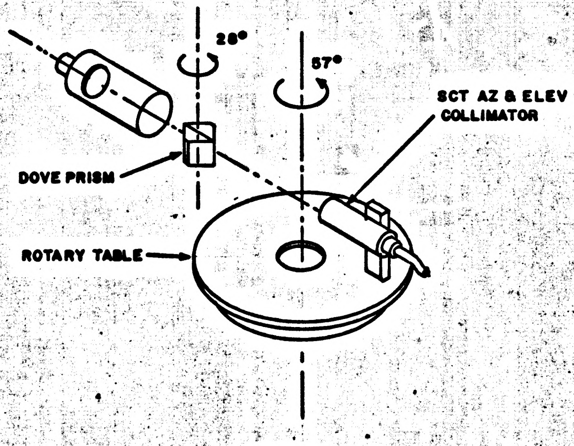

FIGURE 5

4.2.1.4 SXT TDA Accuracy

4.2.1.4.1 SXT TDA Zero Error. The SXT TDA Zero Error shall be measured by observing the SXT reticle simultaneously through the SLOS and LLOS by means of an autocollimator when the SXT TDA is set at electrical zero. The relative displacement between the two views of the reticle is the Zero Error and shall not exceed ± 3 sec.

4.2.1.4.2 SXT TDA Peak to Peak Error. The SXT TDA peak to peak error shall be based on the analysis of a series of positional measurements made with the optical unit as its index mirror is rotated about its vertically oriented trunnion axis, while the unit is in a horizontal position. The SXT shall be autocollimated via SLOS off a reference fixtures elevation mirror as shown in Figure 6. At each index mirror position, the SXT TDA 64X Resolver readout, converted to SXT Trunnion LOS angle, shall be compared to a reference rotary table position when coincidence between the SXT reticle and its reflection is achieved. The peak to peak error or maximum spread between the largest and smallest (algebraic) error measured shall be limited to 24 seconds.

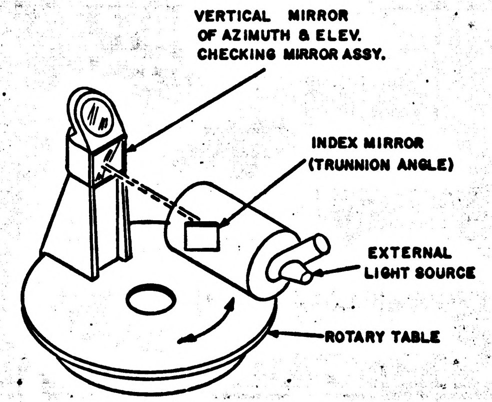

FIGURE 6

4.2.1.5 SXT SDA Accuracy. The SXT SDA accuracy shall be based on the analysis of a series of positional measurements made with the SXT as it is rotated about its vertically positioned Shaft Axis. The SXT shall be autocollimated via the SLOS off the PTF 57° Azimuth Mirror as shown in Figure 7. At each position the SXT SDA 16X Resolver readout, converted to SXT Shaft Angle shall be compared to the PTF rotary table position when coincidence between the SXT reticle and its reflection is achieved. The maximum error at zero reference shall not exceed 10 arc seconds. The peak to peak error at any point shall not exceed 44 arc seconds.

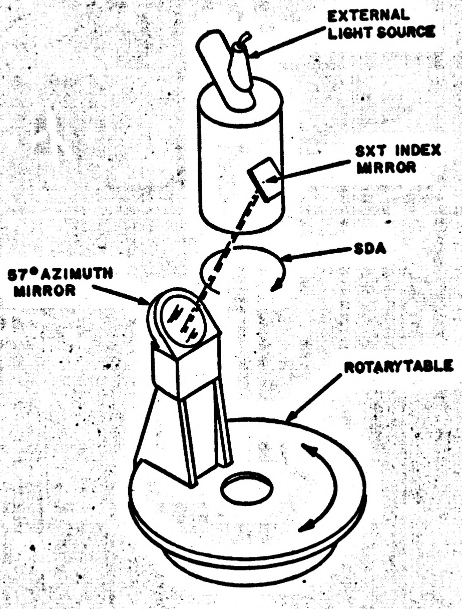
EXTERNAL LIGHT SOURCE
SXT INDEX MIRROR
SDA
57° AZIMUTH MIRROR
ROTARYTABLE

FIGURE 7

4.2.1.6 SCT TDA Electrical Accuracy. The SCT TDA electrical positional accuracy shall be based on the analysis of a series of measurements made with the OUA mounted on the PTF. The PTF's rotary table and SCT azimuth and elevation collimator shall define a TDA angle which shall be compared to an electrical angle readout on the functional tester. The electrical readout represents the SXT (to which the SCT is slaved) TDA's angular position via the 64X RSVR. The OUA shall be positioned at the PTF reference angles by adjusting the SCT LOS to 0° in azimuth and aligning the SCT's reticle "M" line to the PTF's azimuth and elevation collimator as shown in Figure 8 by positioning the SXT TDA. The maximum error at zero reference shall not exceed 2 minutes. The maximum allowable error spread shall be 16 minutes.

4.2.1.7 SCT TDA Mechanical Accuracy. The SCT TDA mechanical positional accuracy shall be measured simultaneously and by a similar technique as the electrical accuracy. The PTF's rotary table and the SCT azimuth and elevation collimator shall define a TDA angle which shall be compared to the angle readout the SCT TDA counter. The OUA shall be positioned at the SCT LOS to 0° in azimuth and then the SCT's reticle "M" line aligned to the PTF's azimuth and elevation collimator as shown in Figure 8. The maximum allowable error spread shall be 4 minutes.

4.2.1.8 SCT SDA Electrical Accuracy. The SCT SDA electrical accuracy shall be based on the analysis of a series of measurements made with the OUA mounted on the PTF. The PTF rotary table and SCT azimuth and elevation collimator shall define an SDA angle which shall be compared to an electrical angle readout on the functional tester. The electrical readout represents the SXT (to which the SCT is slaved) SDA's angular position via the 16X RSVR. The OUA shall be positioned at the PTF reference angles by adjusting the SCT LOS to 57° in elevation and then aligning the SCT's reticle "R" line to the PTF's azimuth and elevation collimator as shown in Figure 9 by positioning the SXT SDA. The maximum error at zero reference shall not exceed 1 minute.

The maximum allowable error spread shall be 8 minutes.

4.2.1.9 SCT SDA Mechanical Accuracy. The SCT SDA mechanical positional accuracy shall be measured simultaneously and by a similar technique as the electrical accuracy, The PTF's rotary table and SCT azimuth and elevation collimator shall define an SDA angle which shall be compared to the angle read off the SCT SDA counter. The OUA shall be positioned at the SCT LOS to 57° in elevation and then the SCT's reticle "R" line aligned to the PTF's azimuth and elevation collimator as shown in Figure 9. The maximum allowable error spread shall be 4 minutes.

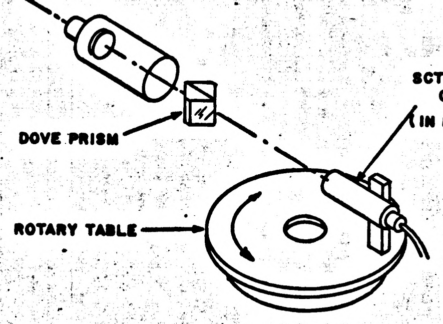

FIGURE 9

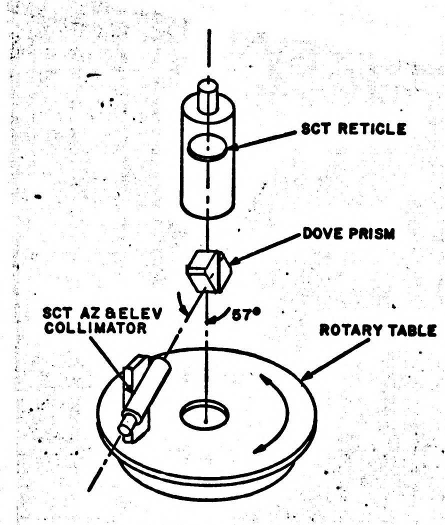

FIGURE 9

4.2.1.10 Resolving Power. The SXT LLOS shall be positioned such that the reticle "R" line and "M" line approximately bisects the black and white resolution target and the SXT eyepiece adjusted for optimum focus. The LLOS resolution for patterns which are parallel to the reticle "M" lines and patterns which are parallel to the reticle "R" lines when converted to arc seconds shall be 14.4 arc seconds or better, or 10.3 arc sec. or better depending on whether the test equipment used has a low or high contrast target respectively.

The fore mentioned tests shall be repeated while positioning the SXT SLOS to bisect the resolution target. The SLOS resolution at the center of the field shall be 9.1 arc sec or better or 7.2 arc seconds or better, depending on whether the test equipment used has a low or high contrast target respectively. In addition, with a low contract target the resolution at 1/3 field radius shall be 14.4 arc seconds or better and at 2/3 field radius shall be 28.7 arc seconds or better, while the corresponding values shall be 11.5 arc seconds for 1/3 field radius and 23.0 arc seconds for 2/3 field radius if a high contrast target is being used in the test equipment.

The SCT LOS shall be positioned such that the reticle "R" line and "M" line bisect the resolution target and the SCT eyepiece shall be adjusted for optimum focus. The LOS resolution at the center of the field shall be 146 arc seconds or better if the test equipment has a low contrast target and 83 arc seconds or better if it has a high contrast target.

The SCT LOS shall be positioned such that the 15 or 35 gradicule bisects the resolution target. The LOS resolution, at approximately 1/3 field radius, shall be 230 arc seconds or better if the test equipment has a low contrast target and 115.0 arc seconds or better if it has a high contrast target.

The SCT LOS shall be positioned such that the 5 or 45 gradicule bisects the resolution target. The LOS resolution, at approximately 2/3 field radius, shall be 328 arc seconds or better if the test equipment has a low contrast target and 184 arc seconds or better if it has a high contrast target.

4.2.1.11 Air/Vacuum Focusing. The focus adjustment of each eyepiece shall be measured by means of a dioptometer. Each eyepiece shall be mounted in place with sufficient entrance light to illuminate the air and vacuum reticle to which the focus is set. The adjustable SXT Standard eyepiece shall have a focusing range of -2 to +2 diopters. All other eyepieces are fixed and shall be set at a -1 ± .25 diopter focus.

4.2.1.12 Luminous Transmittance. The luminous transmittance at the assembly lines of sight shall be tested using a CIE illuminant "C" as a light source and a light transmittance meter to monitor the light intensity. The light intensity at the source (Io) shall be measured prior to testing the assembly.

The assembly shall be positioned such that the light emitted from the source enters the eyepiece and appears centralized in the optics when viewed via the objective lens. The light intensity at the objective lens (I_R) shall then be measured with the transmittance meter. The luminous transmittance shall be determined as follows:

Intensity Ratio ($I_R : I_o$) X 100 = % Transmittance. The luminous transmittance of the SXT LLOS to CIE illuminate "C" shall not be less than 3.2%.

The luminous transmittance of the SCT to CIE illuminate "C" shall not be less than 30%.

The luminous transmittance of the SXT SLOS shall be tested as specified above while monitoring the light intensity at the SXT Indexing Mirror. The luminous transmittance of the SXT SLOS to CIE illuminate "C" shall not be less than 25%.

If the assembly configuration includes an eyepiece polaroid filter then the following test shall be performed.

The ratio of the luminous transmittance of the SXT SLOS and SXT LLOS shall not be less than 12 to 1 for CIE illuminant "C" when the eyepiece polaroid filter is positioned for minimum transmission through the LLOS.

4.2.1.13 Freedom of Motion. Unscrew and pop out the SCT Shaft Manual Input Adapter and rotate control. SCT Shaft shall move freely. Unscrew and pop out the SCT Trunnion Manual Input Adapter and rotate control. SCT Trunnion shall move freely.

4.2.1.14 SXT TDA and SDA Dynamic Friction, Stiction, and Rate Generator Phasing. With a variable AC, 800 cps, input voltage applied to the Motor-Generator control windings, the voltage shall be increased until the SXT Shaft or trunnion starts to rotate. The input voltage shall not exceed 5.3 VAC. The input voltage shall then be decreased to the lowest level required to maintain rotation. The input voltage shall not exceed 4.2 VAC.

With the use of a phase sensitive voltmeter, the generator output voltage, for an increasing angular rotation of the shaft (SDA) shall cause the meter to deflect in a negative direction and in a positive direction for a decreasing angular rotation of the shaft. The generator output voltage for an increasing angular rotation of the trunnion (TDA) shall cause the meter to deflect in a positive direction and in a negative direction for decreasing angular rotation of the trunnion.

With 0 volts AC applied to the Motor-Generator control windings the TDA and SDA tachometer output shall be less than 10 mv with special hook-up using PAV when measured at OUA base connector.

4.2.1.15 SCT TDA and SDA Dynamic Friction, Stiction, and Rate Generator Phasing. With a variable AC 800 cps, input voltage applied to the Motor-Generator control windings the voltage shall be increased until the SCT shaft or trunnion starts to rotate. The input voltage shall not exceed 6.6 VAC when the shaft or trunnion is at the shade flip position, or 5.3 VAC at all other positions. The input voltage shall then be decreased to the lowest level required to maintain rotation. The input voltage shall not exceed 4.2 VAC.

With the use of a phase sensitive voltmeter, the generator output voltage for an increasing angular rotation of the shaft (SDA), shall cause the meter to deflect in a positive direction and the generator output for a decreasing angular rotation of the shaft shall cause the meter to deflect in a negative direction. The generator output voltage for an increasing angular rotation of the trunnion (TDA) shall cause the meter to deflect in a negative direction and in a positive direction for a decreasing angular rotation of the trunnion.

With 0 volts AC applied to the Motor-Generator control windings the TDA and SDA tachometer output shall be less than 10 mv with special hook-up using PAV when measured at OUA base connector.

4.2.1.16 Reticle Lighting. Reticle lamp operation shall be determined by means of their current drain and visual check. The current shall be measured by means of a milliammeter when 5.0 VAC is applied across each bank of 4 parallel lamps that illuminate the SXT and SCT reticles. The current drain shall be within 10% of the current measurements previously made while the lamp illumination could be observed and a visual check will be performed to show that the reticle appears illuminated when viewed via the eyepieces.

4.2.1.17 Baseline Performance. See applicable portions of Section 4.

4.2.1.18 Environmental Tests. See paragraph 3.3.2.

4.2.1.19 Final Visual Mechanical Inspection. See paragraph 3.3.3.

4.2.1.20 Pressure Leak Rate. The Leak Detector shall be calibrated prior to testing. The external side of the OUA shall be evacuated and backfilled with a 10% Helium mixture of 5 psi. The leak rate shall be determined using the following formula. The leak rate shall not exceed 9.99×10^{-5} st'd/cc/sec.

$$\text{Unit Leak Rate St'd cc/sec-He} = \frac{\text{Leak Detector Reading} \quad \text{Calibration St'd Leak Rate} \quad \frac{\text{St'd cc He}}{\text{Sec}}}{\text{Calibrated Leak Detector reading} \quad \frac{\text{\% He in Mixture}}{100}}$$

4.2.1.30 Functional Performance and Repeatability. Same as Section 3.3.5.

4.2.2 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of Apollo G and N Drawing 2011000. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulants, defects, contaminants, pin misalignment, and legibility and appearance of markings.

5. PREPARATION FOR DELIVERY

5.1 General. Preparation for delivery shall be in accordance with Specification ND 1002214, General Specification for Preservation Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment.

The assembly shall be installed in or removed from its shipping container (P/N 1019720) only under Class II or better clean room conditions in accordance with MIL-STD-209, Clean Room and Work Station Requirements Controlled, Environment.

6. NOTES.

6.1 The Precision Test Fixture (PTF) used to test the Optical Unit Assembly (OUA) shall be certified according to PS 2010606. Certification of the PTF is required before and after each final test. The certification shall be completed not more than 50 hours before or after the tests are performed. If the PTF does not recalibrate after a final test, the affected tests shall be rerun.

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APOLLO G&N Specification
PS 2016207
Original Issue Date:
Release Authority: TDRR 29283
Class A Release

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

DRAWING NO. 2011000

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
9-8-66	A	31022	9, 10, 18	M. G. M.	CCA491-0278
11-10-66	B	31921	2	M. G. M.	CCA491-0278
2-6-67	C	32858	2	M. G. M.	CCA491-0278
2-27-67	D	33083	5, 17	M. G. M.	CC A491-0278
7-13-67	E	34139	1, 2	M. G. M.	CCA491-0278
8-18-67	F	34378	1,2	M. G. M.	CCA491-0278
11-2-67	G	35007	1,2	M. G. M	CCA497-0278
3-13-68	H	35758	3,7,11,21,22	M. G. M.	CCA 497-0278
6-25-68	J	36452	2	M. M.	CCH 497-0278
9-7-70	K	38237	1,2	M.S	M-H

This specification consists of page 1 to 26 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	EC 5/31/66 · 6-1-66 · 6-1-66 MIT/IL	5-26-66 KIC

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-041, 2011000-042 , 2011000-051, 2011000-061, 2011000-071 2011000-081 and 2011000-091.

1.1 Product Configuration and Baseline Acceptances

1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. . This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. unless formally approved otherwise as required by ANA Bulletin No. 445.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein.

2.1 Effective Issues

2.1.1 Military Standards and Specifications shall be the issue in effect on the date of contract.

SPECIFICATIONS

APOLLO G and N

ND 1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment.
ND 1002023	Serialization, General Specification for
PS 2010606	Procurement Specification Product Configuration and Acceptance Test Requirements for the Precision Test Fixture

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

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Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
9-8-66	A	31022	9, 10, 18	M.G.M.	CCA491-0278

This specification consists of page 1 to 26 inclusive.

APPROVALS	A. C. METZGER	5/24/66 ECT 5/31/66 6-1-66 6-1-66	5-26-66
	NASA/MSC	MIT/IL	KIC

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

DRAWING NO. 2011000

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				MIT	NASA
-8-66	A	31022	9, 10, 18	M.G.M.	CCA491-0278
11-10-66	B	31921	2	M.G.M.	CCA491-0278

This specification consists of page 1 to 26 Inclusive.

APPROVALS	A. C. METZGER	Ect 5/31/66 6-1-66 6-1-66	5-26-66
	NASA/MSC	MIT/IL	KIC

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This specification consists of page 1 to 26 Inclusive.

APPROVALS	A. C. METZGER	EC 5/31/66 H. J. Sisaco 6-1-66 6-1-66	Arnold J. Frank 5-26-66
	NASA/MSC	MIT/IL	KIC

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-041 and 2011000-051.

1.1 Product Configuration and Baseline Acceptances

1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. . This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. unless formally approved otherwise as required by ANA Bulletin No. 445.

2. APPLICABLE DOCUMENTS

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2.1 Effective Issues

2.1.1 Military Standards and Specifications shall be the issue in effect on the date of contract.

SPECIFICATIONS

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ND 1002023	Serialization, General Specification for
PS 2010606	Procurement Specification Product Configuration and Acceptance Test Requirements for the Precision Test Fixture.

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-041 and 2011000-051.

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

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11-10-66	B	31921	2	M. G. M.	CCA491-0278
2-6-67	C	32858	2	M. G. M.	CCA491-0278

This specification consists of page 1 to 26 inclusive.

APPROVALS	A. G. METZGER NASA/MSC	A. Seltzman ~~EC~~ 5/31/66 J. J. Sirocco 6-1-66 [illegible] 6-1-66 MIT/IL	Arnold T. Frail 5-26-66 KIC

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-041, 2011000-051 and 2011000-061.

1.1 Product Configuration and Baseline Acceptances

1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. . This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. .unless formally approved otherwise as required by ANA Bulletin No. 445.

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Class A Release

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

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11-10-66	B	31921	2	M. G. M.	CCA491-0278
2-6-67	C	32858	2	M. G. M.	CCA491-0278
2-27-67	D	33083	5, 17	M. G. M.	CCA491-0278

This specification consists of page 1 to 26 inclusive.

APPROVALS	A. C. METZGER	5/31/66 6-1-66 6-1-66	5-26-66
	NASA/MSC	MIT/IL	KIC

TABLE I

RESOLVER ALIGNMENT

FUNCTION	COMPONENT	REFERENCE	TOLERANCE (LOS)
SEXTANT TRUNNION (SXT TDA)	64X RSVR (Prior to Trimming)	SXT SLOS Angle (2 times TDA angle)	± 2 min Zero Error
	2X RSVR		± 6 min Zero Error
	1X RSVR		± 6 min Zero Error
	Trimmed 64X RSVR		± 5 sec Zero Error 24 sec Max error spread
SEXTANT SHAFT	16X RSVR	SXT SDA ANGLE	± 1 min Zero Error
	1X (SHAFT)		± 3 min Zero Error
	1X (GEARBOX)		± 2 min Zero Error
	1/2X RSVR		± 8 min Zero Error
	Trimmed 16X RSVR		± 10 sec Zero Error 44 sec Max error spread
TELESCOPE TRUNNION (SCT TDA)	1X RSVR	SCT LOS ELEVATION ANGLE (2 times TDA ANGLE)	± 2 min Zero Error * 16 min Max error spread
	Trunnion TPAC		4 min Max error spread
TELESCOPE SHAFT (SCT SDA)	1X RSVR	SCT SDA ANGLE	8 min Max error spread ** ± 1 min Zero Error
	Shaft TPAC		4 min Max error spread

*This tolerance represents the differences between the SCT LOS Elevation angle (2 times the TDA angle) and the Trimmed SXT 64X Trunnion Resolver.

**This tolerance represents the differences between the SCT SDA angle and the Trimmed SXT 16X Shaft Resolver.

TPAC = Telescope Panel Angle Counter

4.2.1.4 SXT TDA Accuracy

4.2.1.4.1 SXT TDA Zero Error. The SXT TDA Zero Error shall be measured by observing the SXT reticle simultaneously through the SLOS and LLOS by means of an autocollimator when the SXT TDA is set at electrical zero. The relative displacement between the two views of the reticle is the Zero Error and shall not exceed ± 5 sec.

4.2.1.4.2 SXT TDA Peak to Peak Error. The SXT TDA peak to peak error shall be based on the analysis of a series of positional measurements made with the optical unit as its index mirror is rotated about its vertically oriented trunnion axis, while the unit is in a horizontal position. The SXT shall be autocollimated via SLOS off a reference fixture elevation mirror as shown in Figure 6. At each index mirror position, the SXT TDA 64X Resolver readout, converted to SXT Trunnion LOS angle, shall be compared to a reference rotary table position when coincidence between the SXT reticle and its reflection is achieved. The peak to peak error or maximum spread between the largest and smallest (algebraic) error measured shall be limited to 24 seconds.

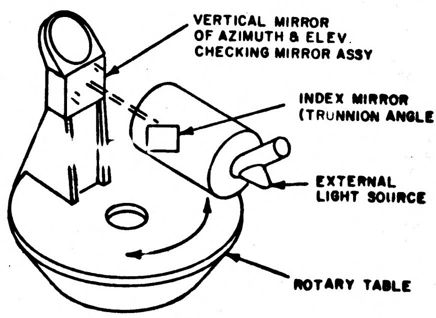
VERTICAL MIRROR OF AZIMUTH & ELEV. CHECKING MIRROR ASSY
INDEX MIRROR (TRUNNION ANGLE)
EXTERNAL LIGHT SOURCE
ROTARY TABLE

Figure 6

APOLLO G&N Specification
PS 2016207
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Class A Release

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

DRAWING NO. 2011000

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
9-8-66	A	31022	9, 10, 18	M.G.M.	CCA491-0278
11-10-66	B	31921	2	M.G.M.	CCA491-0278
2-6-67	C	32858	2	M.G.M.	CCA491-0278
2-27-67	D	33083	5, 17	M.G.M.	CCA491-0278
7-13-67	E	34139	1, 2	M.G.M.	CCA491-0278

This specification consists of page 1 to 26 inclusive.

APPROVALS	A. C. METZGER	5/31/66	6-1-66	6-1-66	5-26-66
	NASA/MSC	MIT/IL			KIC

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-041, 2011000-051, 2011000-061 and 2011000-071.

1.1 Product Configuration and Baseline Acceptance

1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. . This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. unless formally approved otherwise as required by ANA Bulletin No. 445.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein.

2.1 Effective Issues

2.1.1 Military Standards and Specifications shall be the issue in effect on the date of contract.

SPECIFICATIONS

APOLLO G and N

ND 1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment.
ND 1002023	Serialization, General Specification for
PS 2010606	Procurement Specification Product Configuration and Acceptance Test Requirements for the Precision Test Fixture.

APOLLO G&N Specification
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PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

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2-6-67	C	32858	2	M.G.M.	CCA491-027
2-27-67	D	33083	5, 17	M.G.M.	CCA491-027
7-13-67	E	34139	1, 2	M.G.M.	CCA491-027
8-18-67	F	34378	1,2	M.G.M.	CCA491-027

This specification consists of page 1 to 26 inclusive.

APPROVALS	A. C. METZGER	ECT 5/31/66 · Sirocco 6-1-66 · 6-1-66	Arnold 5-26-66
	NASA/MSC	MIT/IL	KIC

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-041, 2011000-042 and 2011000-051, 2011000-061, 2011000-062 and 2011000-071.

1.1 Product Configuration and Baseline Acceptances

1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. . This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. .unless formally approved otherwise as required by ANA Bulletin No. 445.

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PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

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-5-66	A	31022	9, 10, 18	M. G. M.	CCA491-0278
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2-6-67	C	32858	2	M. G. M.	CCA491-0278
2-27-67	D	33083	5, 17	M. G. M.	CCA491-0278
7-13-67	E	34139	1, 2	M. G. M.	CCA491-0278
8-18-67	F	34378	1,2	M. G. M.	CCA491-0278
11-2-67	G	35007	1,2	M. G. M	CCA497-0278

This specification consists of page 1 to 26 Inclusive.

APPROVALS	A. C. METZGER	EC 5/31/66 6-1-66 6-1-66	5-26-66
	NASA/MSC	MIT/IL	KIC

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-041, ~~2011000-042 and~~ 2011000-051, 2011000-061, and 2011000-071.

1.1 Product Configuration and Baseline Acceptances

1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. . This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. .unless formally approved otherwise as required by ANA Bulletin No. 445.

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ND 1002023	Serialization, General Specification for
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APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

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7-13-67	E	34139	1, 2	M.G.M.	CCA491-027
8-18-67	F	34378	1,2	M.G.M.	CCA491-027
11-2-67	G	35007	1,2	M.G.M.	CCA497-027
3-13-68	H	35758	3,7,11,21,22	M.G.M.	CCA [illegible]-027

This specification consists of page 1 to 26 inclusive.

APPROVALS	A. C. METZGER	[illegible] EC 5/31/66 [illegible] 6-1-66 [illegible] 6-1-66	Arnold [illegible] 5-26-66
	NASA/MSC	MIT/IL	KIC

STANDARDS

Military

MIL-STD-150A	Photographic Lenses

Federal

FED-STD-209	Clean Room and Work Station Requirements, Controlled Environment

DRAWINGS

APOLLO G and N

1019720	Optics Navigation Base Shipping Container
2011000	Optical Unit Assembly
2012791	SXT Mirror Housing and Air Focusing Shim Assembly
2012775	SCT Prism Housing and Insulation Assembly
2012798	SCT Eyepiece Assembly (Adjustable Focusing)
2012748	Long Eye Relief Eyepiece Assembly (SXT)
2012790	Long Eye Relief Eyepiece Assembly (SCT)
2012700	Sextant Eyepiece Assembly

Copies of Specifications, Standatds, Drawings, Bulletins and Publications required by suppliers in connection with specific procurement functions should be obtained from the Procuring Activity or as directed by the contracting officer.

2.2 Conflicting Requirements. In the event of conflict between the requirements of the contract, this document and the documents listed in this section, the following order of precedence shall apply and the Contractor shall notify MIT Apollo Management of conflict as soon as it is determined.

a. The contract
b. This specification
c. Documents listed in this section

3. REQUIREMENTS

The Primary Performance Requirements described in Section 3.1 are derived from the Apollo mission analysis. These requirements will be demonstrated by the ability of the Assembly to meet the Functional Performance Requirements.

APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

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2-6-67	C	32858	2	M.G.M.	CCA491-027
2-27-67	D	33083	5, 17	M.G.M.	CCA4[illegible]-027
7-13-67	E	34139	1, 2	M.G.M.	CCA491-027
8-18-67	F	34378	1,2	M.G.M.	CCA491-027
11-3-67	G	35007	1,2	M.G.M.	CCA497-027
3-13-68	H	36758	2,7,11,21,22	M.G.M.	CCA [illegible]-027
[illegible]	J	36452	2	M.M.	CCH 497-0275

This specification consists of page 1 to 26 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. D[illegible] EC 5/31/66 · [illegible] Sisson 6-1-66 · [illegible] 6-1-66 MIT/IL	Arnold [illegible] 5-26-66 KIC

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-041, 2011000-042 , 2011000-051, 2011000-061, 2011000-071 and 2011000-081.

1.1 Product Configuration and Baseline Acceptances

1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. . This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. unless formally approved otherwise as required by ANA Bulletin No. 445.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein.

2.1 Effective Issues

2.1.1 Military Standards and Specifications shall be the issue in effect on the date of contract.

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ND 1002023	Serialization, General Specification for
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APOLLO G&N Specification
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

DRAWING NO. 2011000

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Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
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9-8-66	A	31022	9, 10, 18	M.G.M.	CCA491-0278
11-10-66	B	31921	2	M.G.M.	CCA491-0273
2-6-67	C	32858	2	M.G.M.	CCA491-0278
2-27-67	D	33083	5, 17	M.G.M.	CC A491-0278
7-13-67	E	34139	1, 2	M.G.M.	CCA491-0278
8-18-67	F	34378	1,2	M.G.M.	CCA491-0278
11-2-67	G	35007	1,2	M.G.M	CCA497-0278
3-13-68	H	35758	3,7,11,21,22	M.G.M.	CCA 497-0278
6-25-68	J	36452	2	M.M.	CCH 497-0275
9-7-70	K	38237	1,2	M.S	M-H

This specification consists of page 1 to 26 inclusive.

(Record of revisions continued on page 1a)

APPROVALS	A. C. METZGER NASA/MSC	5/31/66	6-1-66	6-1-66	5-26-66
		MIT/IL			KIC

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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

DRAWING NO. 2011000

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 26 inclusive.

APPROVALS	A. C. METZGER	A. Saltzman E.C. 5/31/66 F. J. Sisco 6-1-66 W. B. Murphy 6-1-66	Arnold T. 5-26-66
	NASA/MSC	MIT/IL	KIC

1. SCOPE

This specification establishes the detail requirements for complete identification and acceptance of the Optical Unit, Assembly Part No. 2011000-041, [illegible] 2011000-024, [illegible].

1.1 Product Configuration and Baseline Acceptances

1.1.1 The product configuration baseline shall be established by FACI for the Optical Unit Assembly, Serial No. . This unit and all subsequent units regardless of intended use shall be accepted to the configuration defined by Serial No. .unless formally approved otherwise as required by ANA Bulletin No. 445.

2. APPLICABLE DOCUMENTS

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ND 1002023	Serialisation, General Specification for
PS 2010606	Procurement Specification Product Configuration and Acceptance Test Requirements for the Precision Test Fixture.

STANDARDS

Military

MIL-STD-150A	Photographic Lenses

Federal

FED-STD-209	Clean Room and Work Station Requirements, Controlled Environment

DRAWINGS

APOLLO G and N

1019720	Optics Navigation Base Shipping Container
2011000	Optical Unit Assembly
2012699	SXT Mirror Housing and Air Focusing Shim Assembly
2012667	SCT Prism Housing and Insulation Assembly
2012719	SCT Eyepiece Assembly (Adjustable Focusing)
2012748	Long Eye Relief Eyepiece Assembly (SXT)
2012691	Long Eye Relief Eyepiece Assembly (SCT)
2012700	Sextant Eyepiece Assembly

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2.2 Conflicting Requirements. In the event of conflict between the requirements of the contract, this document and the documents listed in this section, the following order of precedence shall apply and the Contractor shall notify MIT Apollo Management of conflict as soon as it is determined.

a. The contract
b. This specification
c. Documents listed in this section

3. REQUIREMENTS

The Primary Performance Requirements described in Section 3.1 are derived from the Apollo mission analysis. These requirements will be demonstrated by the ability of the Assembly to meet the Functional Performance Requirements.

3.2.7 Air Focusing. The focus of the SXT Long Eye Relief Eyepiece Assembly 2012748 and the SCT Long Eye Relief Eyepiece Assembly, 2012691 upon the air reticle plane shall be -1 ± .25 diopters.

3.2.8 Luminous Transmittance. The luminous transmittance of the SXT SLOS to CIE illuminant "C" (6500°K) shall not be less than 25%.

The luminous transmittance of the SXT LLOS of CIE illuminant "C" shall not be less than 3.2%.

The luminous transmittance of the scanning telescope to CIE "C" shall not be less than 30%.

The ratio of the luminous transmittance of the SXT SLOS to SXT LLOS shall not be less than 12 to 1 for CIE illuminant "C" when the eyepiece polariod filter is positioned for minimum transmission through the LLOS.

3.2.9 Freedom of Motion. The SDA and TDA of the SCT shall move freely when rotated manually.

3.2.10 Static Friction. Breakaway friction shall be less than .04 inch-ounces on the SXT and SCT drive motor shafts as measured by the voltages on their respective motor control phases. Except that at 0° and 180° the breakaway friction shall be less than .052 inch-ounces on the SCT. The motor tachometer output shall be less than 15 mv with 0 volts AC applied to the Motor-Generator control windings.

3.2.11 Dynamic Friction Level. Dynamic Friction shall be less than .03 inch-ounces on the SXT and SCT drive motor shafts as measured by the voltages on their respective motor control phases.

3.2.12 Reticle Lighting. The SXT and SCT reticle lamps shall draw a current that is within 10% of measurements made while the lamp illumination was observable. In addition the respective reticles shall appear illuminated when viewed via the eyepiece.

3.3 Product Performance and Repeatability. The Assembly shall meet the Functional Requirements of Section 3.2 and furthermore shall withstand specified environmental stresses without degradation of performance characteristics. This performance characteristic repeatability shall be demonstrated by subjecting the OUA to the following test procedures.

NOTE: The following sequence of test procedure is mandatory except that the sequence of the Pressure Leak Rate and Functional Performance tests may be interchanged. Should the OUA be opened for any reason following compliance with these test procedures, the Leak Test shall be performed as the last check following the closing of the OUA.

1. Baseline Performance Test
2. Environmental Test
   a) Mechanical Integrity
   b) Complete Visual and Mechanical Inspection
   c) Thermal Vacuum
3. Luminous Transmittance
4. Functional Performance Test (exclusive of Luminous Transmittance)
5. Pressure Leak Rate Test

3.3.1 Baseline Performance Tests. These tests, as a minimum, shall demonstrate the following, Functional Performance Requirements from Section 3.2.

3.2.1 SDA Orientation
3.2.2 Orientation of the TDA Measuring Plane to the Shaft Axis
3.2.4 Parallelism of Optical Axis to SDA Axis (Reticle Eccentricity)
3.2.8 Luminous Transmittance

3.3.2 Environmental Tests.

3.3.2.1 Mechanical Integrity. The Assembly shall be vibrated according to these requirements.

Random vibration with the indicated characteristics shall be applied along each of three mutually perpendicular axes for a period of one minute per axis.

Linear increase from .0054g^2/cps AT 20 CPS to .02g^2/cps at 70cps and constant to 1000cps; then linear decrease to 0.004g^2/cps at 2000cps with a -3db limit.

3.3.2.2 Thermal-Vacuum Test. The Assembly shall be subjected to simulated flight conditions in a Space Simulator chamber.

The command module conditions shall include the following:

Pressure -5psi of air or greater.
Temperature - greater than $0^{\circ}F$
less than $160^{\circ}F$

The space side conditions shall include the following two conditions:

1. Simultaneous cold wall and vacuum
2. Simultaneous cold wall, vacuum and sun. Cold wall, vacuum and sun are defined as follows:

Cold Wall (temperature of wall) $-320^{\circ}F \; {}^{+10^{\circ}F}_{-\,0^{\circ}F}$
Vacuum: less than 1×10^{-6} torr
Sun: A collimated radiation source simulating the earth's sun in spectrum and intensity.

The SCT and SXT shall be successfully driven in the shaft and trunnion axes once during each hour of the simulation to insure proper general functioning. The focus of the SXT upon the vacuum reticle shall also be verified.

3.3.3 Final Visual and Mechanical Inspection. The eyepiece panels shall be removed and the assembly shall be inspected to ensure that it conforms to the highest quality standards of general workmanship, optical cleanliness and mechanical and operational integrity.

3.3.4 Pressure Leak Rate. With the optical head in vacuum, a differential pressure of 5 psi across the optic base shall not cause a leakage rate in excess of 9.99×10^{-5} st'd cc/sec of air.

3.3.5 Functional Performance and Repeatability. The Assembly will then be tested to show compliance to the Functional Performance Requirements of Section 3.2 by the procedures described in Section 4.2 of this Procurement Specification.

In order to demonstrate that there has been no measurable change in characteristics of the Assembly between Baseline Testing and Final Test, the data from these shall be compared. The maximum allowable differences between the two sets of data for corresponding tests shall be as specified in Table II. No alignments or adjustments shall be made between Baseline and Final Test, except for the following:

1. Eyepiece focus adjustment
2. Eyepiece removal and replacement
3. Panel removal during Final Visual and Mechanical Inspection

3.4 Product Configuration

3.4.1 Drawings. The configuration of the assembly shall be in accordance with APOLLO G&N Drawing 2011000 and all drawings and engineering data referenced thereon.

TABLE II

Test	Performance Requirement	Maximum allowable difference between Baseline and Final Test
SDA Orientation (3.2.1)		
SXT SDA	10 arc sec.	6 arc sec.
SCT SDA	40 arc sec	25 arc sec
Orientation TDA Meas. Plane to SDA (3.2.2)		
SXT	20 arc sec.	6 arc sec.
SCT (not applicable)		
Parallelism of Optical Axis to SDA Axis (Reticle Eccentricity (3.2.4)		
SXT reticle	10 arc sec.	4 arc sec.
SCT reticle	50 arc sec.	25 arc sec.
Luminous Transmittance (3.2.8)		
SXT SLOS	greater than 25%	10% below measured value at Baseline test
SXT LLOS	greater than 3.2%	10% below measured value at Baseline test
SCT LOS	greater than 30 %	10% below measured value at Baseline test

NOTE: The allowable difference between baseline and final test does not represent changes in the Assembly characteristics, but rather allowable errors in measurement accuracy and stability.

3.4.2 Nameplate and Serialization. Each Assembly identified by General Arrangement (or Assembly) Drawing shall be identified by a serial number assigned in accordance with ND 1002023. This number shall be affixed to the optical base.

3.4.2 Government Furnished Property List.

2012699	SXT Mirror Housing and Air Focusing Shim Assembly
2012667	SCT Prism Housing and Insulation Assembly
2012719	SCT Eyepiece Assembly (Adjustable Focusing)
2012700	Sextant Eyepiece Assembly
2012748	Long Eye Relief Eyepiece Assembly (SXT)
2012691	Long Eye Relief Eyepiece Assembly (SCT)

4. QUALITY ASSURANCE PROVISIONS

4.1 General. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein. The failure of the end product to pass any examination or test of this section will automatically classify the unit as nonconforming. When nonconforming units are corrected by the contractor, the unit shall be reinspected. When corrective action has been taken, the reinspection of a nonconforming unit may be limited to the test or examination which defined the nonconformance or, when so directed by the cognizant inspector, a complete reexamination and retest of the unit may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.1.1 Test Condition.

4.1.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25% ± 10°C
b. Relative Humidity: 90% maximum
c. Barometric Pressure: 28 to 32 inches Hg

4.2 Tests. The following chart shall be used to correlate between the Functional Performance Requirements specified in Section 3 and the tests specified in Section 4.

4.2.1.5 SXT SDA Accuracy. The SXT SDA accuracy shall be based on the analysis of a series of positional measurements made with the SXT as it is rotated about its vertically positioned Shaft Axis. The SXT shall be autocollimated via the SLOS off the PTF 57° Azimuth Mirror as shown in Figure 7. At each position the SXT SDA 16X Resolver readout, converted to SXT Shaft Angle shall be compared to the PTF rotary table position when coincidence between the SXT reticle and its reflection is achieved. The maximum error [illegible] reference shall not exceed 10 arc seconds. [illegible]. The peak to peak error at any point shall not exceed [illegible] arc seconds.

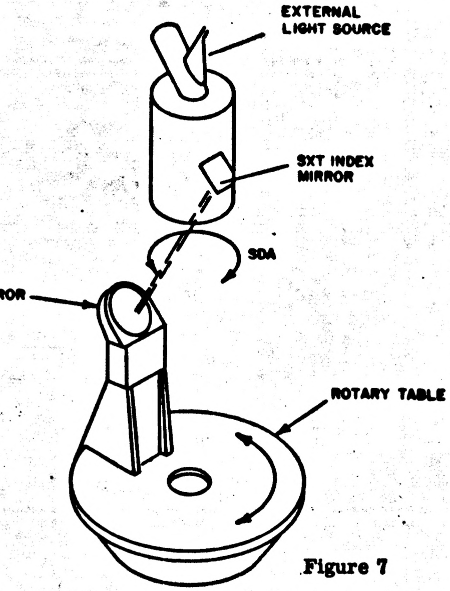

EXTERNAL LIGHT SOURCE
SXT INDEX MIRROR
SDA
57° AZIMUTH MIRROR
ROTARY TABLE

Figure 7

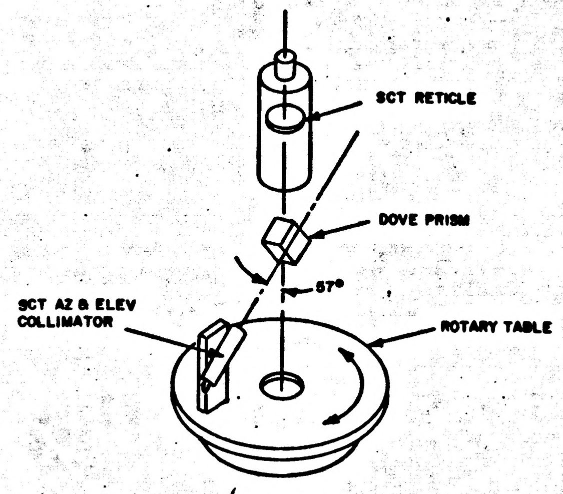


Figure 9

4.2.1.10 Resolving Power. The resolving power for the SXT lines of sight shall be determined using a Sextant Eyepiece Assembly, 2012700, and SXT Mirror Housing and Air Focusing Shim Assembly, 2012699 mounted on the Optical Unit Assembly. The SXT LLOS shall be posisitoned such that the reticle "R" line and "M" line approximately bisects the black and white resolution target and the SXT eyepiece adjusted for optimum focus. The LLOS resolution for patterns which are parallel to the reticle "M" lines and patterns which are parallel to the reticle "R" lines when converted to arc seconds shall be 14.4 arc seconds or better, or 10.3 arc sec. or better depending on whether the test equipment used has a low or high contrast target respectively.

The fore mentioned tests shall be repeated while positioning the SXT SLOS to bisect the resolution target. The SLOS resolution at the center of the field shall be 9.1 arc sec or better or 7.2 arc seconds or better, depending on whether the test equipment used has a low or high contrast target respectively. In addition, with a low contract target the resolution at 1/3 field radius shall be 14.4 arc seconds or better and at 2/3 field radius shall be 28.7 arc seconds or better, while the corresponding values shall be 11.5 arc seconds for 1/3 field radius and 23.0 arc seconds for 2/3 field radius if a high contrast target is being used in the test equipment.

The resolving power for the SCT line of sight shall be determined using a SCT Eyepiece Assembly (Adjustable Focusing), 2012719, and SCT Prism Housing and Insulation Assembly, 2012667 mounted on the Optical Unit Assembly.

The SCT LOS shall be positioned such that the reticle "R" line and "M" line bisect the resolution target and the SCT eyepiece shall be adjusted for optimum focus. The LOS resolution at the center of the field shall be 146 arc seconds or better if the test equipment has a low contrast target and 83 arc seconds or better if it has a high contrast target.

The SCT LOS shall be positioned such that the 15 or 35 gradicule bisects the resolution target. The LOS resolution, at approximately 1/3 field radius, shall be 230 arc seconds or better if the test equipment has a low contrast target and 115.0 arc seconds or better if it has a high contrast target.

The SCT LOS shall be positioned such that the 5 or 45 gradicule bisects the resolution target. The LOS resolution, at approximately 2/3 field radius, shall be 328 arc seconds or better if the test equipment has a low contrast target and 184 arc seconds or better if it has a high contrast target.

4.2.1.11 Air Focusing. The focus of the SXT Long Eye Relief Eyepiece Assembly, 2012748, and SCT Long Eye Relief Eyepiece Assembly, 2012691, shall be measured by means of a dioptometer. The SXT Long Eye Relief Eyepiece shall be mounted on the SXT Mirror Housing and Air Focusing Shim Assembly, 2012699, and the SCT Long Eye Relief Eyepiece mounted on the SCT Prism Housing and Insulation Assembly, 2012667. The SXT and SCT LER eyepieces shall be mounted on the Optical Unit Assembly with sufficient entrance light to illuminate the air reticle. The focus on the air reticle shall be -1 ± .25 diopters.

4.2.1.12 Luminous Transmittance. The luminous transmittance at the SXT lines of sight shall be tested with a SXT Eyepiece Assembly 2012700, and SXT Mirror Housing and Air Focusing Shim Assembly. The luminous transmittance at the SCT line of sight shall be tested with a SCT Eyepiece Assembly, 2012719, and SCT Prism Housing and Insulation Assembly 2012667.

APOLLO G&N Specification
PS 2016208
Original Issue Date: 28 SEPT 67
Release Authority: TDRR-34757
Class A Release

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

OPTICAL UNIT ASSEMBLY

DRAWING NO. 2011000

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 21 inclusive.

APPROVALS	NASA/MSC	9/21/67	E. Thorup 9/21/67 MIT/IL	21 Sept 67	KIC

DRAWINGS

APOLLO G&N

1019720	Optics Navigation Base Shipping Container
2011000	Optical Unit Assembly
2012699	SXT Mirror Housing and Air Focusing Shim Assembly
2012667	SCT Prism Housing and Insulation Assembly
2012719	SCT Eyepiece Assembly (Adjustable Focusing)
2012748	Long Eye Relief Eyepiece Assembly (SXT)
2012691	Long Eye Relief Eyepiece Assembly (SCT)
2012700	Sextant Eyepiece Assembly

Copies of Specifications, Standards, Drawings, Bulletins and Publications required by suppliers in connection with specific procurement functions should be obtained from the Procuring Activity or as directed by the contracting officer.

2.2 Conflicting Requirements. In the event of conflict between the requirements of the contract, this document and the documents listed in this section, the following order of precedence shall apply and the Contractor shall notify MIT Apollo Management of conflict as soon as it is determined.

a. The contract

b. This specification

c. Documents listed in this section

3. REQUIREMENTS

The Primary Performance Requirements described in Section 3.1 are derived from the Apollo mission analysis. These requirements will be demonstrated by the ability of the Assembly to meet the Functional Performance Requirements.

3.3.2 Nameplate and Serialization. Each Assembly identified by General Arrangement (or Assembly) Drawing shall be identified by a serial number assigned in accordance with ND 1002323. This number shall be affixed to the optical base.

3.3.3 Government Furnished Property List.

2012699	SXT Mirror Housing and Air Focusing Shim Assembly
2012667	SCT Prism Housing and Insulation Assembly
2012719	SCT Eyepiece Assembly (Adjustable Focusing)
2012700	Sextant Eyepiece Assembly
2012748	Long Eye Relief Eyepiece Assembly (SXT)
2012691	Long Eye Relief Eyepiece Assembly (SCT)

4. QUALITY ASSURANCE PROVISIONS

4.1 General. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein. The failure of the end product to pass any examination or test of this section will automatically classify the unit as nonconforming. When nonconformance units are corrected by the contractor, the unit shall be reinspected. When corrective action has been taken, the reinspection of a nonconforming unit may be limited to the test or examination which defined the nonconformance or, when so directed by the cognizant inspector, a complete reexamination and retest of the unit may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.1.1 Test Condition.

4.1.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

(a) Temperature: 25° ± 10°C
(b) Relative Humidity: 90% maximum
(c) Barometric Pressure: 28 to 32 inches Hg.

4.2 Tests. The following chart shall be used to correlate between the Functional Performance Requirements specified in Section 3 and the tests specified in Section 4.

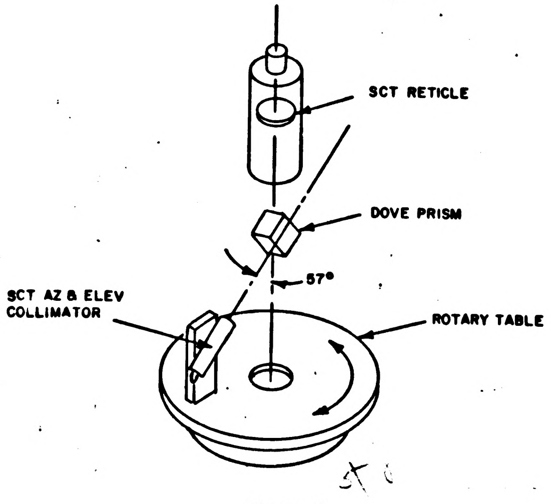


Figure 8

4.2.1.10 Resolving Power. The resolving power for the SXT lines of sight shall be determined using a Sextant Eyepiece Assembly, 2012700, and SXT Mirror Housing and Air Focusing Shim Assembly, 2012699 mounted on the Optical Unit Assembly. The SXT LLOS shall be positioned such that the reticle "R" line and "M" line approximately bisects the black and white resolution target and the SXT eyepiece adjusted for optimum focus. The LLOS resolution for patterns which are parallel to the reticle "M" lines and patterns which are parallel to the reticle "R" lines when converted to arc seconds shall be 14.4 arc seconds or better, or 10.3 arc sec. or better depending on whether the test equipment used has a low or high contrast target respectively.

The fore mentioned tests shall be repeated while positioning the SXT SLOS to bisect the resolution target. The SLOS resolution at the center of the field shall be 9.1 arc sec or better or 7.2 arc seconds or better, depending on whether the test equipment used has a low or high contrast target

9.1

respectively. In addition, with a low contrast target the resolution at 1/3 field radius shall be 14.4 arc seconds or better and at 2/3 field radius shall be 28.7 arc seconds or better, while the corresponding values shall be 11.5 arc seconds for 1/3 field radius and 23.0 arc seconds for 2/3 field radius if a high contrast target is being used in the test equipment.

The resolving power for the SCT line of sight shall be determined using a SCT Eyepiece Assembly (Adjustable Focusing), 2012719, and SCT Prism Housing and Insulation Assembly, 2012667 mounted on the Optical Unit Assembly.

The SCT LOS shall be positioned such that the reticle "R" line and "M" line bisect the resolution target and the SCT eyepiece shall be adjusted for optimum focus. The LOS resolution at the center of the field shall be 146 arc seconds or better if the test equipment has a low contrast target and 83 arc seconds or better if it has a high contrast target.

The SCT LOS shall be positioned such that the 15 or 35 gradicule bisects the resolution target. The LOS resolution, at approximately 1/3 field radius, shall be 230 arc seconds or better if the test equipment has a low contrast target and 115.0 arc seconds or better if it has a high contrast target.

The SCT LOS shall be positioned such that the 5 or 45 gradicule bisects the resolution target. The LOS resolution, at approximately 2/3 field radius, shall be 328 arc seconds or better if the test equipment has a low contrast target and 184 arc seconds or better if it has a high contrast target.

4.2.1.11 Air Focusing. The focus of the SXT Long Eye Relief Eyepiece Assembly, 2012748, and SCT Long Eye Relief Eyepiece Assembly, 2012691, shall be measured by means of a dioptometer. The SXT Long Eye Relief Eyepiece shall be mounted on the SXT Mirror Housing and Air Focusing Shim Assembly, 2012699, and the SCT Long Eye Relief Eyepiece mounted on the SCT Prism Housing and Insulation Assembly, 2012667. The SXT and SCT LER eyepieces shall be mounted on the Optical Unit Assembly with sufficient entrance light to illuminate the air reticle. The focus on the air reticle shall be -1 ± .25 diopters.

4.2.1.12 Freedom of Motion. Unscrew and pull out the SCT Shaft Manual Input Adapter and rotate control. SCT Shaft shall move freely. Unscrew and pull out the SCT Trunnion Manual Input Adapter and rotate control. SCT Trunnion shall move freely.

APOLLO G&N Specification
PS 2016209
Original Issue Date: 28Sept67
Release Authority: TDRR 34759
Class Release

PROCUREMENT SPECIFICATION
PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS
OPTICAL UNIT ASSEMBLY
DRAWING NO. 2011000

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 26 inclusive.

APPROVALS	NASA/MSC	E. Borup 9/21/67 MIT/IL W Stameris 21 Sep 67	8-23-67 8-23-67 KIC 8-23

STANDARDS

Military

MIL-STD-150A	Photographic Lenses

Federal

FED-STD-209	Clean Room and Work Station Requirements, Controlled Environment

DRAWINGS

APOLLO G and N

1019720	Optics Navigation Base Shipping Container
2011000	Optical Unit Assembly
2012699	SXT Mirror Housing and Air Focusing Shim Assembly
2012667	SCT Prism Housing and Insulation Assembly
2012719	SCT Eyepiece Assembly (Adjustable Focusing)
2012748	Long Eye Relief Eyepiece Assembly (SXT)
2012691	Long Eye Relief Eyepiece Assembly (SCT)
2012700	Sextant Eyepiece Assembly

Copies of Specifications, Standards, Drawings, Bulletins and Publications required by suppliers in connection with specific procurement functions should be obtained from the Procuring Activity or as directed by the contracting officer.

2.2 Conflicting Requirements. In the event of conflict between the requirements of the contract, this document and the documents listed in this section, the following order of precedence shall apply and the Contractor shall notify MIT Apollo Management of conflict as soon as it is determined.

a. The contract
b. This specification
c. Documents listed in this section

3. REQUIREMENTS

The Primary Performance Requirements described in Section 3.1 are derived from the Apollo mission analysis. These requirements will be demonstrated by the ability of the Assembly to meet the Functional Performance Requirements.

3.2.7 Air Focusing. The focus of the SXT Long Eye Relief Eyepiece Assembly 2012748 and the SCT Long Eye Relief Eyepiece Assembly, 2012691 upon the air reticle plane shall be $-1 \pm .25$ diopters.

3.2.8 Luminous Transmittance. The luminous transmittance of the SXT SLOS to CIE illuminant "C" (6500°K) shall not be less than 25%.

The luminous transmittance of the SXT LLOS of CIE illuminant "C" shall not be less than 3.2%.

The luminous transmittance of the scanning telescope to CIE "C" shall not be less than 30%.

The ratio of the luminous transmittance of the SXT SLOS to SXT LLOS shall not be less than 12 to 1 for CIE illuminant "C" when the eyepiece polariod filter is positioned for minimum transmission through the LLOS.

3.2.9 Freedom of Motion. The SDA and TDA of the SCT shall move freely when rotated manually.

3.2.10 Static Friction. Breakaway friction shall be less than .04 inch-ounces on the SXT and SCT drive motor shafts as measured by the voltages on their respective motor control phases. Except that at 0° and 180° the breakaway friction shall be less than .052 inch-ounces on the SCT. The motor tachometer output shall be less than 15 mv with 0 volts AC applied to the Motor-Generator control windings.

3.2.11 Dynamic Friction Level. Dynamic Friction shall be less than .03 inch-ounces on the SXT and SCT drive motor shafts as measured by the voltages on their respective motor control phases.

3.2.12 Reticle Lighting. The SXT and SCT reticle lamps shall draw a current that is within 10% of measurements made while the lamp illumination was observable. In addition the respective reticles shall appear illuminated when viewed via the eyepiece.

3.3 Product Performance and Repeatability. The Assembly shall meet the Functional Requirements of Section 3.2 and furthermore shall withstand specified environmental stresses without degradation of performance characteristics. This performance characteristic repeatability shall be demonstrated by subjecting the OUA to the following test procedures.

3.4.2 Nameplate and Serialization. Each Assembly identified by General Arrangement (or Assembly) Drawing shall be identified by a serial number assigned in accordance with ND 1002023. This number shall be affixed to the optical base.

3.4.2 Government Furnished Property List.

2012699	SXT Mirror Housing and Air Focusing Shim Assembly
2012667	SCT Prism Housing and Insulation Assembly
2012719	SCT Eyepiece Assembly (Adjustable Focusing)
2012700	Sextant Eyepiece Assembly
2012748	Long Eye Relief Eyepiece Assembly (SXT)
2012691	Long Eye Relief Eyepiece Assembly (SCT)

4. QUALITY ASSURANCE PROVISIONS

4.1 General. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein. The failure of the end product to pass any examination or test of this section will automatically classify the unit as nonconforming. When nonconforming units are corrected by the contractor, the unit shall be reinspected. When corrective action has been taken, the reinspection of a nonconforming unit may be limited to the test or examination which defined the nonconformance or, when so directed by the cognizant inspector, a complete reexamination and retest of the unit may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.1.1 Test Condition.

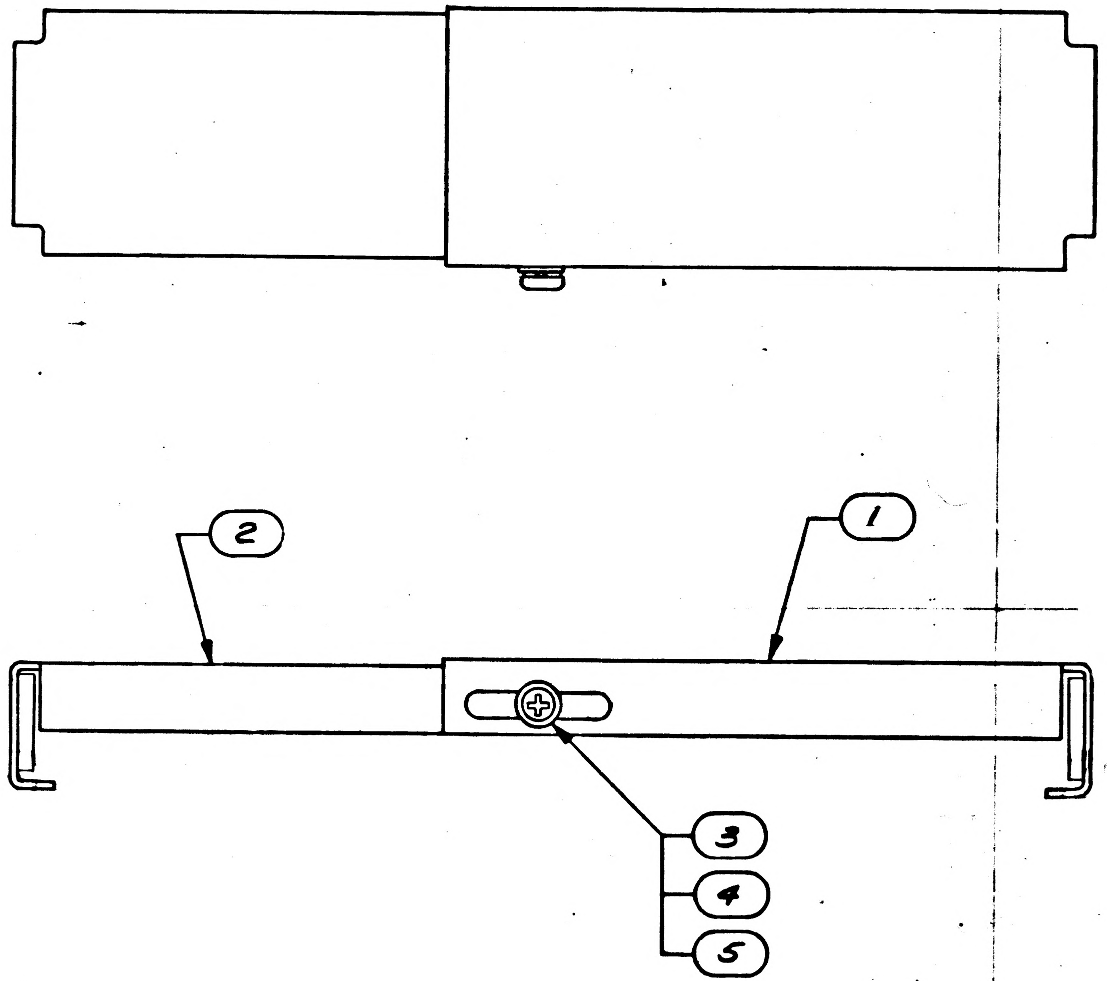
4.1.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Temperature: 25% ± 10°C
b. Relative Humidity: 90% maximum
c. Barometric Pressure: 28 to 32 inches Hg

4.2 Tests. The following chart shall be used to correlate between the Functional Performance Requirements specified in Section 3 and the tests specified in Section 4.

2016310 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA R25282	10/13/65	A. Harano
—	CLASS A RELEASED PER TDRR 25477		



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	MS15795-806	WASHER, FLAT	5
1	MS35338-79	WASHER, LOCK	4
1	MS51957-28	SCREW, PAN HEAD	[illegible]
1	2016309	COVER, PROTECTIVE	[illegible]
1	2016308	COVER, PROTECTIVE	1
-011	LIST OF MATERIALS		

2014199	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN D. Belanger DATE 8 OCT 65
CHECKED E. Wilson 7 OCT 65
APPROVAL 8 Oct 65
APPROVAL D. D'Amato 10/8/65
APPROVAL 10/12/65
NASA APPROVAL A. C. METZGER
MIT APPROVAL 4 Jan 66
MIT APPROVAL A. Harano 1/20/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COVER, PROTECTIVE
ASSEMBLY
360 PIN CONNECTOR

SIZE C
CODE IDENT NO. 49956
NASA DRAWING NO. 2016310
SCALE 1/1
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MODERN BLUE PRINT CO., INC. 02089

2016310 —

2016311 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
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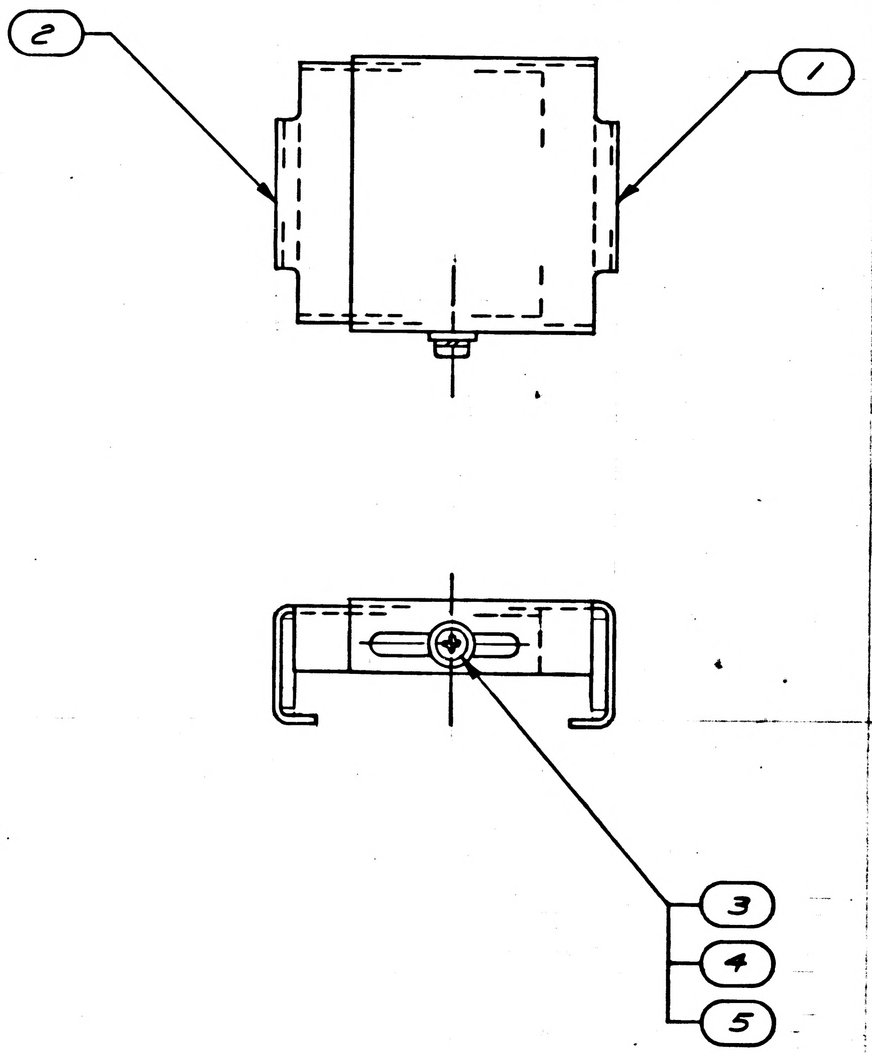
—	CLASS A RELEASED PER TDRR 25478		



2016311 —

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	MS15795-806	WASHER, FLAT	5
1	MS35338-79	WASHER, LOCK	4
1	MS51957-28	SCREW, PAN HEAD	3
1	2016307	COVER, PROTECTIVE	2
1	2016306	COVER, PROTECTIVE	1
-011	LIST OF MATERIALS		

2014137	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN Ken Bull DATE 6OCT65
CHECKED E Urban 7OCT65
APPROVAL P. Hagin 8Oct65
APPROVAL D. Bryant 10/11/65
APPROVAL 10/12/65
NASA APPROVAL A. C. METZGER
MIT APPROVAL
MIT APPROVAL 10/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COVER, PROTECTIVE
ASSEMBLY
144 PIN CONNECTOR

SIZE	CODE IDENT NO.	NASA DRAWING NO.
C	49956	2016311

SCALE 1/1 WT SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MODERN BLUE PRINT CO., INC. 02089

2016314 | C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
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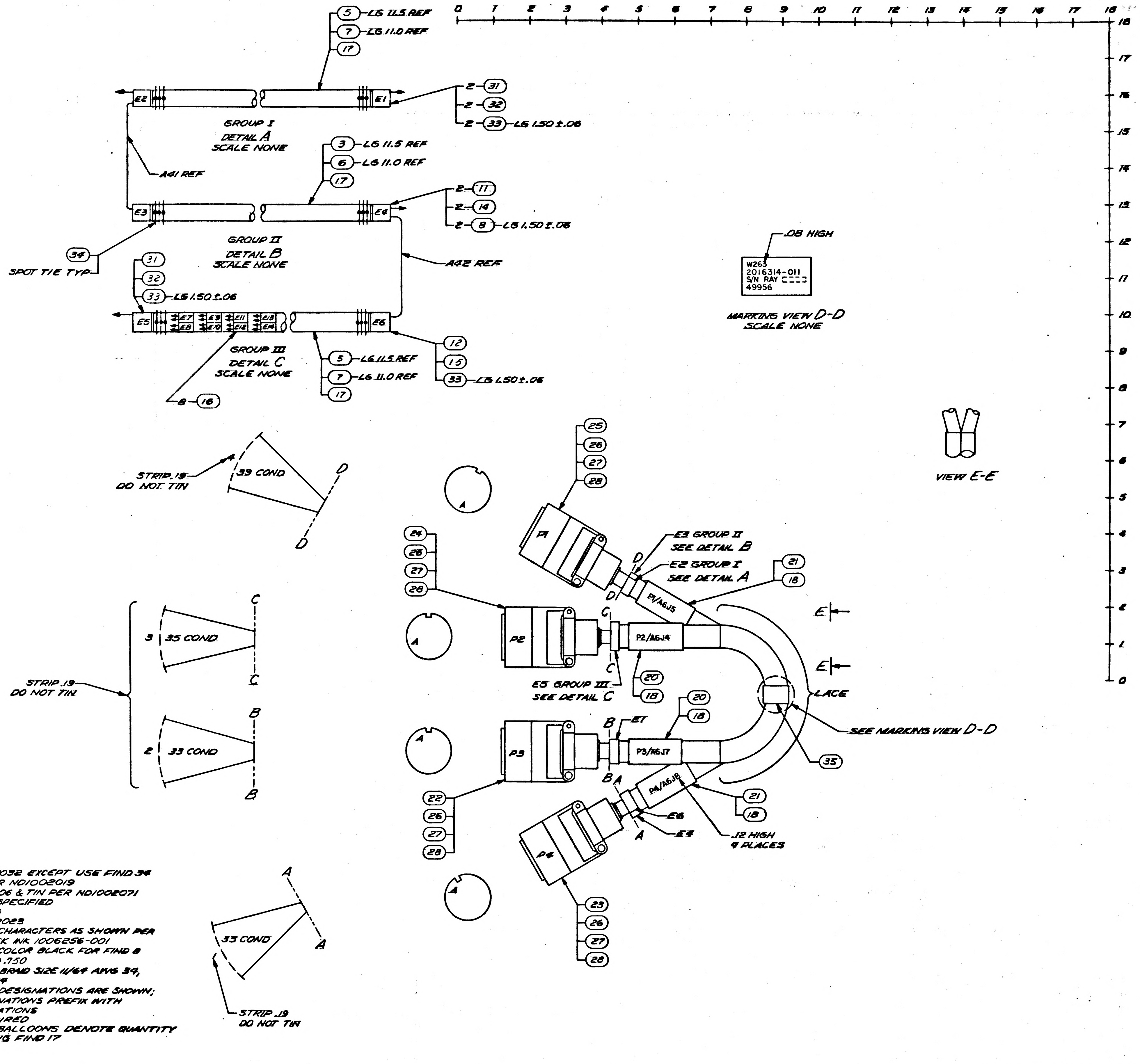


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
5 -LG 11.5 REF
7 -LG 11.0 REF
17
E2
E1
2-31
2-32
2-33 -LG 1.50 ±.06
GROUP I
DETAIL A
SCALE NONE
A41 REF
3 -LG 11.5 REF
6 -LG 11.0 REF
17
E3
E4
2-11
2-14
2-8 -LG 1.50 ±.06
34
SPOT TIE TYP
GROUP II
DETAIL B
SCALE NONE
A42 REF
31
32
33 -LG 1.50 ±.06
E5 E7 E8 E9 E10 E11 E12 E13 E14
E6
12
15
33 -LG 1.50 ±.06
GROUP III
DETAIL C
SCALE NONE
5 -LG 11.5 REF
7 -LG 11.0 REF
17
8-16
.08 HIGH
W263
2016314-011
S/N RAY □□□
49956
MARKING VIEW D-D
SCALE NONE
VIEW E-E
STRIP .19
DO NOT TIN
39 COND
A
D
D
25
26
27
28
P1
E3 GROUP II
SEE DETAIL B
E2 GROUP I
SEE DETAIL A
21
18
P1/A6J5
26
26
27
28
P2
P2/A6J4
C
C
E5 GROUP III
SEE DETAIL C
20
18
E
E
LACE
SEE MARKING VIEW D-D
35
STRIP .19
DO NOT TIN
3 35 COND
2 33 COND
C
C
B
B
P3
B
ET
P3/A6J7
20
18
B A
P4/A6J8
21
18
E6
E4
.12 HIGH
9 PLACES
A
22
26
27
28
P4
23
26
27
28
A
33 COND
A
A
STRIP .19
DO NOT TIN

NOTES
1. FABRICATE PER ND1002032 EXCEPT USE FIND 34
2. MARK COND IDENT PER ND1002019
3. STRIP ALL LEADS .50±.06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED
4. CRIMP PER ND1002206
5. SERIALIZE PER ND1002023
6. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006256-001
7. MIL-I-23053 CLASS 1, COLOR BLACK FOR FIND 8 ID .375, FOR FIND 33 ID .750
8. QQ-B-575 FOR FIND 3 BRAID SIZE 11/64 AWG 39, FIND 5 SIZE 3/8 AWG 39
9. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
10. AR DENOTES AS REQUIRED
11. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
12. SEAL FINDS 6&7 USING FIND 17

	☒	2014358	AGC/ISSE INTERCONNECTIONS	REF
	1	MS18035-1-2	STRAP, CABLE	35
	AR	1006458-004	TAPE, LACING	34
*	0.6	SEE NOTE 7	INSULATION, ELEC	33
	3	1000242-33	FERRULE, ELEC	32
	3	1000243-37	FERRULE, ELEC	31
				30
				29
	4	1020371-11	BUSHING, SLEEVE	28
	4	1020371-16	BUSHING, SLEEVE	27
	4	1020370-26	BUSHING, FLANGED	26
	1	MS3126F-24-61SX	CONNECTOR, PLUG	25
	1	MS3126F-24-61SW		24
	1	MS3126F-24-61S		23
	1	MS3126F-22-55S	CONNECTOR, PLUG	22
	2	1006415-098	BAND, MARKER	21
	2	1006415-096	BAND, MARKER	20
				19
	AR	1006253	ADHESIVE	18
	AR	1006699	SOLVENT	17
	8	1010902-1	SLEEVE, SOLDER	16
	1	1000242-36	FERRULE, ELEC	15
	2	1000242-27	FERRULE, ELEC	14
				13
	1	1000243-40	FERRULE, ELEC	12
	2	1000243-28	FERRULE, ELEC	11
				10
*				9
*	0.3	SEE NOTE 7	INSULATION, ELEC	8
*	1.9	1006696-4	SLEEVING, ELEC	7
*	1.0	1006696-2	SLEEVING, ELEC	6
*	2.0	SEE NOTE 8	SHIELD, BRAID	5
				4
*	1.0	SEE NOTE 8	SHIELD, BRAID	3
*	65.	MIL-W-16878/4 E22 BLK	WIRE, ELEC	2
*	65.	MIL-W-16878/4 E22 WHT	WIRE, ELEC	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	-011	LIST OF MATERIALS		

2016314 | C

*DENOTES LENGTH IN FEET

2014268	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.03 DECIMALS .XXX ± ANGLES ±
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 1 Mar 66
CHECKED 3 MAR 66
APPROVAL P. [illegible] 8 MAR 66
APPROVAL 3/8/66
APPROVAL 3/9/66
NASA APPROVAL A. C. METZGER
MIT APPROVAL 4-1-66
MIT APPROVAL O. [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W263

SIZE	CODE IDENT NO.	NASA DRAWING NO.
J	49956	2016314
SCALE 1/1	WT	SHEET 1 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

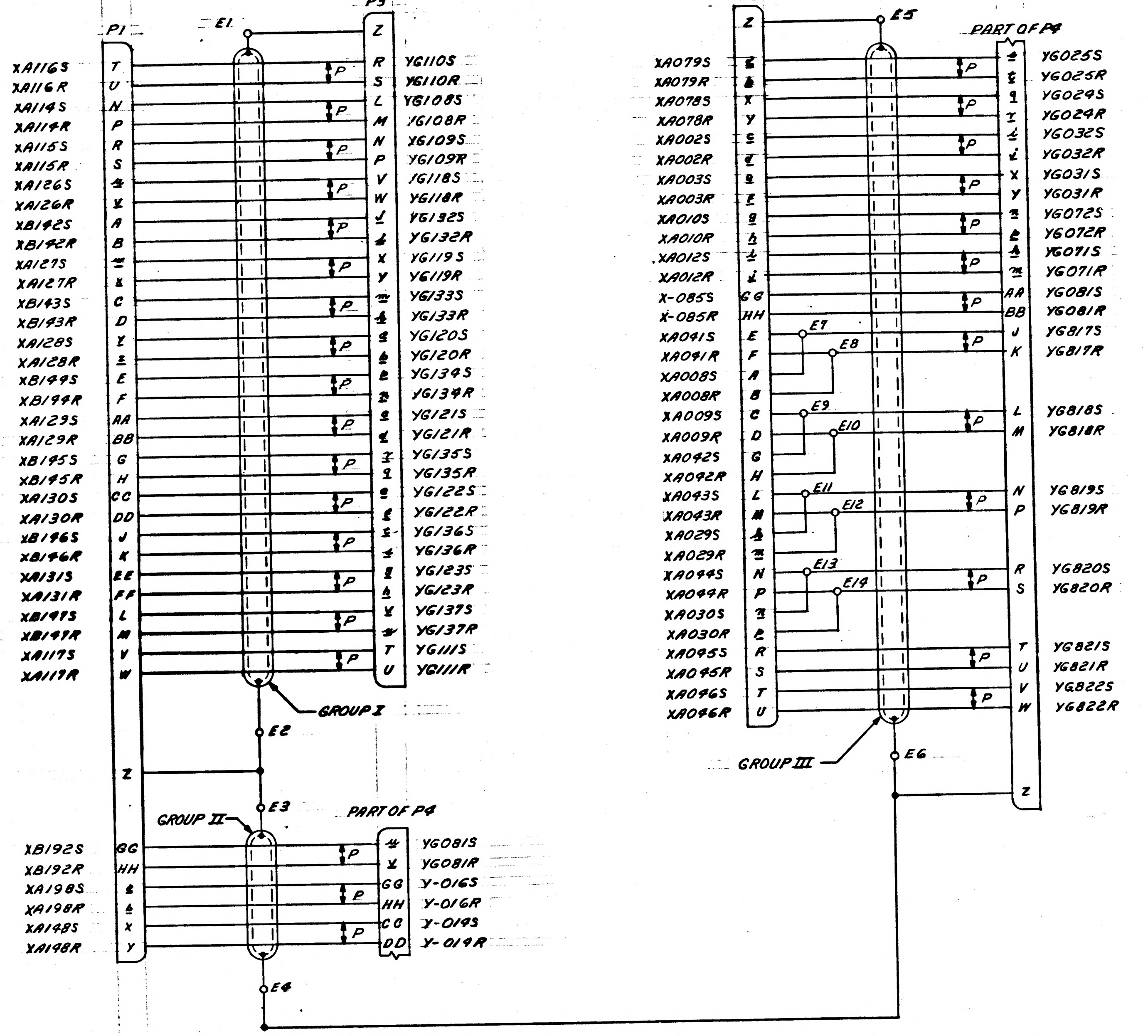
2 H

24

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
TWIST	A1	4	P1-T	WHT	22	1	2	P3-R	GROUP I SEE DETAIL A
	A2		-U	BLK		2		-S	
	A3		-N	WHT		1		-L	
	A4		-P	BLK		2		-M	
	A5		-R	WHT		1		-N	
	A6		-S	BLK		2		-P	
	A7		-u	WHT		1		-V	
	A8		-v	BLK		2		-W	
	A9		-A	WHT		1		-j	
	A10		-B	BLK		2		-i	
	A11		-m	WHT		1		-X	
	A12		-z	BLK		2		-Y	
	A13		-C	WHT		1		-m	
	A14		-D	BLK		2		-k	
	A15		-y	WHT		1		-g	
	A16		-z	BLK		2		-b	
	A17		-E	WHT		1		-p	
	A18		-F	BLK		2		-n	
	A19		-AA	WHT		1		-c	
	A20		-BB	BLK		2		-d	
	A21		-G	WHT		1		-r	
	A22		-H	BLK		2		-q	
	A23		-CC	WHT		1		-e	
	A24		-DD	BLK		2		-f	
	A25		-J	WHT		1		-t	
	A26		-K	BLK		2		-s	
	A27		-EE	WHT		1		-g	
	A28		-FF	BLK		2		-h	
	A29		-L	WHT		1		-v	
	A30		-M	BLK		2		-u	
TWIST	A31		-V	WHT		1		-T	
	A32	4	P1-W	BLK	22	2	2	P3-U	
		△	E2	SHLD			△	E1	
	A33	△	E1	BLK	22	2	2	P3-Z	GROUP I SEE DETAIL A
SEE A41	A34	4	P1-Z	BLK	22	2	△	E2	
TWIST	A35		P1-a	WHT	22	1	1	P4-GG	GROUP II SEE DETAIL B
	A36		-b	BLK		2		-HH	
TWIST	A37		-GG	WHT		1		-u	
	A38		-HH	BLK		2		-v	
TWIST	A39		-X	WHT		1		-CC	
	A40	4	P1-Y	BLK	22	2	1	P4-DD	
		△	E3	SHLD			△	E4	
SEE A34	A41	△	E3	BLK	22	2	△	E2	GROUP II SEE DETAIL B
SEE A85	A42	△	E4	BLK	22	2	△	E6	
TWIST	A43	3	P2-a	WHT	22	1	1	P4-a	GROUP III SEE DETAIL C
	A44		-b	BLK		2		-t	
	A45		-X	WHT		1		-q	
	A46		-Y	BLK		2		-r	
	A47		-c	WHT		1		-i	
	A48		-d	BLK		2		-j	
	A49		-e	WHT		1		-X	
	A50		-f	BLK		2		-Y	
	A51		-g	WHT		1		-n	
	A52		-h	BLK		2		-p	
	A53		-i	WHT		1		-k	
	A54		-j	BLK		2		-m	
	A55		-GG	WHT		1		-AA	
	A56	3	P2-HH	BLK		2		-BB	
	A57	△	E7	WHT		1		-J	
	A58		E8	BLK		2		-K	
	A59		E9	WHT		1		-L	
	A60		E10	BLK		2		-M	
	A61		E11	WHT		1		-N	
	A62		E12	BLK		2		-P	
	A63		E13	WHT		1		-R	
	A64	△	E14	BLK		2		-S	
	A65	3	P2-R	WHT		1		-T	
	A66		-S	BLK		2		-U	
TWIST	A67		-T	WHT		1		-V	
	A68		-U	BLK		2	1	P4-W	
	A69		-E	WHT		1	△	E7	
	A70		-A					E7	
	A71		-C					E9	
	A72		-G					E9	
	A73		-L					E11	
	A74		-k					E11	
	A75		-N					E13	
	A76		-n	WHT		1		E13	
	A77		-F	BLK		2		E8	
	A78		-B					E8	
	A79		-D					E10	
	A80		-H					E10	
	A81		-M					E12	
	A82		-m					E12	
	A83		-P					E14	
	A84	3	P2-p	BLK	22	2		E14	
		△	E5	SHLD			△	E6	
SEE A42	A85	△	E6	BLK	22	2	1	P4-Z	GROUP III SEE DETAIL C
	A86	3	P2-Z	BLK	22	2	△	E5	

△ DENOTES INTERNAL CONNECTION


P1
E1
P3
XA116S
XA116R
XA114S
XA114R
XA115S
XA115R
XA126S
XA126R
XB142S
XB142R
XA127S
XA127R
XB143S
XB143R
XA128S
XA128R
XB144S
XB144R
XA129S
XA129R
XB145S
XB145R
XA130S
XA130R
XB146S
XB146R
XA131S
XA131R
XB147S
XB147R
XA117S
XA117R
T U N P R S u v A B m x C D y z E F AA BB G H CC DD J K EE FF L M V W Z
Z R S L M N P V W j i X Y m k g b p n c d r q e f s t g h v u T U
P
YG110S
YG110R
YG108S
YG108R
YG109S
YG109R
YG118S
YG118R
YG132S
YG132R
YG119S
YG119R
YG133S
YG133R
YG120S
YG120R
YG134S
YG134R
YG121S
YG121R
YG135S
YG135R
YG122S
YG122R
YG136S
YG136R
YG123S
YG123R
YG137S
YG137R
YG111S
YG111R
GROUP I
E2
E3
GROUP II
PART OF P4
XB192S
XB192R
XA198S
XA198R
XA148S
XA148R
GG HH a b X Y
u v GG HH CC DD
YG081S
YG081R
Y-016S
Y-016R
Y-014S
Y-014R
E4
P2
E5
PART OF P4
XA079S
XA079R
XA078S
XA078R
XA002S
XA002R
XA003S
XA003R
XA010S
XA010R
XA012S
XA012R
X-085S
X-085R
XA041S
XA041R
XA008S
XA008R
XA009S
XA009R
XA042S
XA042R
XA043S
XA043R
XA029S
XA029R
XA044S
XA044R
XA030S
XA030R
XA045S
XA045R
XA046S
XA046R
Z a b X Y c d e f g h i j GG HH E F A B C D G H L M k m N P n p R S T U
a t q r i j X Y n e k m AA BB J K L M N P R S T U V W Z
E7
E8
E9
E10
E11
E12
E13
E14
YG025S
YG025R
YG024S
YG024R
YG032S
YG032R
YG031S
YG031R
YG072S
YG072R
YG071S
YG071R
YG081S
YG081R
YG817S
YG817R
YG818S
YG818R
YG819S
YG819R
YG820S
YG820R
YG821S
YG821R
YG822S
YG822R
GROUP III
E6

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
C	CLASS A RELEASED PER TDRR 27697	4-1-66	

2016314 C

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN O. J. Brion DATE 1 MAR 66
CHECKED 3 MAR 66
APPROVAL
APPROVAL 3/18/66
APPROVAL 3/29/66
NASA APPROVAL A. C. METZGER
MIT APPROVAL 4-1-66
MIT APPROVAL O. Wargo 3/2 66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W263

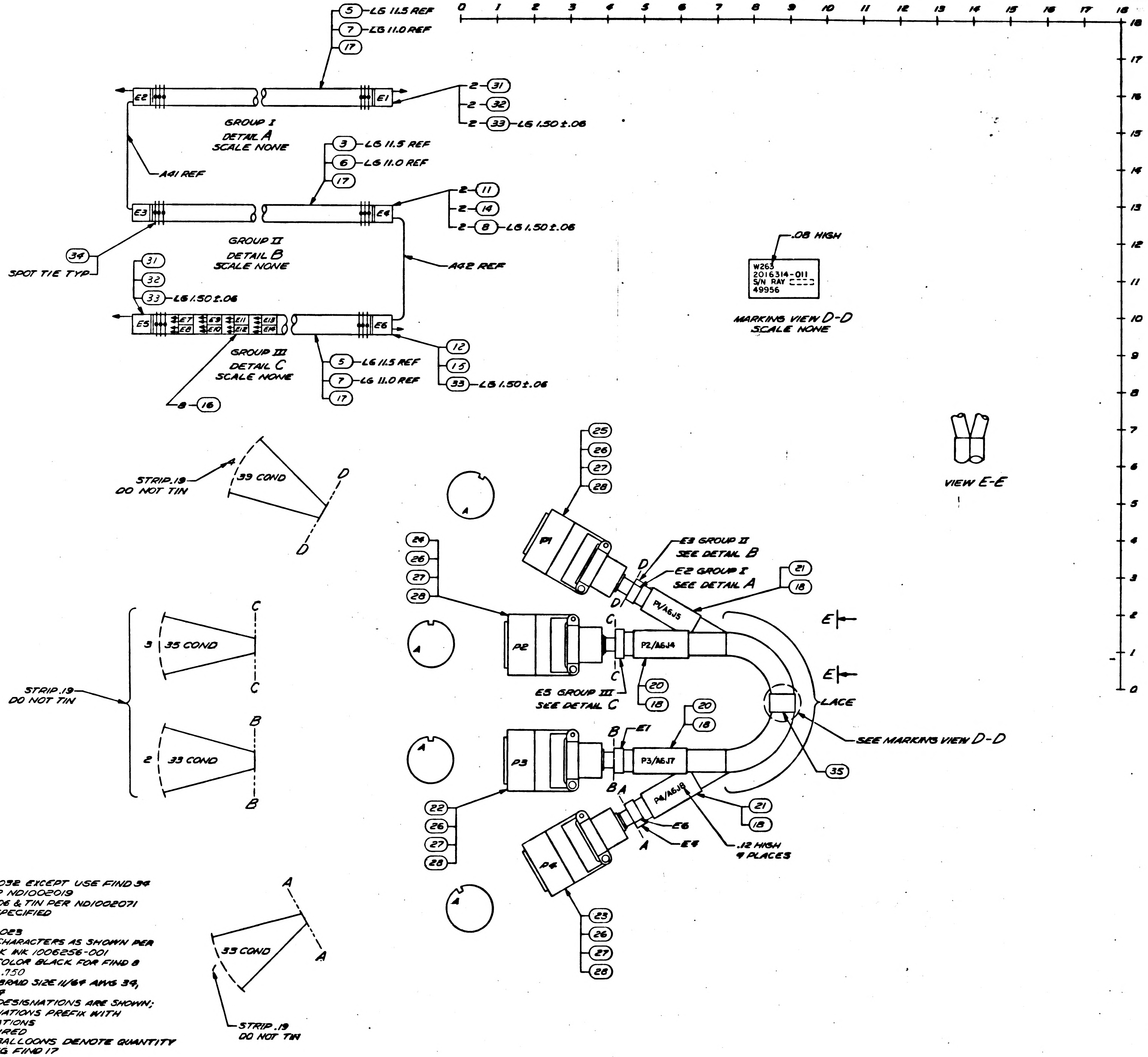
SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016314
SCALE NONE | WT | SHEET 2 OF 2

2016314 C

2016314 C

2016314 D

SYM	DESCRIPTION	DATE	APPROVED
C	CLASS A RELEASED PER TDRR 27697	9-1-66	
D	CHANGED PER TDRR 28615 DR. P. Gettlick CHK Raymond APPD RED	27 May 66	



5 -LG 11.5 REF
7 -LG 11.0 REF
17
E2
E1
2-31
2-32
2-33 -LG 1.50±.06
GROUP I
DETAIL A
SCALE NONE
A41 REF
3 -LG 11.5 REF
6 -LG 11.0 REF
17
E3
E4
2-11
2-14
2-8 -LG 1.50±.06
GROUP II
DETAIL B
SCALE NONE
34
SPOT TIE TYP
A42 REF
31
32
33 -LG 1.50±.06
E5
E7
E8
E9
E10
E11
E12
E13
E14
E6
12
15
33 -LG 1.50±.06
GROUP III
DETAIL C
SCALE NONE
5 -LG 11.5 REF
7 -LG 11.0 REF
17
8-16
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
.08 HIGH
W263
2016314-011
S/N RAY
49956
MARKING VIEW D-D
SCALE NONE
VIEW E-E
STRIP .19
DO NOT TIN
33 COND
D
D
25
26
27
28
P1
E3 GROUP II
SEE DETAIL B
E2 GROUP I
SEE DETAIL A
21
18
P1/A6J5
24
26
27
28
P2
P2/A6J4
C
C
E5 GROUP III
SEE DETAIL C
20
18
3
35 COND
C
C
STRIP .19
DO NOT TIN
2
33 COND
B
B
E
E
LACE
SEE MARKING VIEW D-D
35
20
18
E1
P3
P3/A6J7
B A
P4/A6J8
21
18
22
26
27
28
E6
E4
A
.12 HIGH
4 PLACES
P4
23
26
27
28
A
A
A
A
33 COND
A
STRIP .19
DO NOT TIN

NOTES
1. FABRICATE PER ND1002032 EXCEPT USE FIND 34
2. MARK COND IDENT PER ND1002019
3. STRIP ALL LEADS .50±.06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED
4. CRIMP PER ND1002206
5. SERIALIZE PER ND1002023
6. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006256-001
7. MIL-I-23053 CLASS 1, COLOR BLACK FOR FIND 8 ID .375, FOR FIND 33 ID .750
8. QQ-B-575 FOR FIND 3 BRAID SIZE 11/64 AWG 34, FIND 5 SIZE 3/8 AWG 34
9. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
10. AR DENOTES AS REQUIRED
11. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
12. SEAL FINDS 6&7 USING FIND 17

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	~~X~~	~~2014338~~	~~ASC/BSE INTERCONNECTIONS REF~~	
	1	MS18035-1-2	STRAP, CABLE	35
	AR	1006458-004	TAPE, LACING	34
*	0.6	SEE NOTE 7	INSULATION, ELEC	33
	3	1000242-33	FERRULE, ELEC	32
	3	1000243-37	FERRULE, ELEC	31
				30
				29
	4	1020371-11	BUSHING, SLEEVE	28
	4	1020371-16	BUSHING, SLEEVE	27
	4	1020370-26	BUSHING, FLANGED	26
	1	MS3126F-24-61SX	CONNECTOR, PLUG	25
	1	MS3126F-24-61SW		24
	1	MS3126F-24-61S		23
	1	MS3126F-22-55S	CONNECTOR, PLUG	22
	2	1006415-098	BAND, MARKER	21
	2	1006415-096	BAND, MARKER	20
				19
	AR	1006253	ADHESIVE	18
	AR	1006699	SOLVENT	17
	8	1010402-1	SLEEVE, SOLDER	16
	1	1000242-36	FERRULE, ELEC	15
	2	1000242-27	FERRULE, ELEC	14
				13
	7	1000243-40	FERRULE, ELEC	12
	2	1000243-28	FERRULE, ELEC	11
				10
*				9
*	0.3	SEE NOTE 7	INSULATION, ELEC	8
*	1.9	1006696-4	SLEEVING, ELEC	7
*	1.0	1006696-2	SLEEVING, ELEC	6
*	2.0	SEE NOTE 8	SHIELD, BRAID	5
				4
*	1.0	SEE NOTE 8	SHIELD, BRAID	3
*	65.	MIL-W-16878/4 E22 BLK	WIRE, ELEC	2
*	65.	MIL-W-16878/4 E22 WHT	WIRE, ELEC	1
	-011	LIST OF MATERIALS		

* DENOTES LENGTH IN FEET

2014268	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX .03 DECIMALS .XXX ANGLES
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN DATE 1 Mar 66
CHECKED 3 MAR 66
APPROVAL 3-14-66
APPROVAL D. O'Bryant 3/8/66
APPROVAL 3/19/66
NASA APPROVAL A. C. METZGER
MIT APPROVAL 4-1-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W263

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016314
SCALE 1/1
WT
SHEET 1 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016314 D

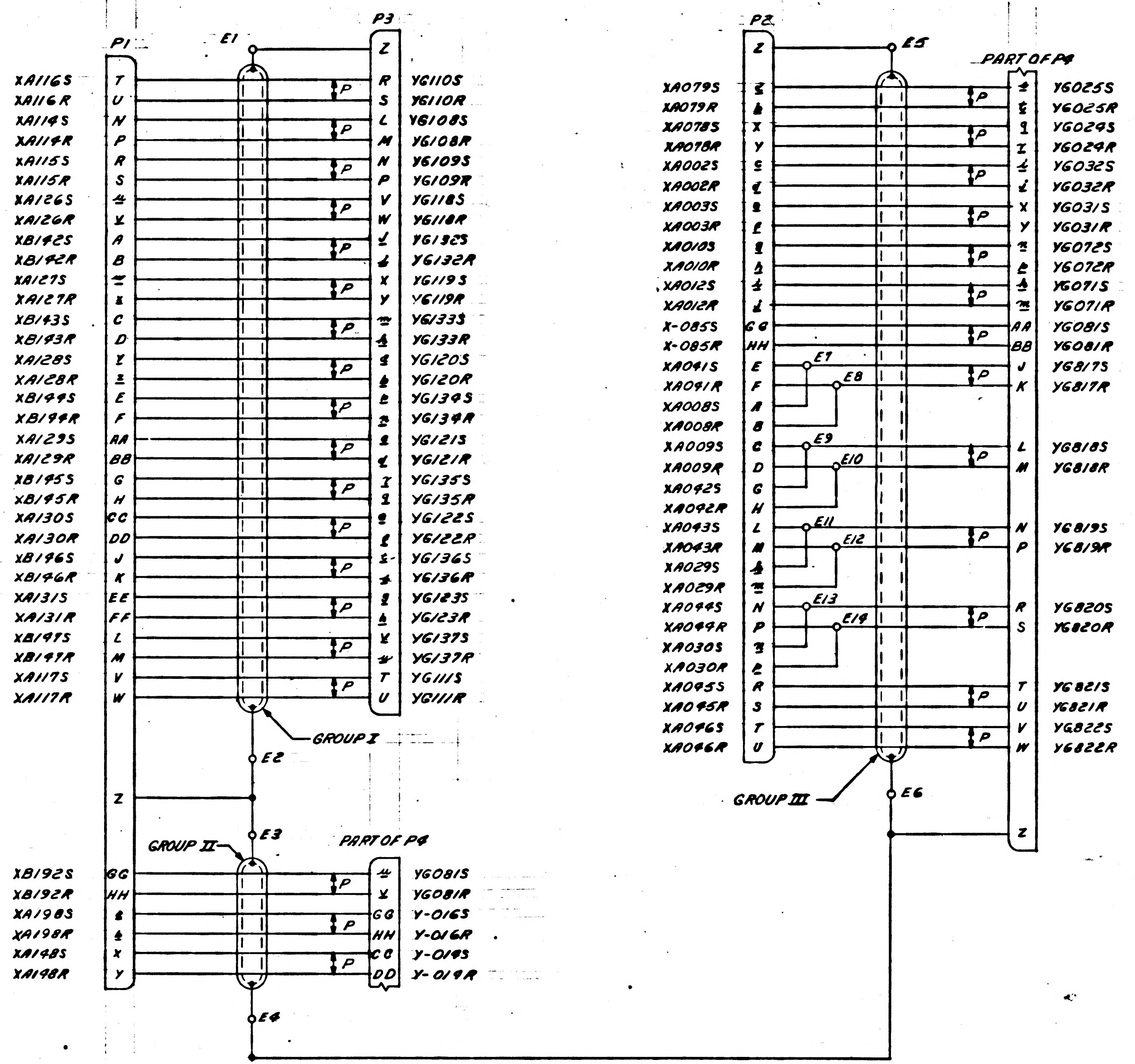
2016314 D

SYM	DESCRIPTION	DATE	APPROVED
C	CLASS A RELEASED PER TDRR 27697	4-1-66	
D	CHANGED PER TDRR 28615 DR. CHK. APPD	66	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
TWIST	A1	4	P1-T	WHT	22	1	2	P3-R	GROUP I
	A2		-U	BLK		2		-S	SEE DETAIL A
	A3		-N	WHT		1		-L	
	A4		-P	BLK		2		-M	
	A5		-R	WHT		1		-N	
	A6		-S	BLK		2		-P	
	A7		-u	WHT		1		-V	
	A8		-v	BLK		2		-W	
	A9		-A	WHT		1		-j	
	A10		-B	BLK		2		-k	
	A11		-w	WHT		1		-X	
	A12		-x	BLK		2		-Y	
	A13		-C	WHT		1		-m	
	A14		-D	BLK		2		-n	
	A15		-y	WHT		1		-e	
	A16		-z	BLK		2		-f	
	A17		-E	WHT		1		-p	
	A18		-F	BLK		2		-r	
	A19		-AA	WHT		1		-c	
	A20		-BB	BLK		2		-d	
	A21		-G	WHT		1		-s	
	A22		-H	BLK		2		-t	
	A23		-CC	WHT		1		-a	
	A24		-DD	BLK		2		-b	
	A25		-J	WHT		1		-u	
	A26		-K	BLK		2		-z	
	A27		-EE	WHT		1		-g	
	A28		-FF	BLK		2		-h	
	A29		-L	WHT		1		-v	
	A30		-M	BLK		2		-w	
TWIST	A31		-V	WHT		1		-T	
	A32	4	P1-W	BLK	22	2	2	P3-U	
		⚠	E2	SHLD			⚠	E1	
	A33	⚠	E1	BLK	22	2	2	P3-Z	GROUP I
SEE A91	A34	4	P1-Z	BLK	22	2	⚠	E2	SEE DETAIL A
TWIST	A35	4	P1-a	WHT	22	1	1	P4-GG	GROUP II
	A36		-b	BLK		2		-HH	SEE DETAIL B
TWIST	A37		-GG	WHT		1		-u	
	A38		-HH	BLK		2		-v	
TWIST	A39		-X	WHT		1		-CC	
	A40	4	P1-Y	BLK	22	2	1	P4-DD	
		⚠	E3	SHLD			⚠	E4	
SEE A34	A91	⚠	E3	BLK	22	2	⚠	E2	GROUP II
SEE A85	A92	⚠	E4	BLK	22	2	⚠	E6	SEE DETAIL B
TWIST	A43	3	P2-a	WHT	22	1	1	P4-a	GROUP III
	A44		-b	BLK		2		-b	SEE DETAIL C
	A45		-X	WHT		1		-g	
	A46		-Y	BLK		2		-h	
	A47		-c	WHT		1		-i	
	A48		-d	BLK		2		-j	
	A49		-e	WHT		1		-X	
	A50		-f	BLK		2		-Y	
	A51		-g	WHT		1		-n	
	A52		-h	BLK		2		-p	
	A53		-i	WHT		1		-k	
	A54		-j	BLK		2		-m	
	A55		-GG	WHT		1		-AA	
	A56	3	P2-HH	BLK		2		-BB	
	A57	⚠	E7	WHT		1		-J	
	A58		E8	BLK		2		-K	
	A59		E9	WHT		1		-L	
	A60		E10	BLK		2		-M	
	A61		E11	WHT		1		-N	
	A62		E12	BLK		2		-P	
	A63		E13	WHT		1		-R	
	A64	⚠	E14	BLK		2		-S	
	A65	3	P2-R	WHT		1		-T	
	A66		-S	BLK		2		-U	
TWIST	A67		-T	WHT		1		-V	
	A68		-U	BLK		2	1	P4-W	
	A69		-E	WHT		1	⚠	E7	
	A70		-A					E7	
	A71		-C					E9	
	A72		-G					E9	
	A73		-L					E11	
	A74		-k					E11	
	A75		-N					E13	
	A76		-n	WHT		1		E13	
	A77		-F	BLK		2		E8	
	A78		-B					E8	
	A79		-D					E10	
	A80		-H					E10	
	A81		-M					E12	
	A82		-m					E12	
	A83		-P					E14	
	A84	3	P2-p	BLK	22	2		E14	
		⚠	E5	SHLD			⚠	E6	
SEE A92	A85	⚠	E6	BLK	22	2	1	P4-Z	GROUP III
	A86	3	P2-Z	BLK	22	2	⚠	E5	SEE DETAIL C

⚠ DENOTES INTERNAL CONNECTION


P1
E1
P3
XA116S T R YG110S
XA116R U S YG110R
XA114S N L YG108S
XA114R P M YG108R
XA115S R N YG109S
XA115R S P YG109R
XA126S u V YG118S
XA126R v W YG118R
XB142S A j YG132S
XB142R B k YG132R
XA127S w X YG119S
XA127R x Y YG119R
XB143S C m YG133S
XB143R D n YG133R
XA128S y e YG120S
XA128R z f YG120R
XB144S E p YG134S
XB144R F r YG134R
XA129S AA c YG121S
XA129R BB d YG121R
XB145S G s YG135S
XB145R H t YG135R
XA130S CC a YG122S
XA130R DD b YG122R
XB146S J u YG136S
XB146R K z YG136R
XA131S EE g YG123S
XA131R FF h YG123R
XB147S L v YG137S
XB147R M w YG137R
XA117S V T YG111S
XA117R W U YG111R
Z
P
GROUP I
E2
Z
E3
GROUP II
PART OF P4
XB192S GG u YG081S
XB192R HH v YG081R
XA198S a GG Y-016S
XA198R b HH Y-016R
XA148S x CC Y-019S
XA148R Y DD Y-019R
E4
P2
Z
E5
PART OF P4
XA079S a a YG025S
XA079R b b YG025R
XA078S X g YG024S
XA078R Y h YG024R
XA002S c i YG032S
XA002R d j YG032R
XA003S e X YG031S
XA003R f Y YG031R
XA010S g n YG072S
XA010R h p YG072R
XA012S i k YG071S
XA012R j m YG071R
X-085S GG AA YG081S
X-085R HH BB YG081R
XA041S E J YG817S
XA041R F K YG817R
XA008S A
XA008R B
XA009S C L YG818S
XA009R D M YG818R
XA042S G
XA042R H
XA043S L N YG819S
XA043R M P YG819R
XA029S k
XA029R m
XA044S N R YG820S
XA044R P S YG820R
XA030S n
XA030R p
XA045S R T YG821S
XA045R S U YG821R
XA046S T V YG822S
XA046R U W YG822R
E7
E8
E9
E10
E11
E12
E13
E14
GROUP III
E6
Z

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 1 MAR 66
CHECKED 3-14-66
APPROVAL
APPROVAL 3/16/66
APPROVAL 3/29/66
NASA APPROVAL C. C. METZLER
MIT APPROVAL 4-4-66
MIT APPROVAL A. Warano

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W263

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016314
SCALE NONE | WT | SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016314 D

2016314 D

2016318 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA R25495		
—	CLASS A RELEASED PER TDRR 24474		
A	CHANGED PER TDRR 30748 DR CHK APPD	9/14/66	

GROUP 2016318	-011	
CONNECTOR COVER KIT BLK II AGC	2014399-011	
COVER, CONNECTOR ASSY (UNIVERSAL DSKY)	1006425-014	

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
	1900030

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN DATE 20 Oct 65
CHECKED 23 Oct 65
APPROVAL 29 Oct 65
APPROVAL
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL
MIT APPROVAL 12/6/65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC CONNECTOR COVER
GROUP

SIZE C
CODE IDENT NO. 49956
NASA DRAWING NO. 2016318
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016318 A

2016318	—

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA R25495		
—	CLASS A RELEASED PER TORR 24474		

GROUP 2016318	-011	
CONNECTOR COVER KIT BLK II AGC	2014399-011	
COVER, CONNECTOR ASSY (UNIVERSAL DSKY)	1006425-006	

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

	1900030
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN DATE 20 Oct 65
CHECKED 23 Oct 65
APPROVAL 29 Oct 65
APPROVAL 10/29/65
APPROVAL 11/1/65
NASA APPROVAL A. C. METZGER
MIT APPROVAL 7 Dec 65
MIT APPROVAL 12/6/65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC CONNECTOR COVER
GROUP

SIZE	CODE IDENT NO.	NASA DRAWING NO.
C	49956	2016318

SCALE NONE WT SHEET 1 OF 1

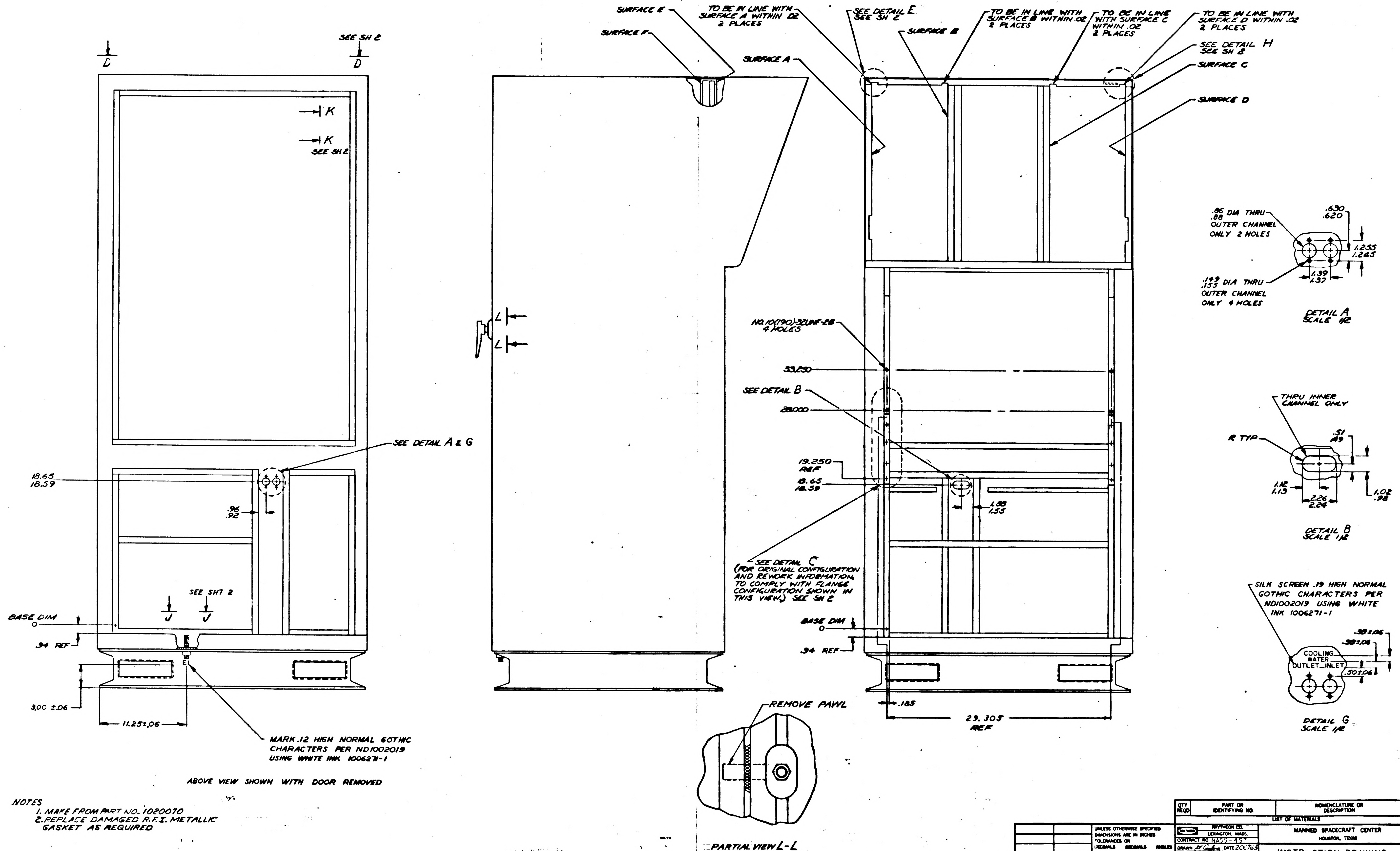
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

MODERN BLUE PRINT CO., INC. 02089

2016325 C

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
0	RELEASED PER CCA 25507		
–	CLASS B NO CHANGE PER CCA 925509		
A	CHANGED PER CCA R25668 DR CHKD PCD	4/64	
B	CHANGED PER CCA R[illegible]-8	11/64	
C	CLASS A RELEASE PER [illegible] 28259		


SEE SH 2
D
D
K
K
SEE SH 2
SEE DETAIL A & G
18.65
18.59
.96
.92
SEE SHT 2
J
J
BASE DIM
0
.94 REF
3.00 ±.06
11.25±.06
E
MARK .12 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING WHITE INK 1006271-1
ABOVE VIEW SHOWN WITH DOOR REMOVED
SURFACE E
SURFACE F
L
L
TO BE IN LINE WITH SURFACE A WITHIN .02 2 PLACES
SEE DETAIL E SEE SH 2
SURFACE B
TO BE IN LINE WITH SURFACE B WITHIN .02 2 PLACES
TO BE IN LINE WITH SURFACE C WITHIN .02 2 PLACES
TO BE IN LINE WITH SURFACE D WITHIN .02 2 PLACES
SEE DETAIL H SEE SH 2
SURFACE C
SURFACE A
SURFACE D
NO.10(.190)-32UNF-2B 4 HOLES
33.250
SEE DETAIL B
28.000
19.250 REF
18.65
18.59
1.59
1.55
SEE DETAIL C (FOR ORIGINAL CONFIGURATION AND REWORK INFORMATION, TO COMPLY WITH FLANGE CONFIGURATION SHOWN IN THIS VIEW) SEE SH 2
BASE DIM
.94 REF
.185
29.305 REF
REMOVE PAWL
PARTIAL VIEW L-L
SCALE 1/1
.86 DIA THRU
.88
OUTER CHANNEL ONLY 2 HOLES
.630
.620
1.255
1.245
.149 DIA THRU
.155
OUTER CHANNEL ONLY 4 HOLES
1.39
1.37
DETAIL A
SCALE 1/2
THRU INNER CHANNEL ONLY
R TYP
.51
.49
1.12
1.13
2.26
2.24
1.02
.98
DETAIL B
SCALE 1/2
SILK SCREEN .19 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING WHITE INK 1006271-1
.38±.06
.38±.06
.50±.06
COOLING WATER
OUTLET INLET
DETAIL G
SCALE 1/2

NOTES
1. MAKE FROM PART NO. 1020070
2. REPLACE DAMAGED R.F.I. METALLIC GASKET AS REQUIRED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

8104065	-
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ±.005 ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN DATE 20CT65
CHECKED 23OCT65
APPROVAL 29Oct65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSTRUCTION DRAWING
FOR KIT LIST NO. 8104065
OPERATION CONSOLE

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016325
SCALE NONE
WT
SHEET 1 OF 2

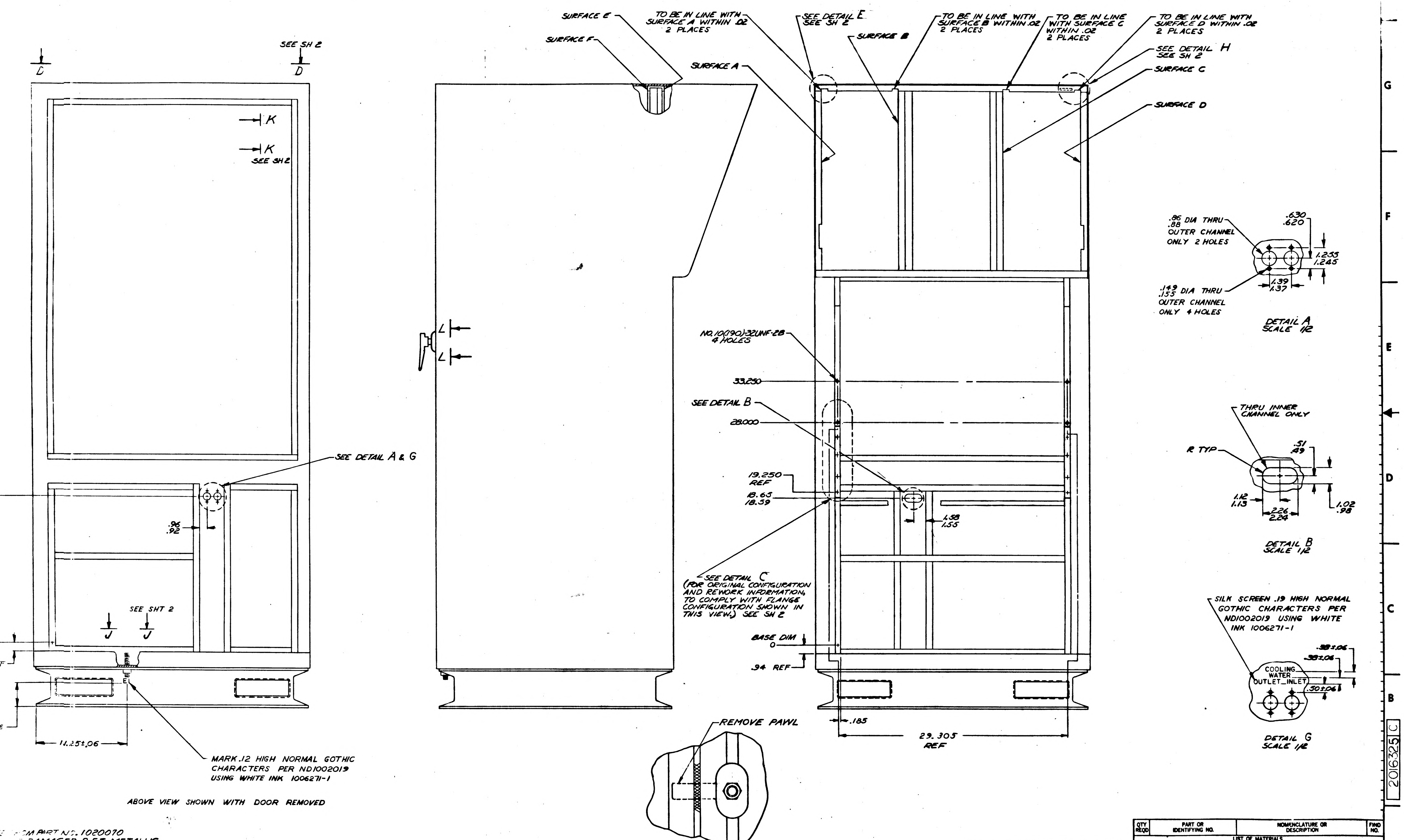
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016325 C

2016325 C

2016325 C

SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA 25507		
–	CLASS B NO CHANGE PER CCA R25509	3/24/66	
A	CHANGED PER CCA R25668 DR CHK APPD PSD	1/12/66	
B	CHANGED PER CCA R25748	1/15/66	
C	CLASS A RELEASE PER TORR 28259		



SEE SH 2
D
D
K
K
SEE SH 2
SEE DETAIL A & G
.96
.92
SEE SHT 2
J
J
11.25±.06
E
SURFACE E
SURFACE F
L
L
TO BE IN LINE WITH SURFACE A WITHIN .02 2 PLACES
SURFACE A
SEE DETAIL E SEE SH 2
SURFACE B
TO BE IN LINE WITH SURFACE B WITHIN .02 2 PLACES
TO BE IN LINE WITH SURFACE C WITHIN .02 2 PLACES
TO BE IN LINE WITH SURFACE D WITHIN .02 2 PLACES
SEE DETAIL H SEE SH 2
SURFACE C
SURFACE D
NO.10(.190)-32UNF-2B 4 HOLES
33.250
SEE DETAIL B
28.000
19.250 REF
18.65
18.59
1.58
1.55
SEE DETAIL C (FOR ORIGINAL CONFIGURATION AND REWORK INFORMATION, TO COMPLY WITH FLANGE CONFIGURATION SHOWN IN THIS VIEW.) SEE SH 2
BASE DIM 0
.94 REF
.185
29.305 REF
REMOVE PAWL
.86
.88 DIA THRU OUTER CHANNEL ONLY 2 HOLES
.630
.620
1.255
1.245
.149
.155 DIA THRU OUTER CHANNEL ONLY 4 HOLES
1.39
1.37
THRU INNER CHANNEL ONLY
R TYP
.51
.49
1.12
1.13
2.26
2.24
1.02
.98
SILK SCREEN .19 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING WHITE INK 1006271-1
.38±.06
.38±.06
COOLING WATER
OUTLET INLET
.50±.06

DETAIL A
SCALE 1/2

DETAIL B
SCALE 1/2

DETAIL G
SCALE 1/2

MARK .12 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING WHITE INK 1006271-1

ABOVE VIEW SHOWN WITH DOOR REMOVED

PARTIAL VIEW L-L
SCALE 1/1

CM PART NO. 1020070
DAMAGED R.F.I. METALLIC
AS REQUIRED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

8104065	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ±.005 ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN DATE 20CT65
CHECKED 29Oct65
APPROVAL 29Oct65
APPROVAL 10/29/65
APPROVAL 10/29/65
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSTRUCTION DRAWING
FOR KIT LIST NO. 8104065
OPERATION CONSOLE

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016325
SCALE NONE
WT
SHEET 1 OF 2

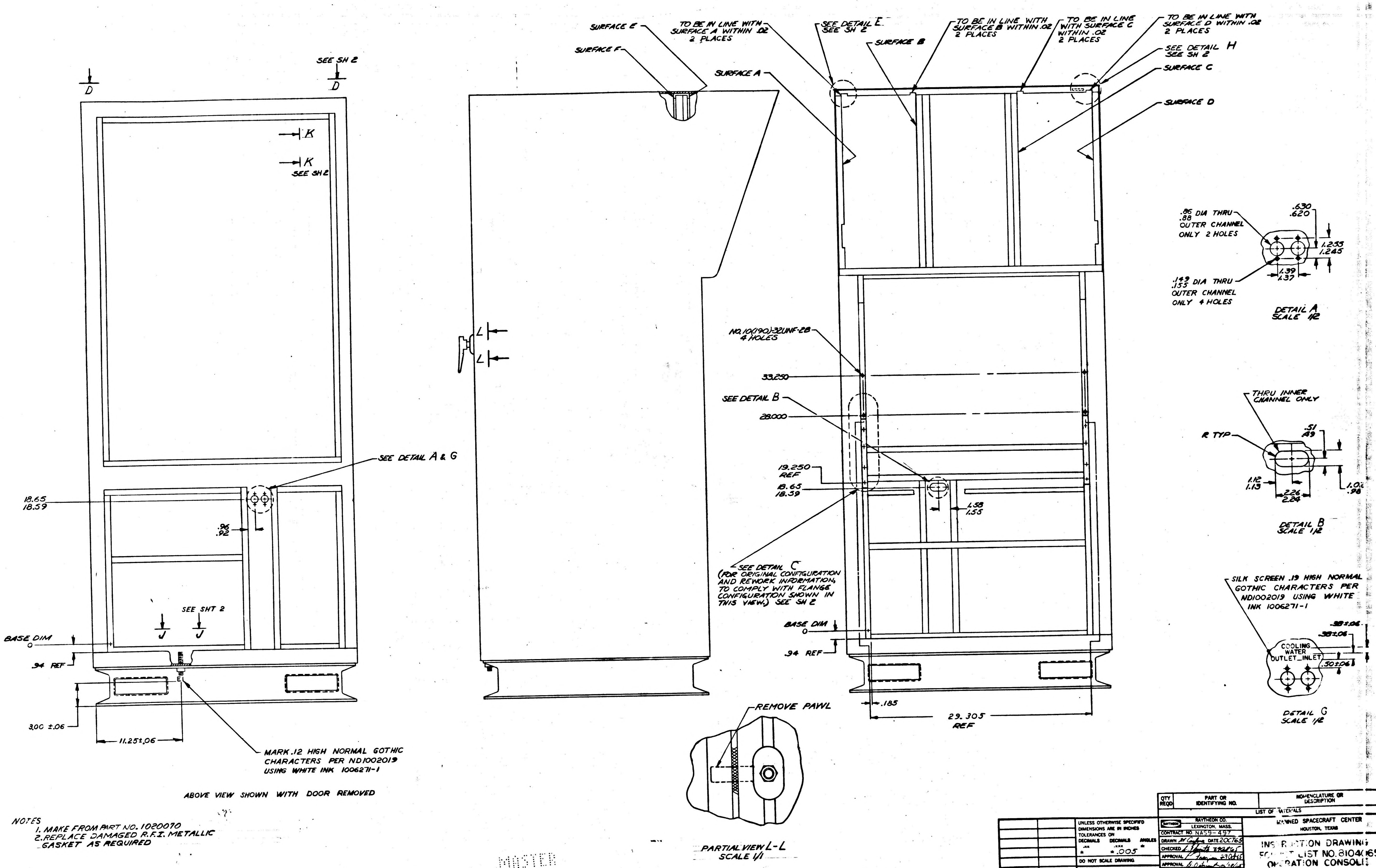
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016325 C

F-2

2016325 C

SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA 25507		
–	CLASS B NO CHANGE PER CCA R25509	13/4/66	
A	CHANGED PER CCA R25668 DR CHKD APPD PED	6/12/66	
B	CHANGED PER CCA R25748	1/15/66	
C	CLASS A RELEASE PER TORR 28259		


SEE SH 2
D
D
K
K
SEE SH 2
SEE DETAIL A & G
18.65
18.59
.96
.92
SEE SHT 2
J
J
BASE DIM
0
.94 REF
3.00 ±.06
11.25±.06
MARK .12 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING WHITE INK 1006271-1
ABOVE VIEW SHOWN WITH DOOR REMOVED
SURFACE E
SURFACE F
L
L
TO BE IN LINE WITH SURFACE A WITHIN .02 2 PLACES
SURFACE A
SEE DETAIL E SEE SH 2
SURFACE B
TO BE IN LINE WITH SURFACE B WITHIN .02 2 PLACES
TO BE IN LINE WITH SURFACE C WITHIN .02 2 PLACES
TO BE IN LINE WITH SURFACE D WITHIN .02 2 PLACES
SEE DETAIL H SEE SH 2
SURFACE C
SURFACE D
NO.10(.190)-32UNF-2B 4 HOLES
33.250
SEE DETAIL B
28.000
19.250 REF
18.65
18.39
1.58
1.55
SEE DETAIL C (FOR ORIGINAL CONFIGURATION AND REWORK INFORMATION, TO COMPLY WITH FLANGE CONFIGURATION SHOWN IN THIS VIEW.) SEE SH 2
BASE DIM
0
.94 REF
.185
29.305 REF
REMOVE PAWL
PARTIAL VIEW L-L SCALE 1/1
.86 DIA THRU .88 OUTER CHANNEL ONLY 2 HOLES
.630
.620
1.255
1.245
1.39
1.37
.143 DIA THRU .155 OUTER CHANNEL ONLY 4 HOLES
DETAIL A SCALE 1/2
THRU INNER CHANNEL ONLY
R TYP
.51
.49
1.12
1.13
2.26
2.24
1.02
.98
DETAIL B SCALE 1/2
SILK SCREEN .19 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING WHITE INK 1006271-1
.38±.06
.38±.06
.50±.06
COOLING WATER OUTLET INLET
DETAIL G SCALE 1/2

NOTES
1. MAKE FROM PART NO. 1020070
2. REPLACE DAMAGED R.F.I. METALLIC GASKET AS REQUIRED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
8104065	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±
DECIMALS .XXX ±.005
ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN DATE 20CT65
CHECKED 29OCT65
APPROVAL 29Oct65
APPROVAL
APPROVAL 10/29/65
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSPECTION DRAWING
FOR KIT LIST NO. 8104065
OPERATION CONSOLE

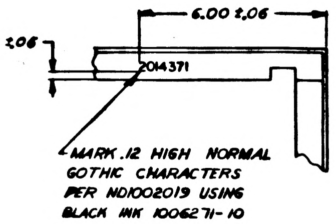
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016325
SCALE
WT
SHEET 1 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016325 C

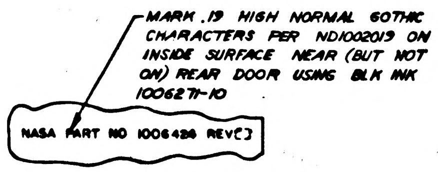
2016325 C

SYM	DESCRIPTION	DATE	APPROVED
⌣	RELEASED PER CCA 25507		
–	CLASS B NO CHANGE PER CCA R25509	[illegible]	[illegible]
A	CHANGED PER CCA R25668 DR [illegible] P C A	1/14/66	[illegible]
B	CHANGED PER CCA R25798	1/25/66	[illegible]
C	CLASS A RELEASE PER TDRR 28259		


6.00 ±.06
.25 ±.06
2014371

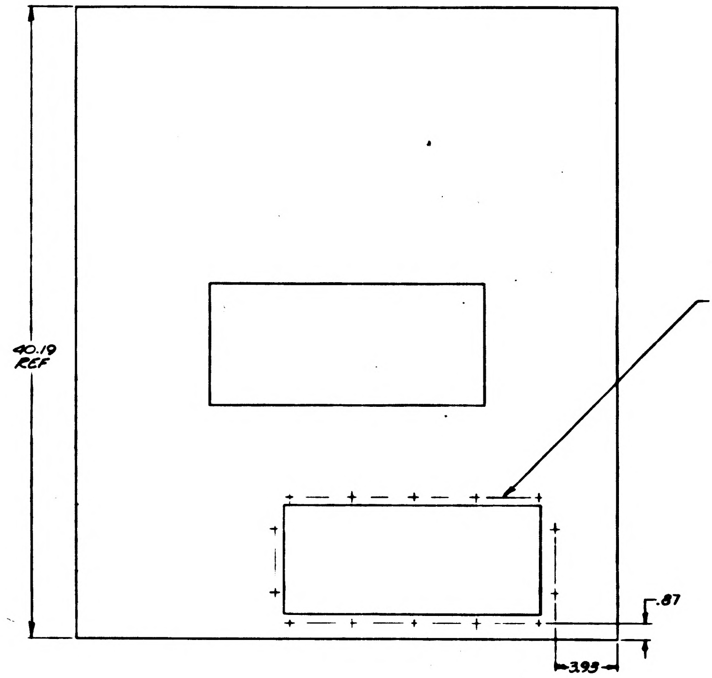
MARK .12 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING BLACK INK 1006271-10

DETAIL H
SEE SHEET 1

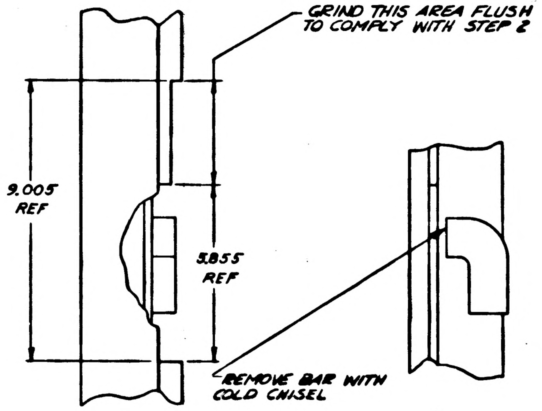

NASA PART NO 1006484 REV[ ]

MARK .19 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 ON INSIDE SURFACE NEAR (BUT NOT ON) REAR DOOR USING BLK INK 1006271-10

VIEW K-K


40.19 REF
SEE DETAIL F
.87
3.95

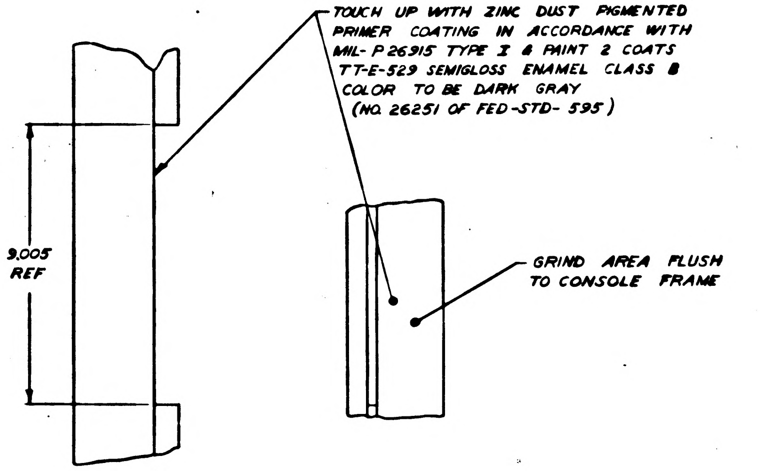
VIEW D-D
SEE SHEET 1


9.005 REF
5.855 REF

GRIND THIS AREA FLUSH TO COMPLY WITH STEP 2

REMOVE BAR WITH COLD CHISEL

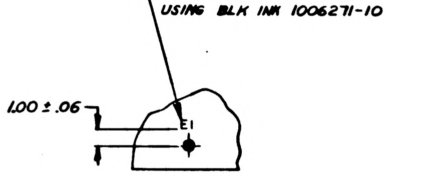
STEP 1



TOUCH UP WITH ZINC DUST PIGMENTED PRIMER COATING IN ACCORDANCE WITH MIL-P26915 TYPE I & PAINT 2 COATS TT-E-529 SEMIGLOSS ENAMEL CLASS B COLOR TO BE DARK GRAY (NO. 26251 OF FED-STD-595)

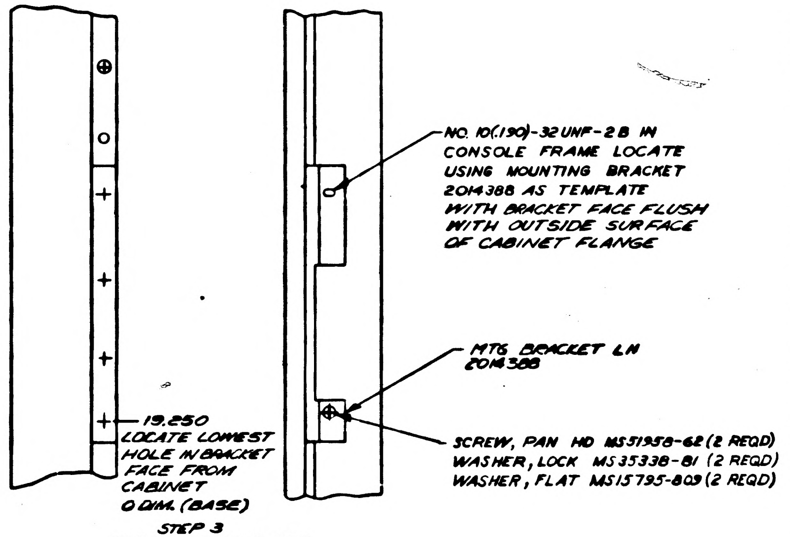
GRIND AREA FLUSH TO CONSOLE FRAME

STEP 2



MARK .12 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING BLK INK 1006271-10

VIEW J-J
SEE SHEET 1



NO. 10(.190)-32UNF-2B IN CONSOLE FRAME LOCATE USING MOUNTING BRACKET 2014388 AS TEMPLATE WITH BRACKET FACE FLUSH WITH OUTSIDE SURFACE OF CABINET FLANGE

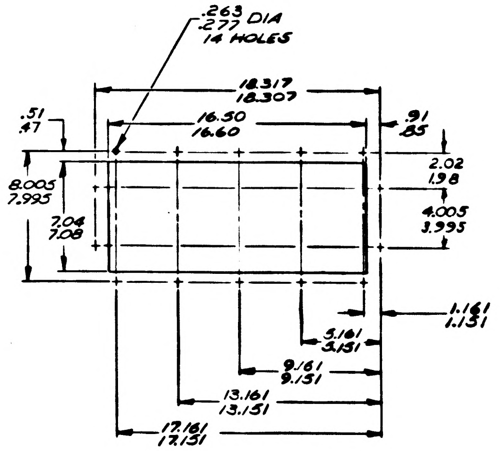
MTG BRACKET LH 2014388

SCREW, PAN HD MS51958-62 (2 REQD)
WASHER, LOCK MS35338-81 (2 REQD)
WASHER, FLAT MS15795-809 (2 REQD)

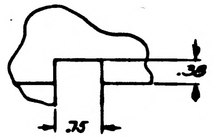
LOCATE LOWEST HOLE IN BRACKET FACE FROM CABINET 0 DIM. (BASE)

STEP 3
FOR RIGHT HAND USE MTG BRACKET RH 2014391

DETAIL C
SEE SHEET 1
STEPS 1 THRU 3
REPEAT OPERATION FOR REWORK OF RIGHT SIDE OF CABINET FRAME


.263
.277 DIA
14 HOLES
18.317
18.307
16.50
16.60
.51
.47
.91
.85
2.02
1.98
8.005
7.995
7.04
7.08
4.005
3.995
1.161
1.131
5.161
5.151
9.161
9.151
13.161
13.151
17.161
17.151

DETAIL F



DETAIL E
8 CUTOUTS THRU SURFACE E & F
SEE SHEET 1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN [illegible] DATE 6 OCT 65
CHECKED [illegible] 29 OCT 65
APPROVAL [illegible] 29 Oct 65
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

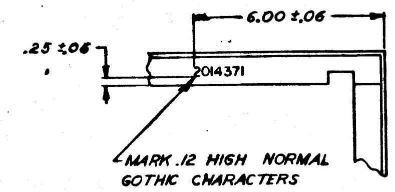
INSTRUCTION DRAWING
FOR KIT LIST NO. 8104065
OPERATION CONSOLE

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016325
SCALE NONE
WT
SHEET 2 OF 2

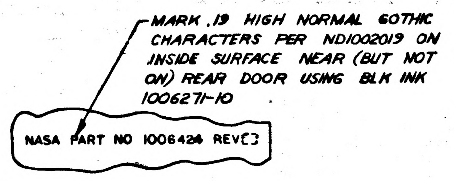
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016325 C

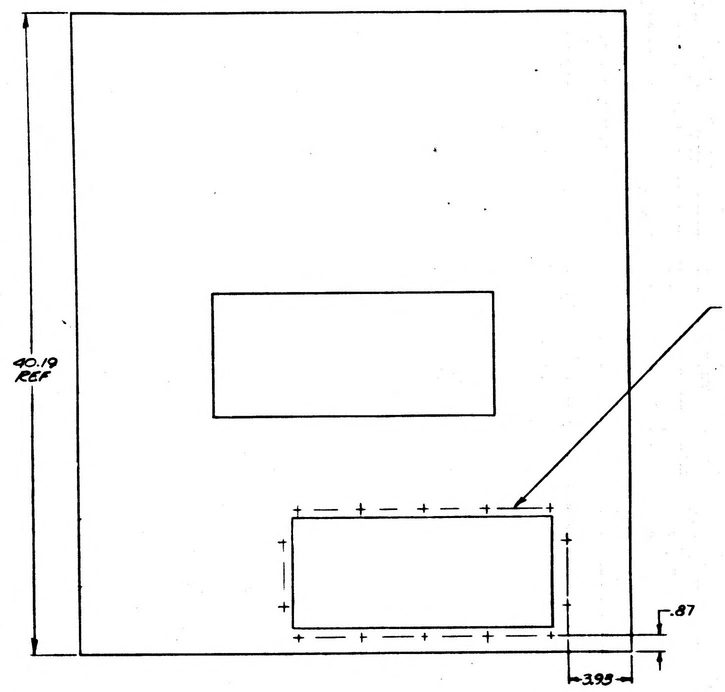
SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA 25507		
–	CLASS B NO CHANGE PER CCA R25509		
A	CHANGED PER CCA R25668 DR CHK APPD P C D	1/14/66	
B	CHANGED PER CCA R25748	1/15/66	
C	CLASS A RELEASE PER TDRR 28259		


6.00 ±.06
.25 ±.06
2014371
MARK .12 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING BLACK INK 1006271-10

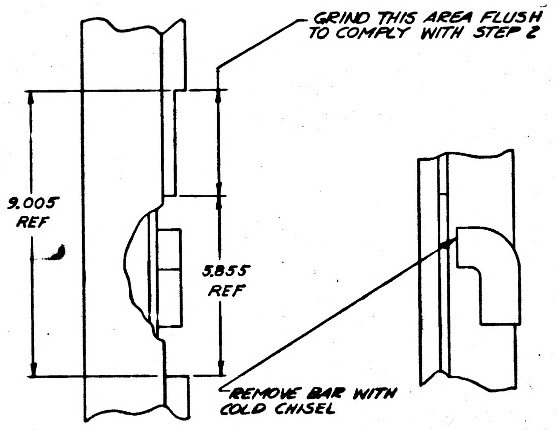
DETAIL H
SEE SHEET 1


MARK .19 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 ON INSIDE SURFACE NEAR (BUT NOT ON) REAR DOOR USING BLK INK 1006271-10
NASA PART NO 1006424 REV C

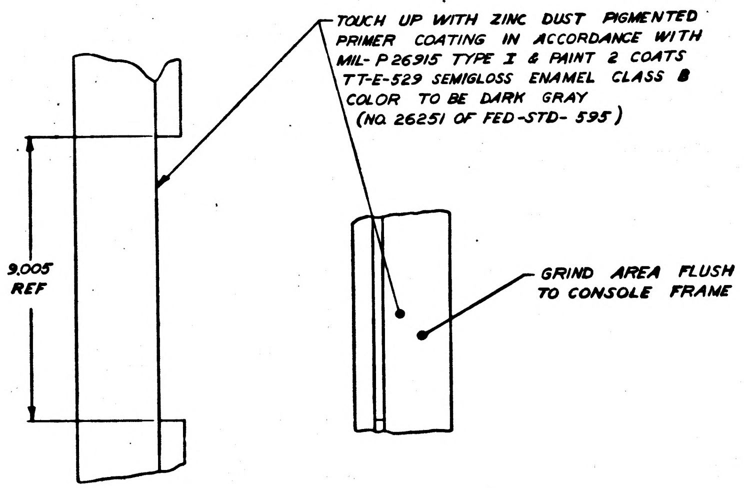
VIEW K-K


40.19 REF
SEE DETAIL F
.87
3.93

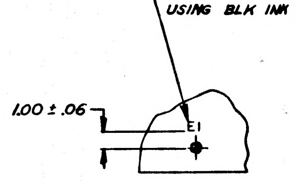
VIEW D-D
SEE SHEET 1


GRIND THIS AREA FLUSH TO COMPLY WITH STEP 2
9.005 REF
5.855 REF
REMOVE BAR WITH COLD CHISEL

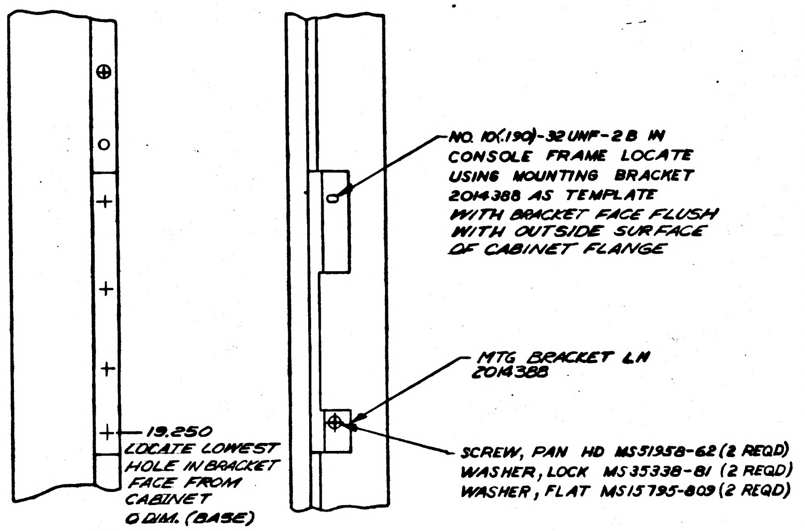
STEP 1


TOUCH UP WITH ZINC DUST PIGMENTED PRIMER COATING IN ACCORDANCE WITH MIL-P 26915 TYPE I & PAINT 2 COATS TT-E-529 SEMIGLOSS ENAMEL CLASS B COLOR TO BE DARK GRAY (NO. 26251 OF FED-STD-595)
9.005 REF
GRIND AREA FLUSH TO CONSOLE FRAME

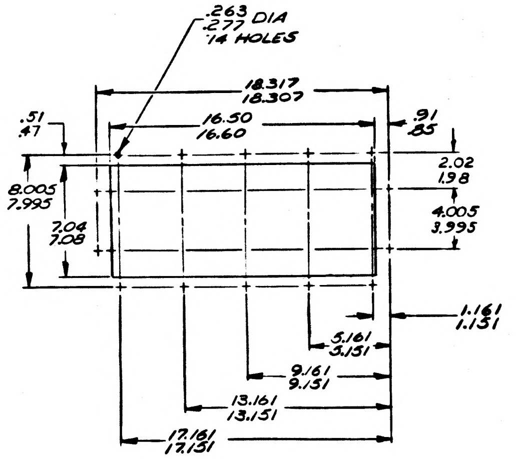
STEP 2


MARK .12 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING BLK INK 1006271-10
1.00 ± .06
E1

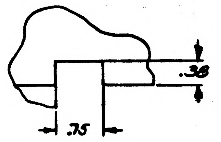
VIEW J-J
SEE SHEET 1


NO. 10(.190)-32 UNF-2B IN CONSOLE FRAME LOCATE USING MOUNTING BRACKET 2014388 AS TEMPLATE WITH BRACKET FACE FLUSH WITH OUTSIDE SURFACE OF CABINET FLANGE
MTG BRACKET LH 2014388
SCREW, PAN HD MS51958-62 (2 REQD)
WASHER, LOCK MS35338-81 (2 REQD)
WASHER, FLAT MS15795-809 (2 REQD)
19.250
LOCATE LOWEST HOLE IN BRACKET FACE FROM CABINET
0 DIM. (BASE)

STEP 3
FOR RIGHT HAND USE
MTG BRACKET RH 2014391


.263 DIA
.277
14 HOLES
18.317
18.307
16.50
16.60
.51
.47
.91
.85
2.02
1.98
8.005
7.995
7.04
7.08
4.005
3.995
1.161
1.151
5.161
5.151
9.161
9.151
13.161
13.151
17.161
17.151

DETAIL F



DETAIL E
8 CUTOUTS THRU SURFACE E & F
SEE SHEET 1

DETAIL C
SEE SHEET 1
STEPS 1 THRU 3
REPEAT OPERATION FOR REWORK OF RIGHT SIDE OF CABINET FRAME

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN DATE 6 OCT 65
CHECKED 29 Oct 65
APPROVAL 29 Oct 65
APPROVAL D. O. Bryant 10/29/65
APPROVAL 10/29/65
NASA APPROVAL A. C. METZGER
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

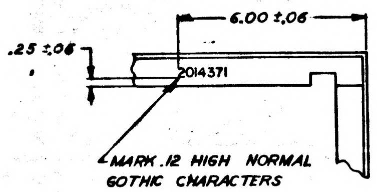
INSTRUCTION DRAWING
FOR KIT LIST NO. 8104065
OPERATION CONSOLE

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016325
SCALE NONE
WT
SHEET 2 OF 2

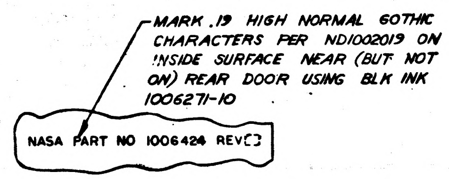
MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

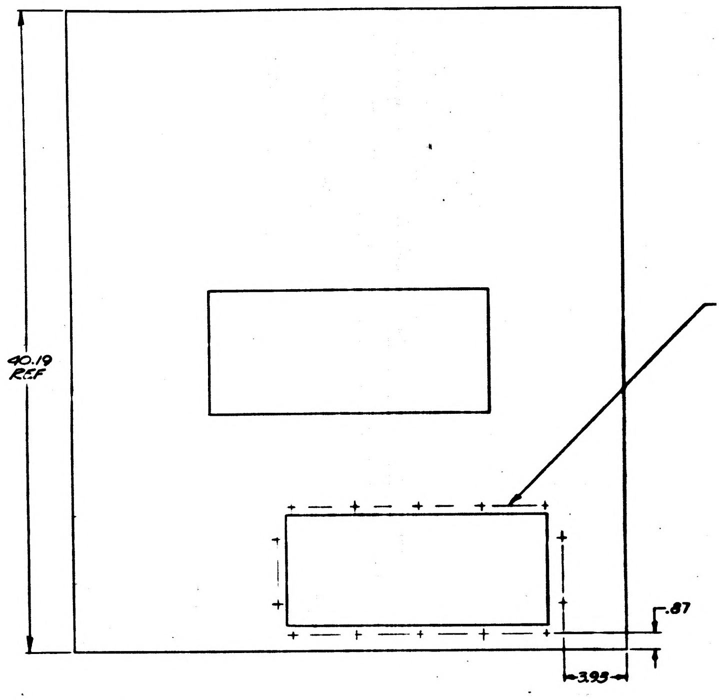
SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA 25507		
–	CLASS B NO CHANGE PER CCA R25509		
A	CHANGED PER CCA R25668 DR CHK APPD P C D		
B	CHANGED PER CCA R25748		
C	CLASS A RELEASE PER TDRR 28259		


6.00 ±.06
.25 ±.06
2014371
MARK .12 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING BLACK INK 1006271-10

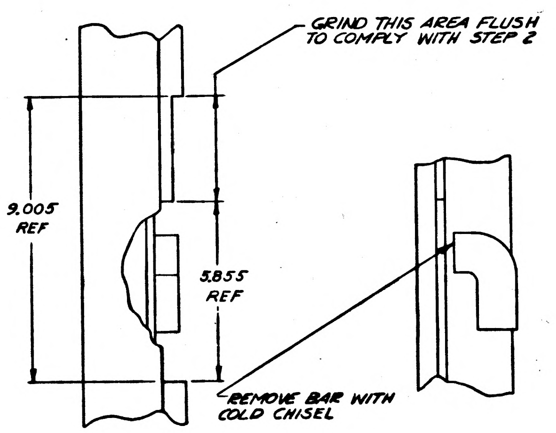
DETAIL H
SEE SHEET 1


MARK .19 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 ON INSIDE SURFACE NEAR (BUT NOT ON) REAR DOOR USING BLK INK 1006271-10
NASA PART NO 1006424 REV C

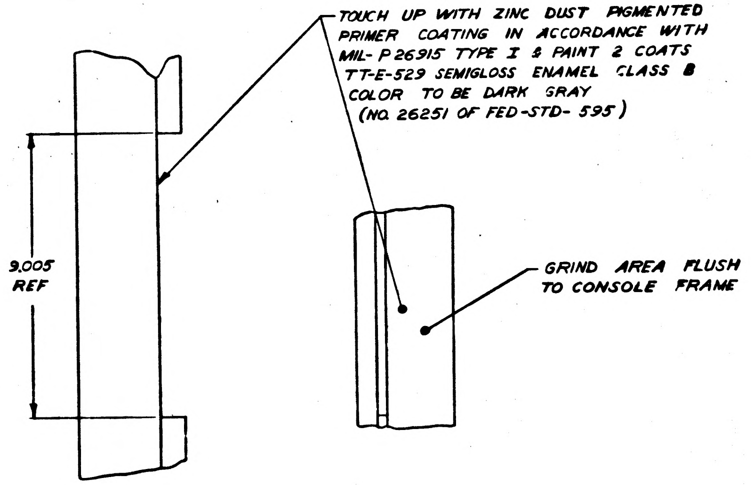
VIEW K-K


40.19 REF
SEE DETAIL F
.87
3.93

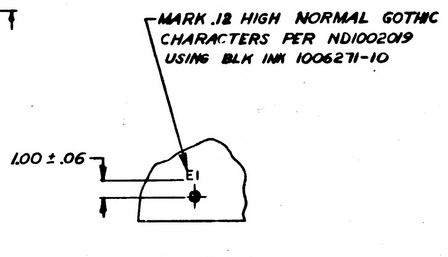
VIEW D-D
SEE SHEET 1


GRIND THIS AREA FLUSH TO COMPLY WITH STEP 2
9.005 REF
5.855 REF
REMOVE BAR WITH COLD CHISEL

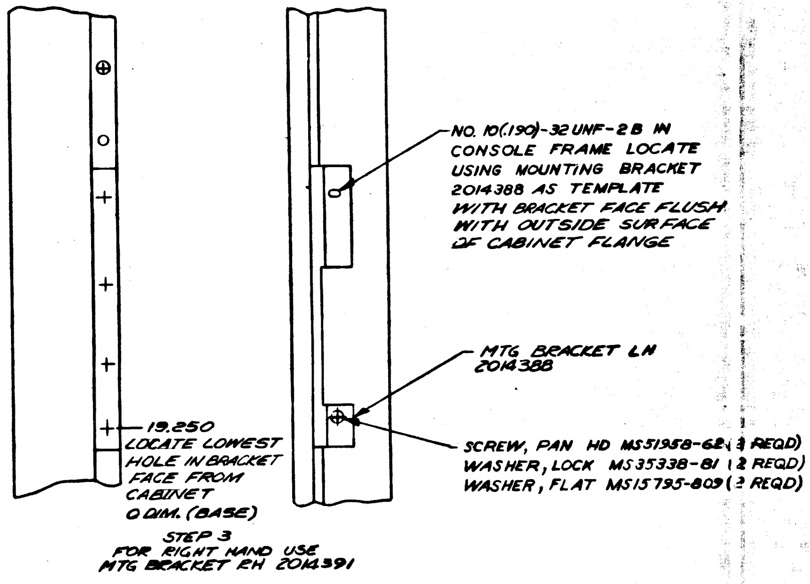
STEP 1


TOUCH UP WITH ZINC DUST PIGMENTED PRIMER COATING IN ACCORDANCE WITH MIL-P-26915 TYPE I & PAINT 2 COATS TT-E-529 SEMIGLOSS ENAMEL CLASS B COLOR TO BE DARK GRAY (NO. 26251 OF FED-STD-595)
9.005 REF
GRIND AREA FLUSH TO CONSOLE FRAME

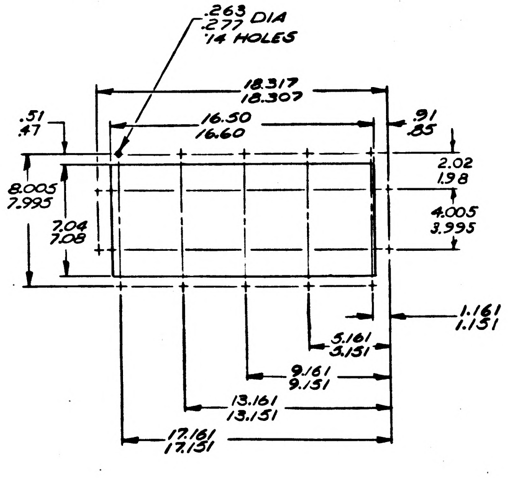
STEP 2


MARK .12 HIGH NORMAL GOTHIC CHARACTERS PER ND1002019 USING BLK INK 1006271-10
1.00 ±.06
E1

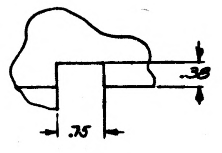
VIEW J-J
SEE SHEET 1


NO. 10(.190)-32 UNF-2B IN CONSOLE FRAME LOCATE USING MOUNTING BRACKET 2014388 AS TEMPLATE WITH BRACKET FACE FLUSH WITH OUTSIDE SURFACE OF CABINET FLANGE
MTG BRACKET LH 2014388
SCREW, PAN HD MS51958-62 (3 REQD)
WASHER, LOCK MS35338-81 (2 REQD)
WASHER, FLAT MS15795-803 (3 REQD)
19.250 LOCATE LOWEST HOLE IN BRACKET FACE FROM CABINET O DIM. (BASE)

STEP 3
FOR RIGHT HAND USE
MTG BRACKET RH 2014391


.263 DIA
.277
14 HOLES
18.317
18.307
16.50
16.60
.51
.47
.91
.85
2.02
1.98
8.005
7.995
4.005
3.995
7.04
7.08
1.161
1.151
5.161
5.151
9.161
9.151
13.161
13.151
17.161
17.131

DETAIL F



DETAIL E
8 CUTOUTS THRU SURFACE E & F
SEE SHEET 1

DETAIL C
SEE SHEET 1
STEPS 1 THRU 3
REPEAT OPERATION FOR REWORK OF RIGHT SIDE OF CABINET FRAME

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN DATE 6 OCT 65
CHECKED 29 Oct 65
APPROVAL 29 Oct 65
APPROVAL
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL
MIT APPROVAL

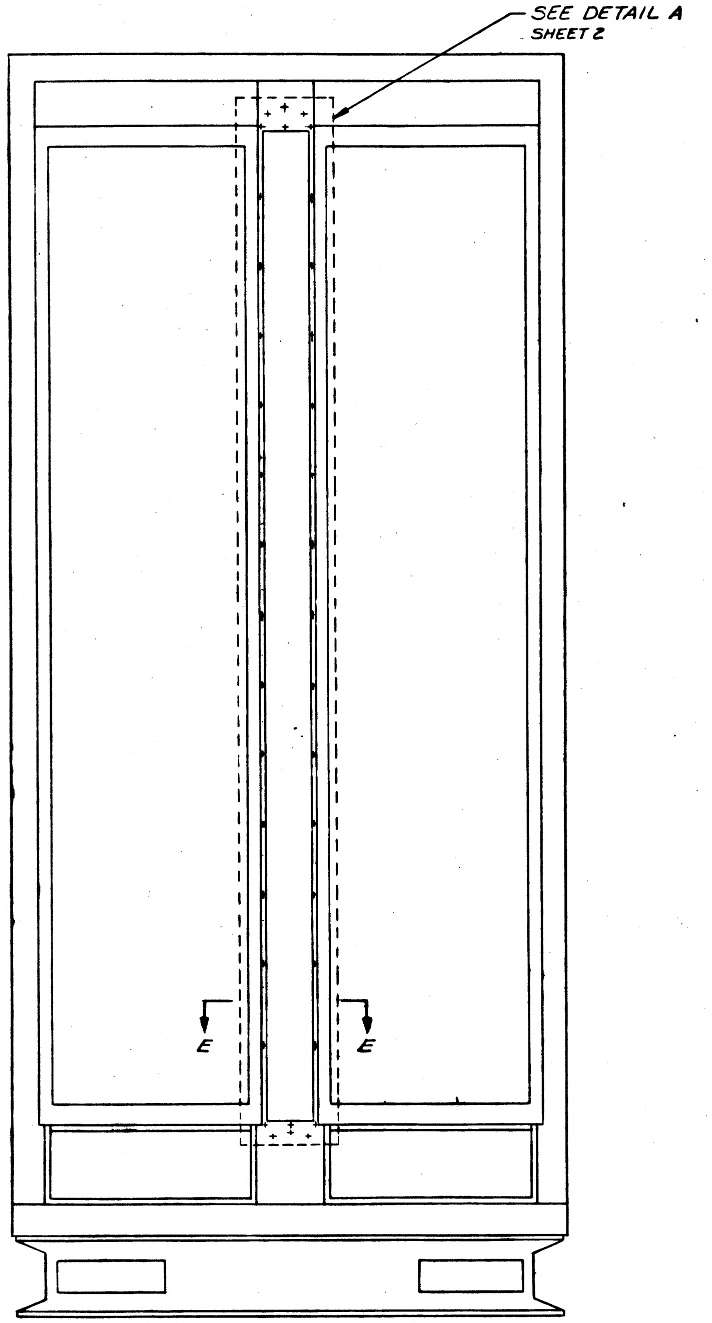
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

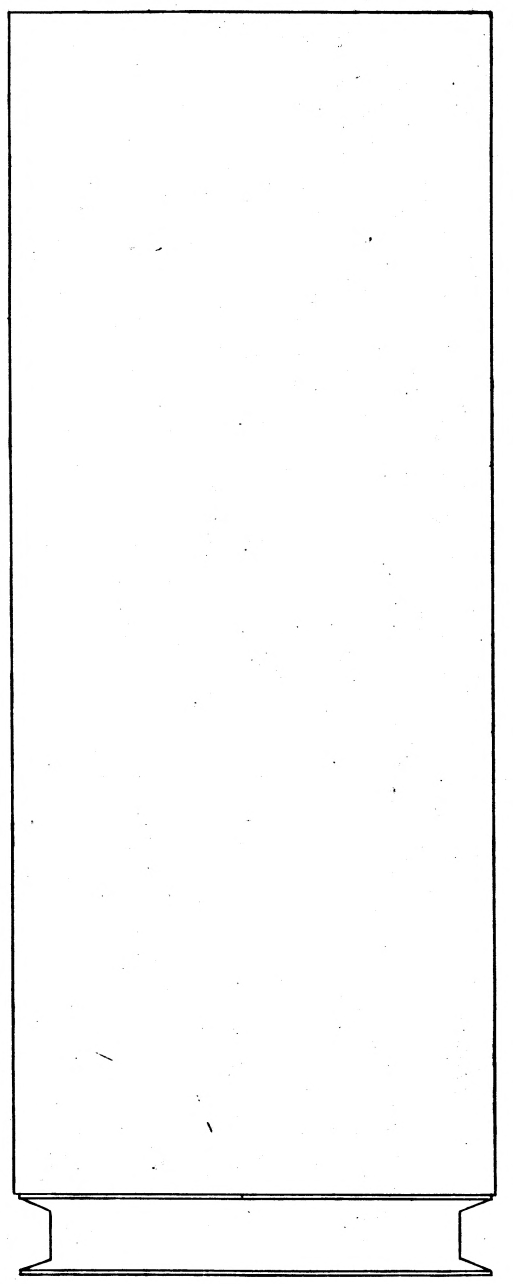
INSTRUCTION DRAWING
FOR KIT LIST NO. 6104065
OPERATION CONSOLE

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016325
SCALE NONE
WT
SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA 25507		
—	CLASS B NO CHANGE PER CCAR25502	9/29/65	
A	CHANGED PER CCA R25672 DR [illegible] CHK [illegible] APPD P.A.D	1/14/66	
B	CHANGED PER CCA R25777 DR [illegible] CHK [illegible] APPD P.A.D	1/19/66	
C	CLASS A RELEASED PER DRR 27464	3/28/66	


SEE DETAIL A
SHEET 2
E
E



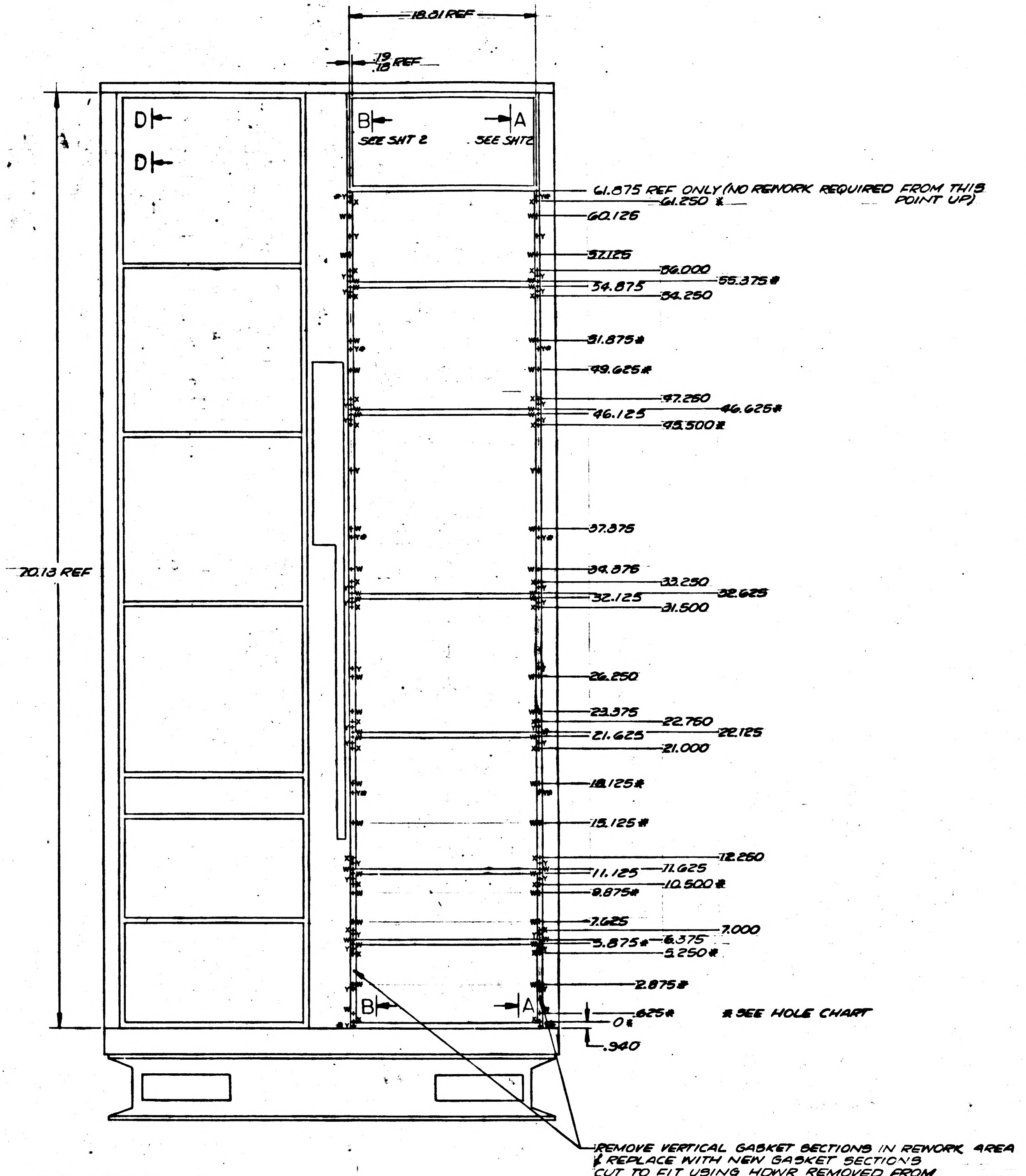

18.81 REF
.19
.18 REF
70.18 REF
D
D
B
SEE SHT 2
A
SEE SHT2
61.875 REF ONLY (NO REWORK REQUIRED FROM THIS POINT UP)
61.250 *
60.125
57.125
56.000
55.375 *
54.875
54.250
51.875 *
49.625 *
47.250
46.625 *
46.125
45.500 *
37.875
34.875
33.250
32.625
32.125
31.500
26.250
23.375
22.750
22.125
21.625
21.000
18.125 *
15.125 *
12.250
11.625
11.125
10.500 *
9.875 *
7.625
7.000
6.375
5.875 *
5.250 *
2.875 *
.625 *
0 *
.940
* SEE HOLE CHART
B
A
REMOVE VERTICAL GASKET SECTIONS IN REWORK AREA & REPLACE WITH NEW GASKET SECTIONS CUT TO FIT USING HDWR REMOVED FROM OLD SECTIONS (MS51959-12 REF)

TABLE FOR RH BAY REWORK AREA ONLY
* DENOTES HOLES EXIST IN FLANGE AS REQUIRED

HOLE DES	HOLE DESCRIPTION	TOTAL QTY	QTY REQD FOR REWORK
W	NO.10(.190)-32UNF-2B IN FLANGE & LEAVE GASKET BLIND	82	32
X	NO. 10(.190)-32UNF-2B IN FLANGE	28	18
	NO. 10-32 CLEARANCE IN GASKET	28	28
Y	LOCATE APPROX AS SHOWN (.25/.31) ABOVE OR BELOW X & W HOLES		
	NO. 4(.112)-40UNC-2B IN FLANGE	42	32
	NO. 4-40 CLEARANCE & CSINK IN GASKET	42	42

NOTES
1. MAKE FROM PART NO. 1006929
2. REPLACE DAMAGED MONEL RFI SHIELDING AS REQUIRED
3. REMOVE & REPLACE RUBBER RFI SHIELDING WITH MONEL RFI SHIELDING AS SPECIFIED ON SCD 1006423

ZH

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

8104070	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN [illegible] DATE 25 OCT 65
CHECKED [illegible] 3 NOV 65
APPROVAL [illegible]
APPROVAL [illegible]
APPROVAL [illegible] 11/10/65
NASA APPROVAL A. C. METZGER
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSTRUCTION DRAWING
FOR KIT LIST NO. 8104070
COMPUTER TEST SET

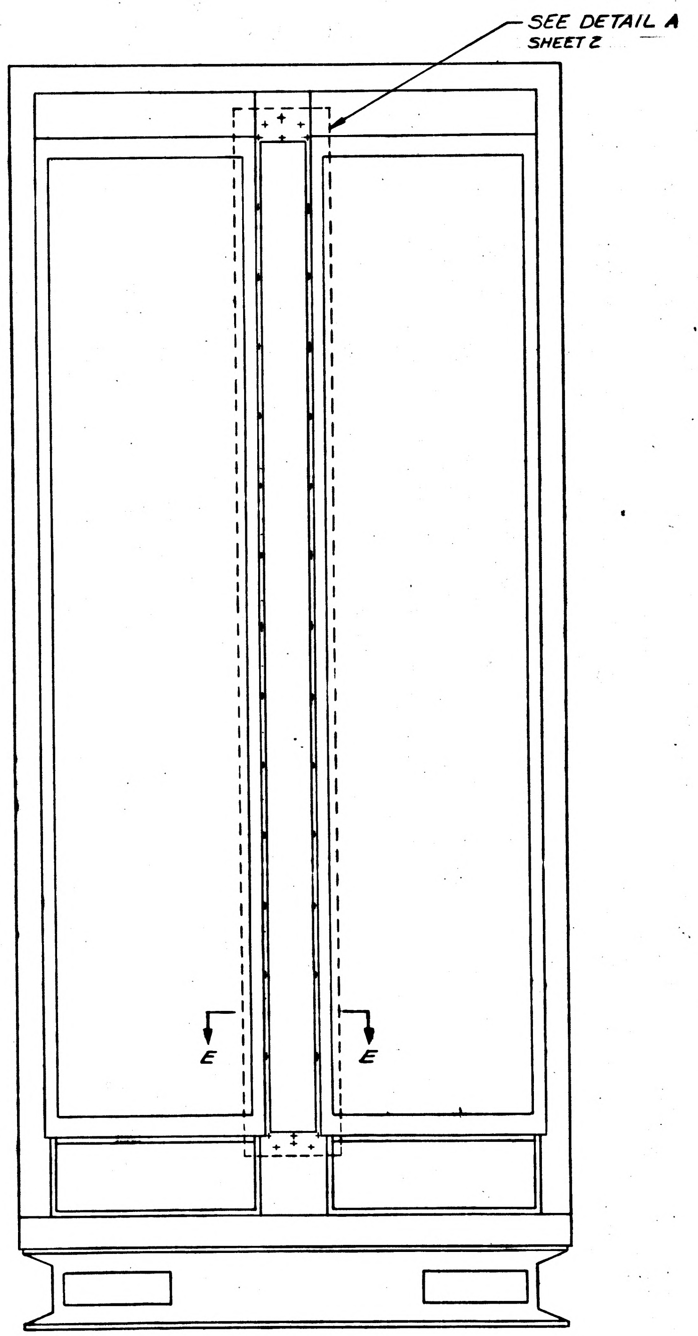
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016326
SCALE NONE
WT
SHEET 1 OF 2

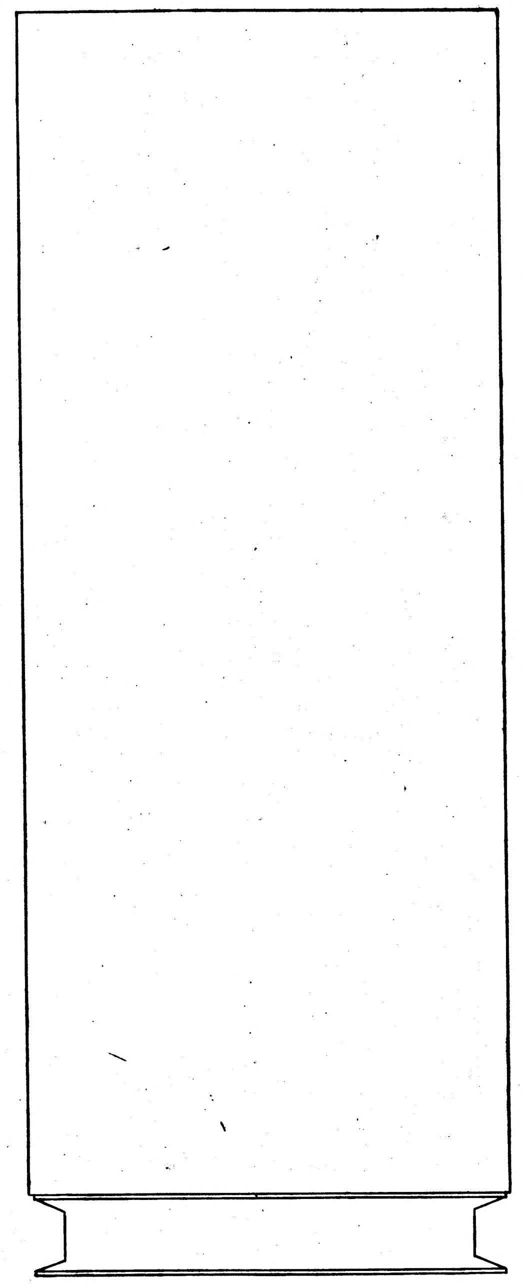
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

F-2

2016326 | C

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA 25507		
–	CLASS B NO CHANGE PER CCAR25522	[illegible]	[illegible]
A	CHANGED PER CCA [illegible]72 DR [illegible] CHK [illegible] APPD P.A.B	[illegible]	[illegible]
B	CHANGED PER CCA [illegible] DR [illegible] CHK [illegible] P.A.B	[illegible]	[illegible]
C	CLASS A RELEASED PER TDRR 27161	[illegible]	[illegible]


SEE DETAIL A
SHEET 2
E
E



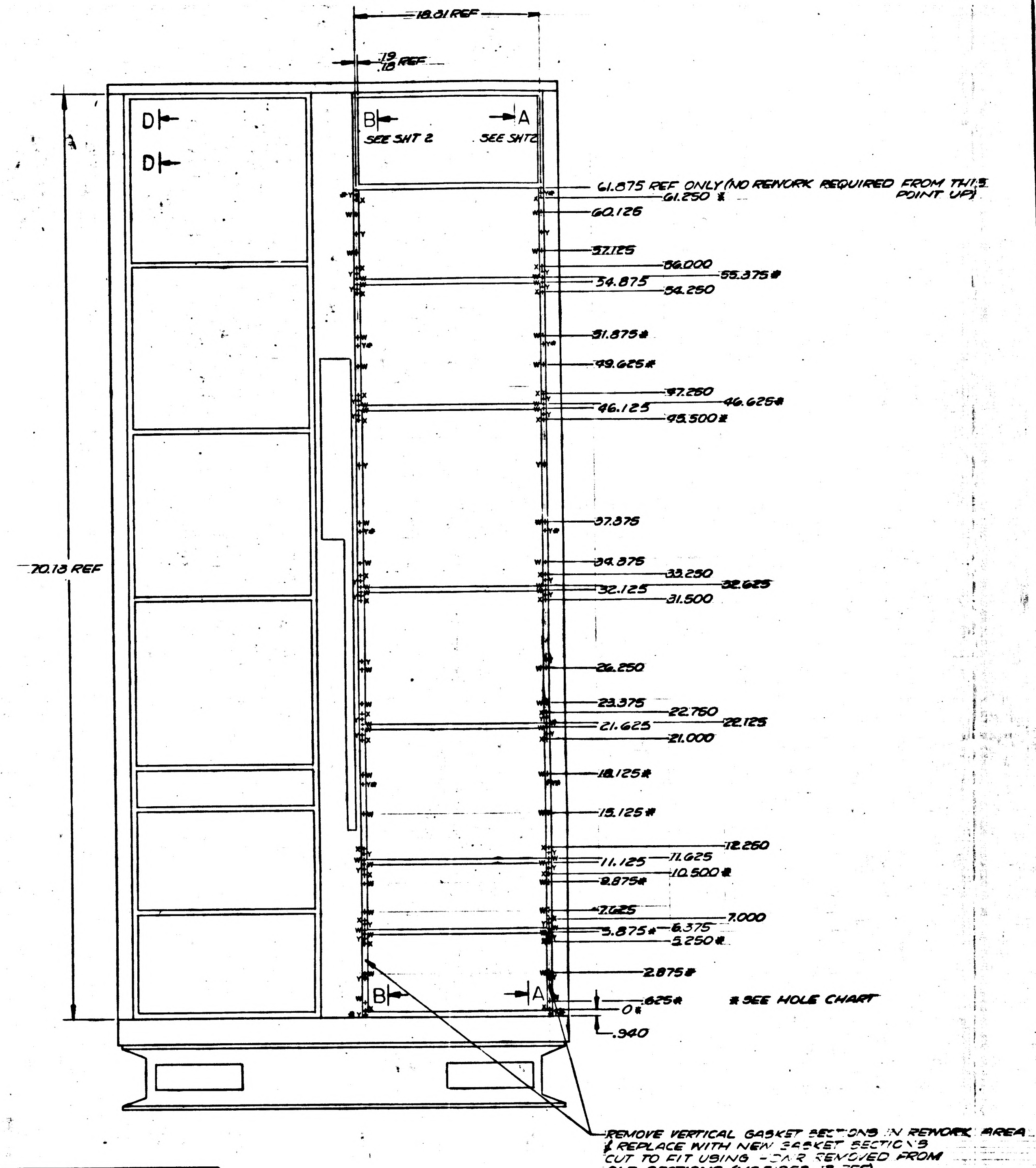

18.81 REF
.19
.18 REF
70.18 REF
D
D
B
SEE SHT 2
A
SEE SHT2
61.875 REF ONLY (NO REWORK REQUIRED FROM THIS POINT UP)
61.250 *
60.125
57.125
56.000
55.375*
54.875
54.250
51.875*
49.625*
47.250
46.625*
46.125
45.500*
37.875
34.875
33.250
32.625
32.125
31.500
26.250
23.375
22.750
22.125
21.625
21.000
18.125*
15.125*
12.250
11.125
11.625
10.500*
8.875*
7.625
7.000
5.875*
6.375
5.250*
2.875*
B
A
.625*
0*
.940
* SEE HOLE CHART
REMOVE VERTICAL GASKET SECTIONS IN REWORK AREA & REPLACE WITH NEW GASKET SECTIONS CUT TO FIT USING -DAR REMOVED FROM OLD SECTIONS (ME5/959-12 REF)

TABLE FOR RH BAY REWORK AREA ONLY
* DENOTES HOLES EXIST IN FLANGE AS REQUIRED

HOLE DES	HOLE DESCRIPTION	TOTAL QTY	QTY REQD FOR REWORK
W	NO.10(.190)-32UNF-2B IN FLANGE & LEAVE GASKET BLIND	32	32
X	NO. 10(.190)-32UNF-2B IN FLANGE	28	18
	NO.10-32 CLEARANCE IN GASKET	28	28
Y	LOCATE APPROX AS SHOWN (.25/.31) ABOVE OR BELOW X & W HOLES		
	NO. 4(.112)-40UNC-2B IN FLANGE	42	32
	NO.4-40 CLEARANCE & CSINK IN GASKET	42	42

NOTES
1. MAKE FROM PART NO. 1006929
2. REPLACE DAMAGED MONEL RFI SHIELDING AS REQUIRED
3. REMOVE & REPLACE RUBBER RFI SHIELDING WITH MONEL RFI SHIELDING AS SPECIFIED ON SCD 1006423

2H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION.	FIND NO.

LIST OF MATERIALS

8104070	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN [illegible] DATE 28 OCT 65
CHECKED [illegible] 3 NOV 65
APPROVAL [illegible]
APPROVAL [illegible]
APPROVAL [illegible] 11/10/65
NASA APPROVAL A.C. [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSTRUCTION DRAWING
FOR UNIT LIST NO. 3114070
COMPUTER TEST SET

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016326
SCALE NONE
WT
SHEET 1 OF [illegible]

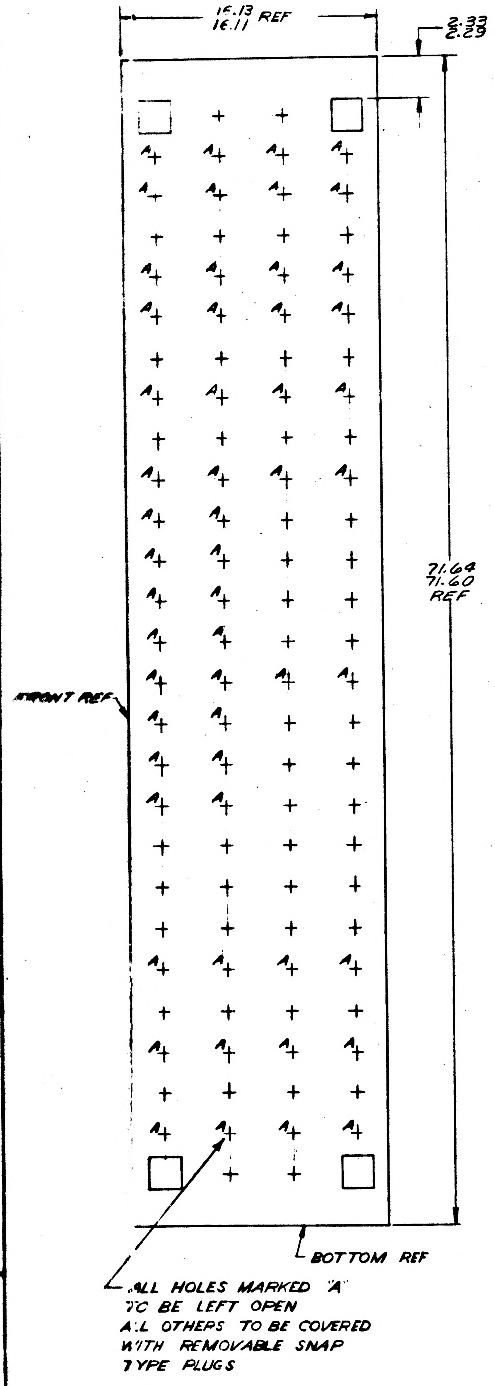
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016326 | C

2016326 | C

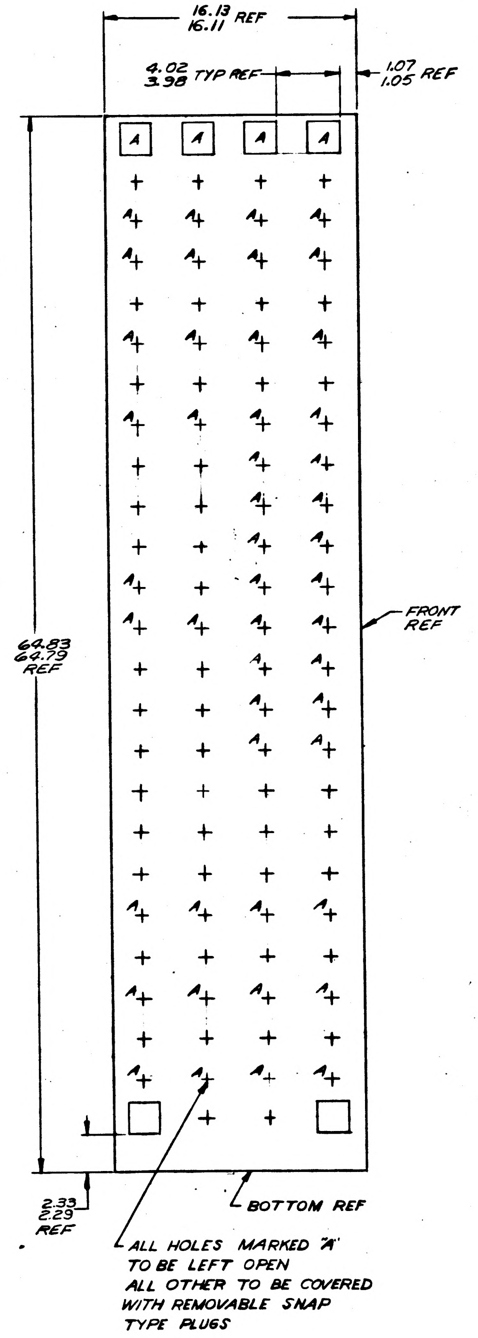
F-1

SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA 25507		
—	CLASS B NO CHANGE PER CCAR25502		
A	CHANGED PER CCA R25672 DR CHK APPD P.E.D.	4/ /66	
B	CHANGED PER CCA R25777 DR B.C. CHK APPD P.E.O.	4/12/66	
C	CLASS A RELEASED PER TDRR 27464	3/25/66	RA


16.13
16.11 REF
2.33
2.29 REF
71.64
71.60
REF
FRONT REF
A
BOTTOM REF

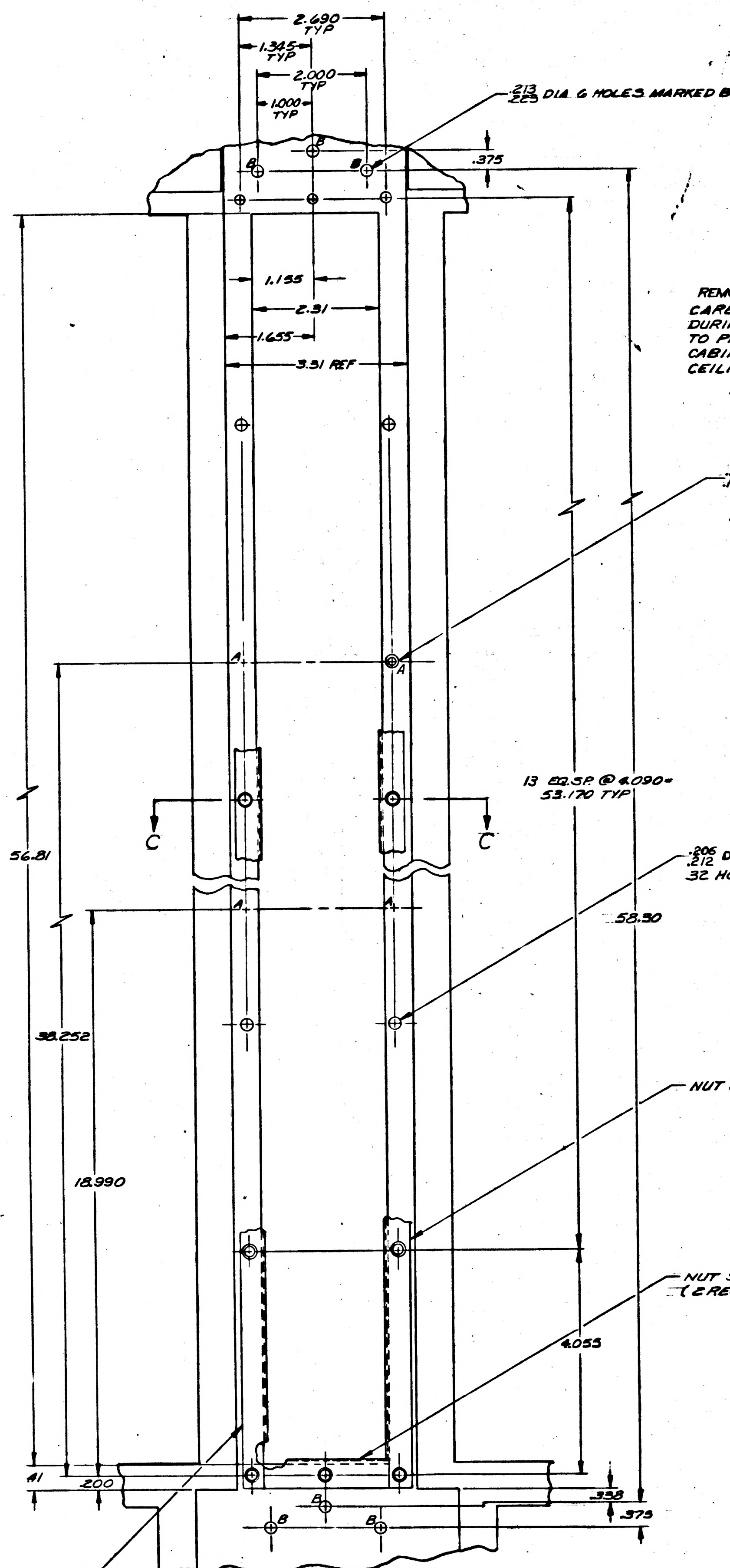
ALL HOLES MARKED "A" TO BE LEFT OPEN
ALL OTHERS TO BE COVERED WITH REMOVABLE SNAP TYPE PLUGS

VIEW B-B
SEE SHEET 1

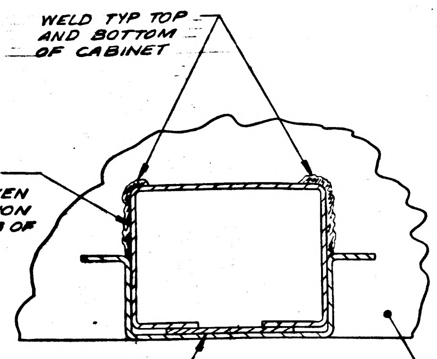

16.13
16.11 REF
4.02
3.98 TYP REF
1.07
1.05 REF
A
64.83
64.79
REF
FRONT REF
2.33
2.29
REF
BOTTOM REF

ALL HOLES MARKED "A" TO BE LEFT OPEN
ALL OTHER TO BE COVERED WITH REMOVABLE SNAP TYPE PLUGS

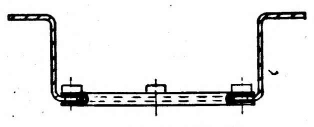
VIEW A-A
SEE SHEET 1


2.690 TYP
1.345 TYP
2.000 TYP
1.000 TYP
.213
.223 DIA 6 HOLES MARKED B
B
.375
1.155
2.31
1.655
3.31 REF
.136
.144 DIA & CSK 82°
TO .229
.239 DIA
4 HOLES MARKED A
A
C
C
13 EQ.SP. @ 4.090=
53.170 TYP
56.81
.206
.212 DIA
32 HOLES
58.30
38.252
NUT STRIP, LH 2014395
18.990
NUT STRIP 2014397
(2 REQD)
4.055
.41
.200
.338
.375
NUT STRIP, RH
2014396

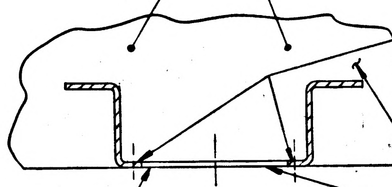
DETAIL A
SEE SHEET 1
STEP 3


WELD TYP TOP AND BOTTOM OF CABINET
REMOVE BOX SECTION
CARE SHOULD BE TAKEN DURING THIS OPERATION TO PREVENT DIMPLING OF CABINET FLOOR AND CEILING
REINFORCING BAR HELD IN PLACE BY BOX SECTION
CABINET FLOOR (REF)

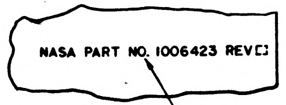
SECTION E-E
STEP 1



SECTION C-C


GRIND ALL REMAINING WELD LEFT BY BOX SECTION IN THIS AREA FLUSH TO CABINET FLOOR AND CEILING
STRIP, MASK, AND PAINT WITH FILTER CONDUCTIVE SILVER PAINT .38±.06 WIDE AROUND CUTOUT BOTH SIDES
MAKE CUTOUT AND DRILL HOLES TO DIMENSIONS SHOWN ON DETAIL A
PRIME AND TOUCH UP WITH DARK GRAY PAINT NO. 26251 OF FED-STD-595 ALL REWORKED AREAS

STEP 2


NASA PART NO. 1006423 REV[ ]

VIEW D-D

MARK .19 HIGH NORMAL GOTHIC CHARACTERS PER ND 1002019 ON INSIDE SURFACE NEAR (BUT NOT ON) REAR DOOR USING BLK INK 1006271-10

2 H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 DECIMALS .XXX ±.005 ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 25OCT65
CHECKED E. Urban 3NOV65
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL
MIT APPROVAL 3/25/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSTRUCTION DRAWING
FOR KIT LIST NO. 8104070
COMPUTER TEST SET

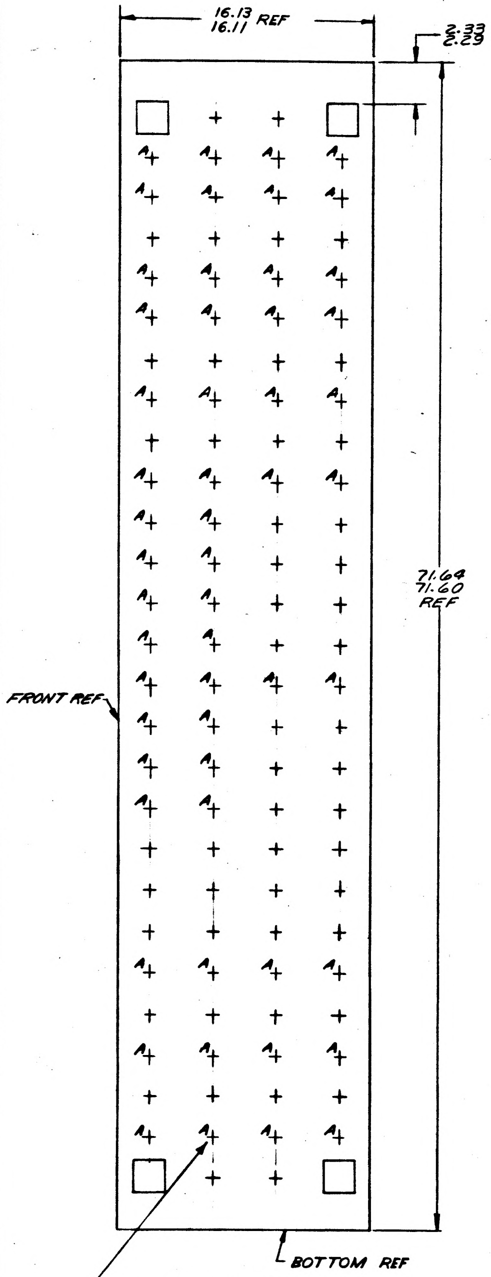
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016326
SCALE NONE
WT
SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

F2

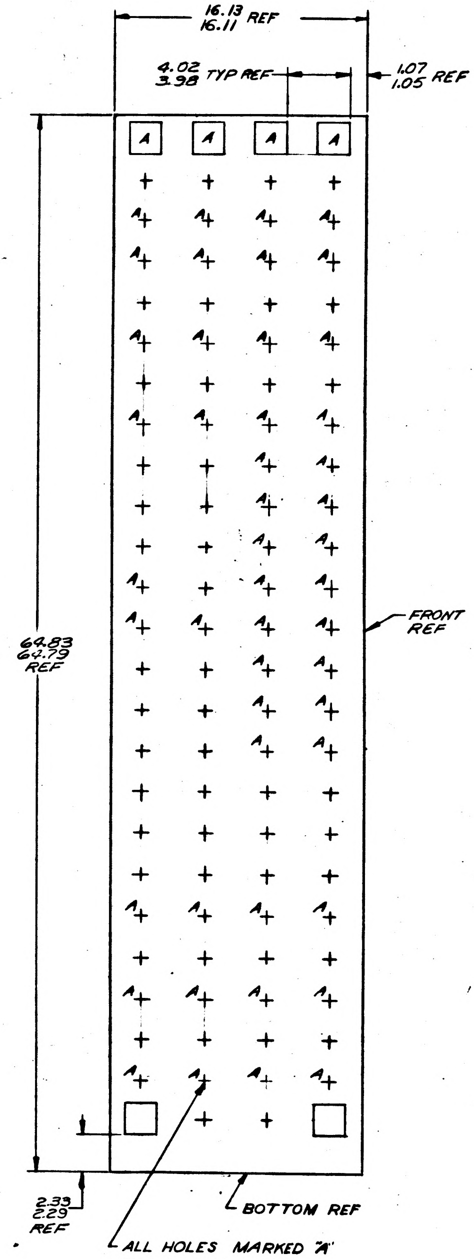
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA 25507		
—	CLASS B NO CHANGE PER CCAR25502	[illegible]	[illegible]
A	CHANGED PER CCA R25672 DR [illegible] CHK G.B. Williams APPD R.C.D.	[illegible]	[illegible]
B	CHANGED PER CCA R25777 DR B.C.[illegible] CHK [illegible] APPD R.C.D.	4/8/66	[illegible]
C	CLASS A RELEASED PER TDR R 27464	3/25/66	[illegible]



16.13
16.11 REF
2.33
2.29 REF
71.64
71.60
REF
FRONT REF
BOTTOM REF
A

ALL HOLES MARKED "A" TO BE LEFT OPEN
ALL OTHERS TO BE COVERED WITH REMOVABLE SNAP TYPE PLUGS

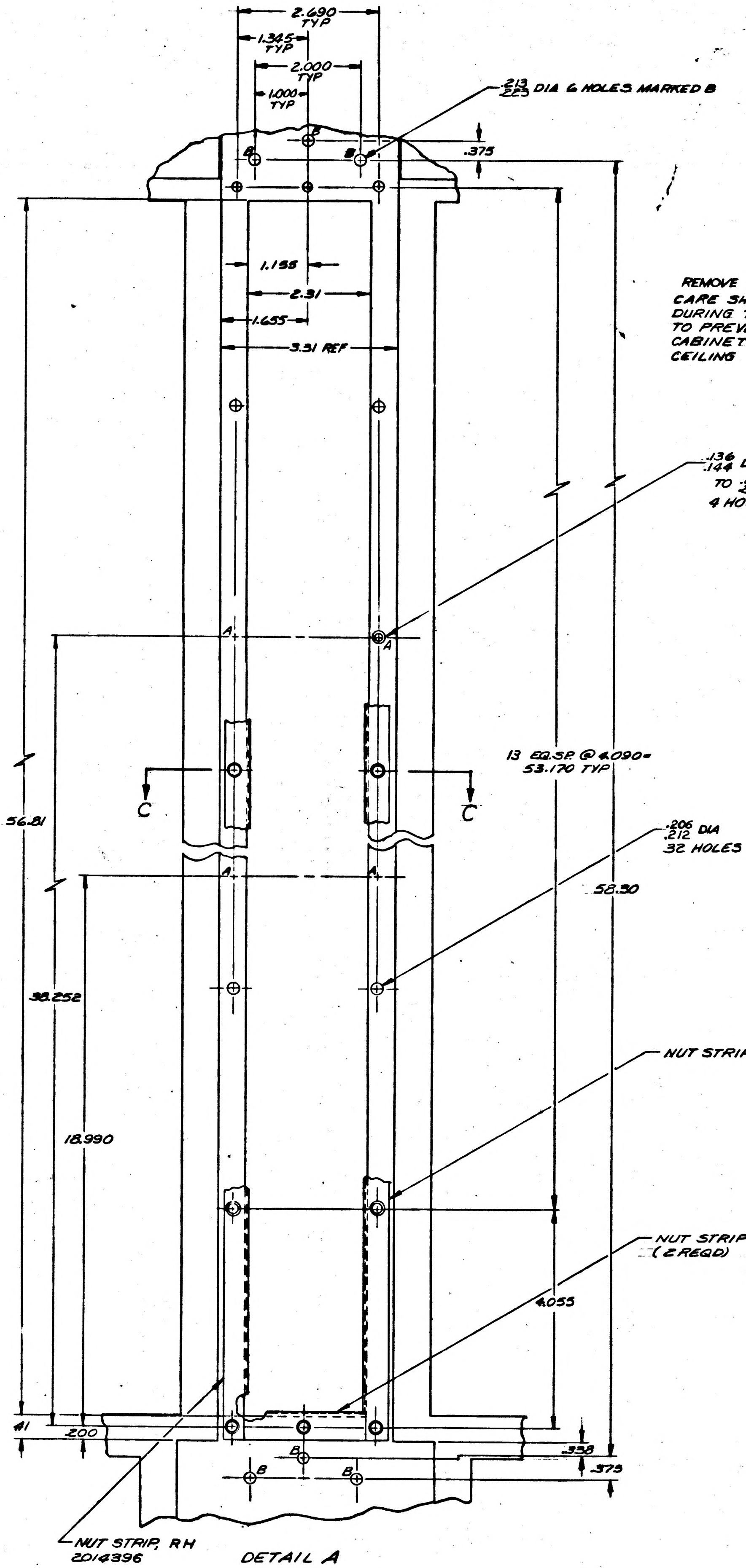
VIEW B-B
SEE SHEET 1



16.13
16.11 REF
4.02
3.98 TYP REF
1.07
1.05 REF
64.83
64.79
REF
FRONT REF
2.33
2.29
REF
BOTTOM REF
A

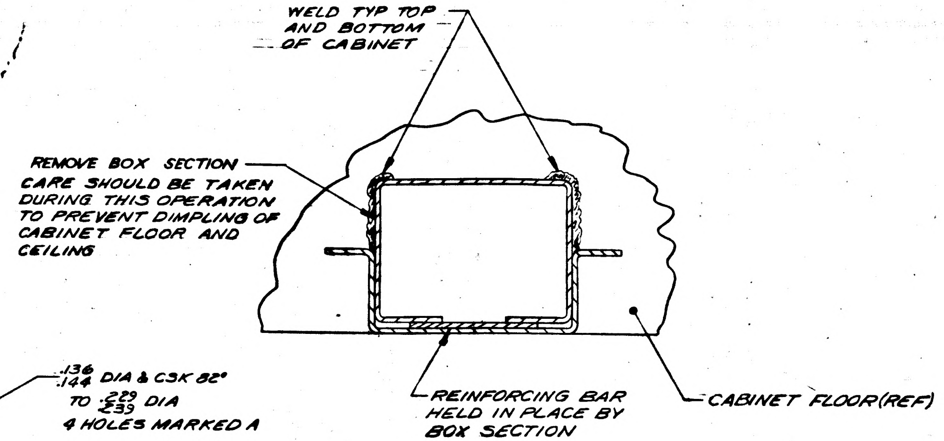
ALL HOLES MARKED "A" TO BE LEFT OPEN
ALL OTHER TO BE COVERED WITH REMOVABLE SNAP TYPE PLUGS

VIEW A-A
SEE SHEET 1



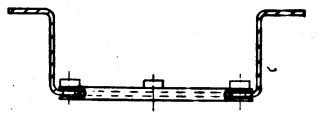
2.690
TYP
1.345
TYP
2.000
TYP
1.000
TYP
.213
.223 DIA 6 HOLES MARKED B
.375
1.155
2.31
1.655
3.31 REF
.136
.144 DIA & CSK 82°
TO .229
.239 DIA
4 HOLES MARKED A
13 EQ.SP. @ 4.090=
53.170 TYP
C
C
56.81
.206
.212 DIA
32 HOLES
58.30
38.252
18.990
NUT STRIP, LH 2014395
NUT STRIP 2014397
(2 REQD)
4.055
.41
.200
.358
.375
A
B
NUT STRIP, RH
2014396

DETAIL A
SEE SHEET 1
STEP 3

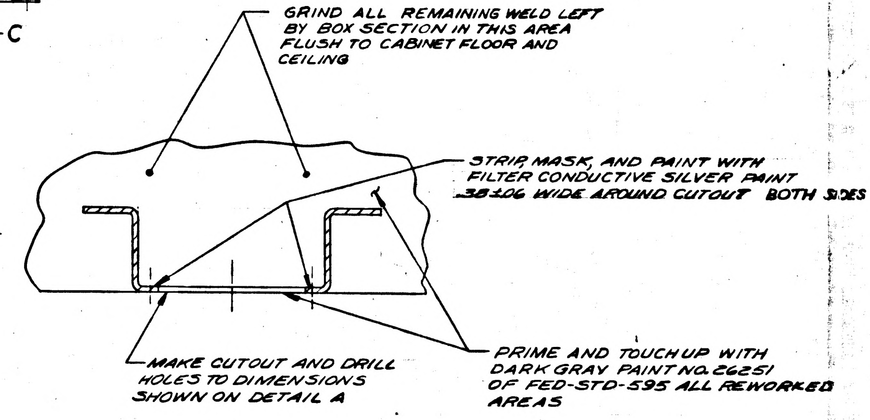


WELD TYP TOP AND BOTTOM OF CABINET
REMOVE BOX SECTION CARE SHOULD BE TAKEN DURING THIS OPERATION TO PREVENT DIMPLING OF CABINET FLOOR AND CEILING
REINFORCING BAR HELD IN PLACE BY BOX SECTION
CABINET FLOOR (REF)

SECTION E-E
STEP 1

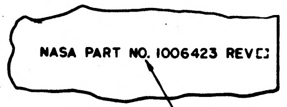


SECTION C-C



GRIND ALL REMAINING WELD LEFT BY BOX SECTION IN THIS AREA FLUSH TO CABINET FLOOR AND CEILING
STRIP, MASK, AND PAINT WITH FILTER CONDUCTIVE SILVER PAINT .38±.06 WIDE AROUND CUTOUT BOTH SIDES
MAKE CUTOUT AND DRILL HOLES TO DIMENSIONS SHOWN ON DETAIL A
PRIME AND TOUCH UP WITH DARK GRAY PAINT NO. 26251 OF FED-STD-595 ALL REWORKED AREAS

STEP 2



NASA PART NO. 1006423 REV[]

VIEW D-D

MARK .19 HIGH NORMAL GOTHIC CHARACTERS PER ND 1002019 ON INSIDE SURFACE NEAR (BUT NOT ON) REAR DOOR USING BLK INK 1006271-10

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 DECIMALS .XXX ±.005 ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN [illegible] DATE 25 OCT 65
CHECKED E. Urban 3 NOV 65
APPROVAL [illegible]
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible] 3/25/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

NSTRUCTION DRAWING
KIT LIST NO. 8104070
OMPUTER TEST SET

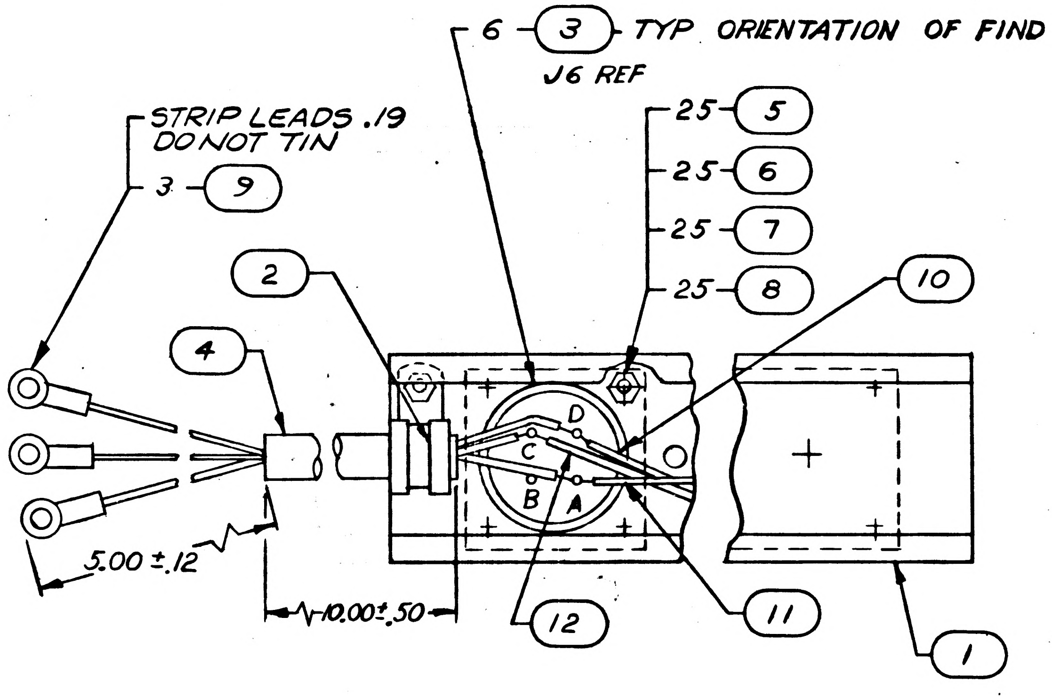
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016326
SCALE
WT
SHEET 2 OF 2

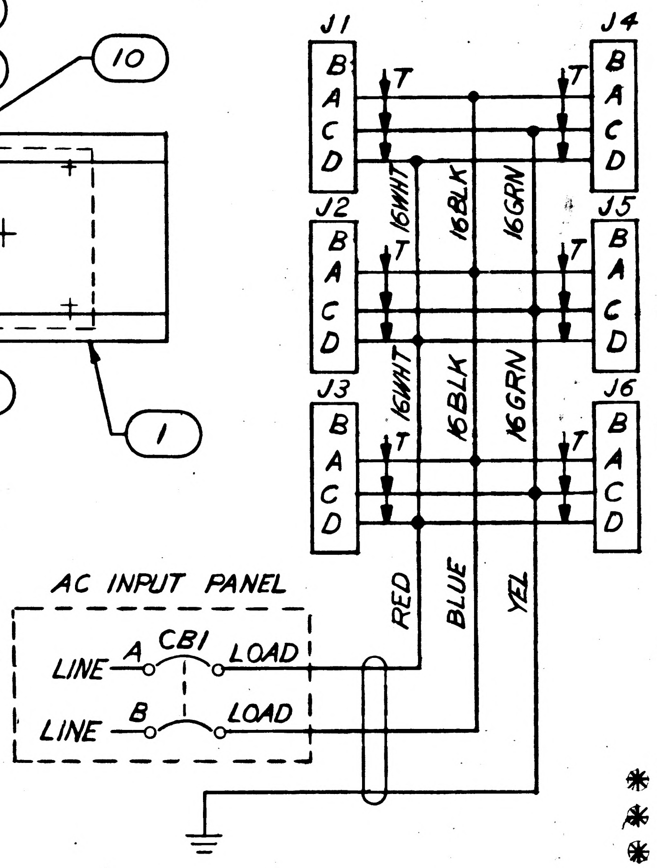
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

2016332 -

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASE PER TDRR 24660		


6 (3) TYP ORIENTATION OF FIND 3
J6 REF
STRIP LEADS .19
DO NOT TIN
3 (9)
25 (5)
25 (6)
25 (7)
25 (8)
(2)
(4)
(10)
D
C
B
A
5.00 ±.12
10.00 ±.50
(12)
(11)
(1)


J1
J2
J3
J4
J5
J6
B
A
C
D
T
16WHT
16BLK
16GRN
AC INPUT PANEL
LINE
A
CB1
LOAD
B
RED
BLUE
YEL

SCHEMATIC DIAGRAM

NOTES

1. FOR FABRICATION SEE ND1002032
2. SOLDER PER ND1002071
3. CRIMP PER ND1002206
4. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH UNIT NUMBER OR SUB-ASSEMBLY DESIGNATIONS
6. STRIP LEADS .50±.06 & TIN PER ND1002071, UNLESS OTHERWISE SPECIFIED.

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
*	1.5	MIL-W-16878/4 E16 GRN	WIRE, ELECTRICAL	12
*	1.5	MIL-W-16878/4 E16 BLK	WIRE, ELECTRICAL	11
*	1.5	MIL-W-16878/4 E16 WHT	WIRE, ELECTRICAL	10
	3	MS25036-8	LUG, TERMINAL	9
	25	MS35649-44	NUT, HEX	8
	25	MS35338-78	WASHER, LOCK	7
	25	MS15795-804	WASHER, FLAT	6
	25	MS51957-15	SCREW, MACH, PAN HD	5
*	1.5	1006966-2	CABLE, ELECTRICAL	4
	6	MS3102A-20-4S	CONN, RECP	3
	1	MS21919 DG-6	CLAMP, CUSHIONED	2
	1	2016336-001	BRACKET	1
	-011	LIST OF MATERIALS		

* DENOTES LENGTH IN FEET

NEXT ASSY	USED ON
2014059	
2014049	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .xx ±.03
DECIMALS .xxx ±
ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 9 DEC 65
CHECKED 10 Dec 65
APPROVAL 10 Dec 65
APPROVAL 12/10/65
APPROVAL 12/10/65
NASA APPROVAL A. C. METZGER
MIT APPROVAL 14 Dec 65
MIT APPROVAL 12/10/65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BRACKET ASSEMBLY
AC CONNECTOR

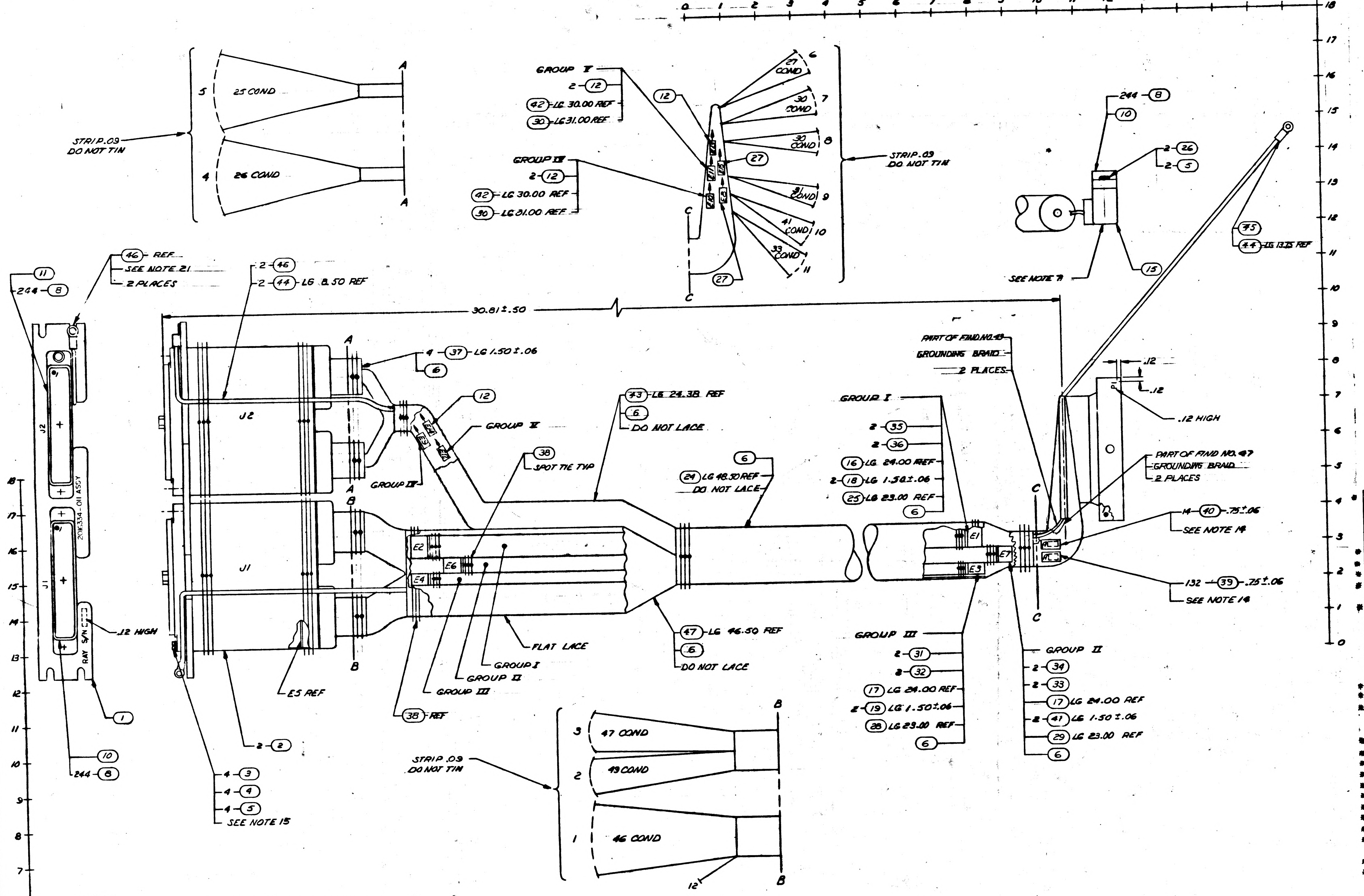
SIZE C
CODE IDENT NO. 49956
NASA DRAWING NO. 2016332
SCALE 1/1
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MODERN BLUE PRINT CO., INC. 02089

2016334 E

SYM	DESCRIPTION	DATE	APPROVED
E	CLASS A RELEASED PER TDRR 27699		



STRIP .09
DO NOT TIN
5 25 COND
4 26 COND
A
GROUP II
2-(12)
(42)-LG 30.00 REF
(30)-LG 31.00 REF
GROUP III
2-(12)
(42)-LG 30.00 REF
(30)-LG 31.00 REF
(12)
(27)
27 COND 6
30 COND 7
30 COND 8
31 COND 9
41 COND 10
33 COND 11
C
STRIP .09
DO NOT TIN
244-(8)
(10)
2-(26)
2-(5)
(45)
(44)-LG 13.25 REF
(15)
SEE NOTE 7
(11)
244-(8)
(46)-REF
SEE NOTE 21
2 PLACES
2-(46)
2-(44)-LG 8.50 REF
30.81±.50
4-(37)-LG 1.50±.06
(6)
(12)
GROUP II
GROUP III
(43)-LG 24.38 REF
(6)
DO NOT LACE
(38)
SPOT TIE TYP
J2
J1
20W334-011 ASSY
RAY S/N
.12 HIGH
(6)
(24) LG 48.50 REF
DO NOT LACE
E2
E6
E4
E5 REF
E1
E3
E7
GROUP I
2-(35)
2-(36)
(16) LG 24.00 REF
2-(18) LG 1.50±.06
(25) LG 23.00 REF
(6)
PART OF FIND NO.47
GROUNDING BRAID
2 PLACES
.12
.12
.12 HIGH
PART OF FIND NO. 47
GROUNDING BRAID
2 PLACES
14-(40)-.75±.06
SEE NOTE 14
132-(39)-.75±.06
SEE NOTE 14
(47)-LG 46.50 REF
(6)
DO NOT LACE
FLAT LACE
GROUP I
GROUP II
GROUP III
(38)-REF
GROUP III
2-(31)
2-(32)
(17) LG 24.00 REF
2-(19) LG 1.50±.06
(28) LG 23.00 REF
(6)
GROUP II
2-(34)
2-(33)
(17) LG 24.00 REF
2-(41) LG 1.50±.06
(29) LG 23.00 REF
(6)
(1)
(10)
244-(8)
2-(2)
4-(3)
4-(4)
4-(5)
SEE NOTE 15
B
STRIP .09
DO NOT TIN
3 47 COND
2 49 COND
1 46 COND
12

NOTES
1. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
2. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING WHITE INK 1006271-1
3. CRIMP PER ND1002206
4. SOLDER PER ND1002071
5. FABRICATE PER ND1002032, EXCEPT USE FIND NO. 38
6. SERIALIZE PER ND1002023
7. FILL USING FIND NO. 9 PER ND1002009, METHOD E AND PRIME
8. QQ-B-575 FOR FIND NO. 16 BRAID SIZE 1/2 AWG 34, FOR FIND NO. 17 BRAID SIZE 3/8 AWG 34, FOR FIND NO. 42 BRAID SIZE 11/64 AWG 34
9. MIL-W-16878/4 E22 WHT & BLK TWISTED, SHIELDED, WHT TFE OUTER JACKET
10. MIL-I-23053 CLASS 1, COLOR BLK FOR FIND NO. 18 SIZE .750 I.D. FOR FIND NO. 19 COLOR BLACK SIZE .375 I.D. FOR FIND NO. 39 COLOR WHITE SIZE .125 I.D., FOR FIND 41 COLOR BLK SIZE .500 I.D., FOR FIND NO. 40 COLOR WHT SIZE .187 I.D.
11. AR DENOTES AS REQUIRED
~~12. MIL-I-631, TYPE F, FORM U2, GRADE 2, CLASS 1 CATEGORY 1 FOR FIND NO. 30 SIZE AWG 8 FOR FIND NO. 37 SIZE 1.00 I.D.~~
13. CUT SLEEVING & SHLD LENGTHS AS SHOWN
14. MARK COND IDENT PER ND1002019
15. DISCARD HARDWARE SUPPLIED WITH FIND NO. 2 & REPLACE WITH FIND NO. 3, 4 & 5
16. STRIP .50±.06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED
17. LACE ENTIRE HARNESS CONFIGURATION UNLESS OTHERWISE SPECIFIED
18. ND1002155, TYPE III WITH Z TYPE TRACK AND .003 ±.001 ALUMINUM FOIL, ID 1 5/8 FOR FIND 47, ID 3/4 FOR FIND NO. 43
19. ZIPPER TUBING MUST BE CUT TO PROVIDE A SUFFICIENT GROUNDING BRAID AT EACH END
20. MIL-I-631, TYPE F, FORM U2, GRADE 2, CLASS 1, CATEGORY 1, COLOR BLK, AWG SIZE NO. 4
21. TO BE ATTACHED AT FINAL ASSY

✱ DENOTES LENGTH IN FEET

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
✱ 3.9	SEE NOTE 18	ZIPPER TUBING, PLASTIC	47
2	MS25036-53	TERMINAL LUG	46
1	MS25036-12	TERMINAL LUG	45
2.7	SEE NOTE 20	INSULATION, ELEC	44
4.0	SEE NOTE 18	ZIPPER TUBING, PLASTIC	43
✱ 3.0	SEE NOTE 8	WIRE BRAID	42
✱ 0.3	SEE NOTE 10	SLEEVING	41
✱ 1.0	SEE NOTE 10	SLEEVING	40
✱ 9.0	SEE NOTE 10	SLEEVING	39
AR	1006458-004	TAPE, LACING	38
✱ 0.5	1006696-7	SLEEVING	37
2	1000243-41	FERRULE, ELEC COND	36
2	1000242-37		35
2	1000243-34		34
2	1000242-30		33
2	1000243-22		32
2	1000242-29	FERRULE, ELEC COND	31
✱ 5.2	1006696-1	SLEEVING	30
✱ 2.0	1006696-3	SLEEVING	29
✱ 2.0	1006696-2	SLEEVING	28
2	1010402-1	SLEEVE, SOLDER	27
2	MS51957-17	SCREW, PAN HEAD	26
✱ 2.0	1006696-4	SLEEVING	25
✱ 1.4	1006696-10	SLEEVING	24
✱ 16.0	MIL-W-16878/4E24	WIRE ELEC, BLU	23
✱ 16.0	MIL-W-16878/4E24	WIRE ELEC, GRN	22
✱ 7.5	MIL-W-16878/4 E24	WIRE ELEC, WHT	21
✱ 176	1014341-12	WIRE ELEC, TWISTED	20
✱ 0.5	SEE NOTE 10	SLEEVING	19
✱ 0.3	SEE NOTE 10	SLEEVING	18
✱ 4.0	SEE NOTE 8	WIRE BRAID	17
✱ 20	SEE NOTE 8	WIRE BRAID	16
1	1006232-2	SHELL, POTTING ELEC CONNECTOR	15
✱ 3.0	SEE NOTE 9	WIRE, ELEC, TW PR	14
✱ 30	MIL-W-16878/4 E22	WIRE, ELEC, WHT	13
6	1010402-3	SLEEVE, SOLDER	12
1	1010816-244	CONNECTOR	11
2	1010816-144	CONNECTOR	10
AR	1006683	COMPOUND, SILICONE RUBBER	9
732	1010738-2	CONTACT, ELECT	8
✱ 20	MIL-W-16878/4,E24	WIRE ELECT, BLK	7
AR	1006699	SOLVENT	6
6	MS15795-803	WASHER, FLAT	5
4	MS35337-78	WASHER, LOCK	4
4	MS51957-20	SCREW, PAN HD	3
2	1006225-2	SHELL, ELEC CONN	2
1	2016335	BRACKET, ADAPTER	
-011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2014255	
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.03
DECIMALS .XXX ±
ANGLES ±

MATERIAL

RAYTHEON CO.
LEXINGTON MASS.
CONTRACT NO. NAS 9-497
DRAWN R. [illegible] DATE 11 MAR 66
CHECKED [illegible] 15 MAR 66
APPROVAL [illegible] 15 MAR 66
APPROVAL [illegible] 15 MAR 66
APPROVAL [illegible] 15 MAR 66
NASA APPROVAL C. METZGER
MIT APPROVAL [illegible] 4-66
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/PSA/SC ADAPTER ASSY

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016334
SCALE 1/1
WT
SHEET 1 OF

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

2016334 E

SYM	DESCRIPTION	DATE	APPROVED
E	CLASS A RELEASED PER TDRR 27099		

ASSEMBLY INFORMATION CHART

REMARKS	COND IDENT	FROM STA NO.	FROM DES	COLOR	AWG	FIND NO.	TO STA NO.	TO DES	REMARKS
	A1	3	J1-210	WHT	24	20	11	P1-210	
			211	BLK				211	
	A2		175	WHT				175	
			176	BLK				176	
	A3		142	WHT				142	
			143	BLK				143	
	A4		109	WHT				109	
			110	BLK				110	
	A5		76	WHT				76	
			77	BLK				77	
	A6		41	WHT				41	
			42	BLK				42	
	A7		4	WHT				4	
			5	BLK				5	
	A8		212	WHT			11	212	
			213	BLK			10	213	
	A9		177	WHT			11	177	
			178	BLK			11	178	
	A10		144	WHT			11	144	
			145	BLK			10	145	
	A11		111	WHT			11	111	
			112	BLK			11	112	
	A12		78	WHT			11	78	
			79	BLK			10	79	
	A13		43	WHT			11	43	
			44	BLK			11	44	
	A14		6	WHT			11	6	
			7	BLK			10	7	GROUP I
	A15	3	214	WHT				214	
		2	215	BLK				215	
	A16	3	179	WHT				179	
		3	180	BLK				180	
	A17	3	146	WHT				146	
		2	147	BLK				147	
	A18	3	113	WHT				113	
		3	114	BLK				114	
	A19	3	80	WHT				80	
		2	81	BLK				81	
	A20	3	45	WHT				45	
		3	46	BLK				46	
	A21	3	8	WHT				8	
		2	9	BLK				9	
	A22		216	WHT				216	
			217	BLK				217	
	A23		181	WHT				181	
			182	BLK				182	
	A24		148	WHT				148	
			149	BLK				149	
	A25		115	WHT				115	
			116	BLK				116	
	A26		82	WHT				82	
			83	BLK				83	
	A27		47	WHT		20		47	
		2	48	BLK			10	48	
	A28	3	3	WHT		21	11	3	
	A29	3	141	WHT		21	11	141	
	A30	3	J1-209	WHT	24	21	11	P1-209	
			E2	SHLD				E1	
	A31	3	J1-107	BLK	24	7	△1	E2	
	A32		E1	BLK	24	7	11	P1-107	
	A33	2	J1-11	WHT	24	21	10	P1-11	
	A34		218	WHT		20	10	218	
			219	BLK			9	219	
	A35		183	WHT			10	183	
			184	BLK			10	184	
	A36		150	WHT			10	150	
			151	BLK			9	151	
	A37		117	WHT			10	117	
			118	BLK			10	118	
	A38		84	WHT			10	84	GROUP II
			85	BLK			9	85	
	A39		49	WHT			10	49	
			50	BLK			10	50	
	A40		220	WHT			9	220	
			221	BLK				221	
	A41		185	WHT				185	
			186	BLK				186	
	A42		51	WHT		20		51	
			52	BLK			9	52	
	A43	2	J1-10	WHT	24	21	10	P1-10	
			E6	SHLD				E7	
	A44	2	J1-187	BLK	24	7	△1	E6	
	A45		E7	BLK	24	7	9	P1-187	

△1 DENOTES INTERNAL CONNECTION
△2 STRIP .09 DO NOT TIN

ASSEMBLY INFORMATION CHART

REMARKS	COND IDENT	FROM STA NO.	FROM DES	COLOR	AWG	FIND NO.	TO STA NO.	TO DES	REMARKS
TWIST	A46	4	J2-193	BLU	24	23	7	P1-131	
			192	GRN		22		164	
			230	WHT		21		165	
TWIST	A47		233	BLU		23		163	
			232	GRN		22		197	
			195	WHT		21		198	
TWIST	A48		198	BLU		23		97	
			197	GRN		22		98	
			235	WHT		21		130	
TWIST	A49		237	BLU		23		99	
			238	GRN		22		100	
			200	BLK		7	7	132	
TWIST	A50		227	BLU		23	6	103	
			228	GRN		22	6	104	
		4	J2-190	WHT	24	21	6	P1-136	
	A51	1	J1-232	WHT	24	21	9	P1-188	
	A52		22					189	
	A53		59					155	
	A54		227					119	
	A55		93					87	
	A56	1	24					120	
	A57	2	88					88	
	A58	1	127					54	
	A59	2	121					86	
	A60	1	90					55	GROUP III
	A61	1	26					121	
	A62	2	17					122	
	A63	2	119					152	
	A64	2	188					153	
	A65	1	228					154	
	A66	1	162				9	19	
	A67	1	20				8	20	
	A68	1	J1-231	WHT	24	21	9	P1-222	
			E4	SHLD				E3	
	A69	12	E5	BLK	24	7	△1	E4	
	A70		E3	BLK	24	7	9	P1-89	
	A71	1	J1-190	WHT	24	20	8	P1-190	
			191	BLK				191	
	A72		192	WHT				192	
			193	BLK				193	
	A73		194	WHT			8	194	
			195	BLK			7	195	
	A74		123	WHT			8	123	
			124	BLK				124	
	A75		125	WHT				125	
		1	126	BLK				126	
	A76	2	222	WHT				228	
		2	223	BLK			8	229	
	A77	1	91	WHT			7	127	
		1	92	BLK			7	161	
	A78	2	152	WHT			8	24	
			153	BLK			8	25	
	A79		154	WHT			8	26	
		2	155	BLK			7	27	
	A80	1	98	WHT			8	90	
			99	BLK			8	91	
	A81		34	WHT			8	94	
		1	35	BLK			7	95	
	A82	2	224	WHT			9	224	
		1	226	BLK			8	226	
	A83		102	WHT			9	16	
			103	BLK			9	18	
	A84		96	WHT			8	58	
			97	BLK				59	
	A85		196	WHT				22	
			197	BLK				23	
	A86		170	WHT				57	
			171	BLK				93	
	A87		198	WHT			8	60	
			199	BLK			7	61	
	A88		166	WHT			8	230	
			167	BLK			8	231	
	A89		168	WHT			8	-232	
		1	J1-169	BLK			7	233	
	A90	5	J2-107	WHT			7	166	
			139	BLK			6	167	
	A91		141	WHT			7	199	
			142	BLK			7	200	
	A92		113	WHT		20	6	201	
		5	J2-114	BLK			6	P1-202	
△2	A93	△1	J1-61	BLK		7	△1	E5	
	A94		233					E5	
	A95		23					E5	
△2	A96	△1	J1-58	BLK	24	7	△1	E5	

ASSEMBLY INFORMATION CHART

REMARKS	COND IDENT	FROM STA NO.	FROM DES	COLOR	AWG	FIND NO.	TO STA NO.	TO DES	REMARKS
	A97	5	J2-144	WHT	24	20	6	P1-168	
			-111	BLK				169	
	A98		110	WHT				170	
			148	BLK				171	
	A99		-150	WHT				203	
			-151	BLK				204	
	A100		153	WHT				243	
		5	120	BLK				242	
	A101	4	240	WHT				240	
			241	BLK				241	
	A102		38	WHT			6	P1-101	
			37	BLK			△1	E15	
	A103		72	WHT		20	6	P1-102	
		4	J2-71	BLK			△1	E15	
	A104	△1	E15	BLK		7	6	P1-134	
	A105	1	J1-100	WHT		20	8	P1-92	
		1	J1-101	BLK			△1	E8	
	A106	△1	E8	BLK		7	7	P1-62	
TWIST	A107	4	J2-206	BLK		7	△1	E8	
		4	J2-244	BLU		23	7	P1-28	
		4	J2-243	GRN		22	7	P1-63	
		4	J2-171	WHT	24	21	7	P1-96	
	A108	3	J1-40		22	13	11	P1-40	
	A109		39					P1-39	
	A110		108					P1-108	
	A111		173					P1-173	
	A112	3	J1-174				11	P1-174	
TWIST	A113	5	J2-1				7	P1-66	
	A114	5	J2-39				7	P1-31	
	A115	5	J2-40	WHT	22	13	7	P1-32	
		△1	E10	SHLD			△1	E9	GROUP IV
	A116	△1	E10	BLK	24	7	6	P1-67	
	A117	5	J2-2	BLK	24	7	△1	E9	
TWIST	A118	5	J2-6	WHT	22	13	6	P1-33	
	A119	5	J2-43	WHT	22	13	6	P1-69	
	A120	5	J2-44	WHT	22	13	6	P1-68	GROUP V
		△1	E12	SHLD			△1	E11	
	A121	5	J2-5	BLK	24	7	△1	E12	
	A122	△1	E11	BLK	24	7	6	P1-34	
	A123	5	J2-48	BLK	22	14	6	P1-36	
		5	J2-10	WHT	22		6	P1-35	
		△1	E14	SHLD			△1	E13	
	A124	5	J2-11	BLK	24	7	△1	E14	
	A125	△1	E13	BLK	24	7	6	P1-70	
	A126	4	J2-172	WHT	24	21	7	P1-29	
△2	A127	△1	J1-19	BLK	24	7	△1	E5	
	A128		225						
	A129		94						
	A130		25						
	A131		89						
	A132		128						
	A133		122						
	A134		95						
	A135		27						
	A136		120						
	A137		189						
	A138		229						
	A139		163						
	A140		21						
	A141		230						
△2	A142	△1	J1-156	BLK	24	7	△1	E5	

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN D. Smith DATE 12 MAR 66
CHECKED 15 MAR 66
APPROVAL 15 MAR 66
APPROVAL 15 MAR 66
APPROVAL 15 MAR 66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/PSA/SC ADAPTER ASSY

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016334
SCALE NONE
WT
SHEET 2 OF 3

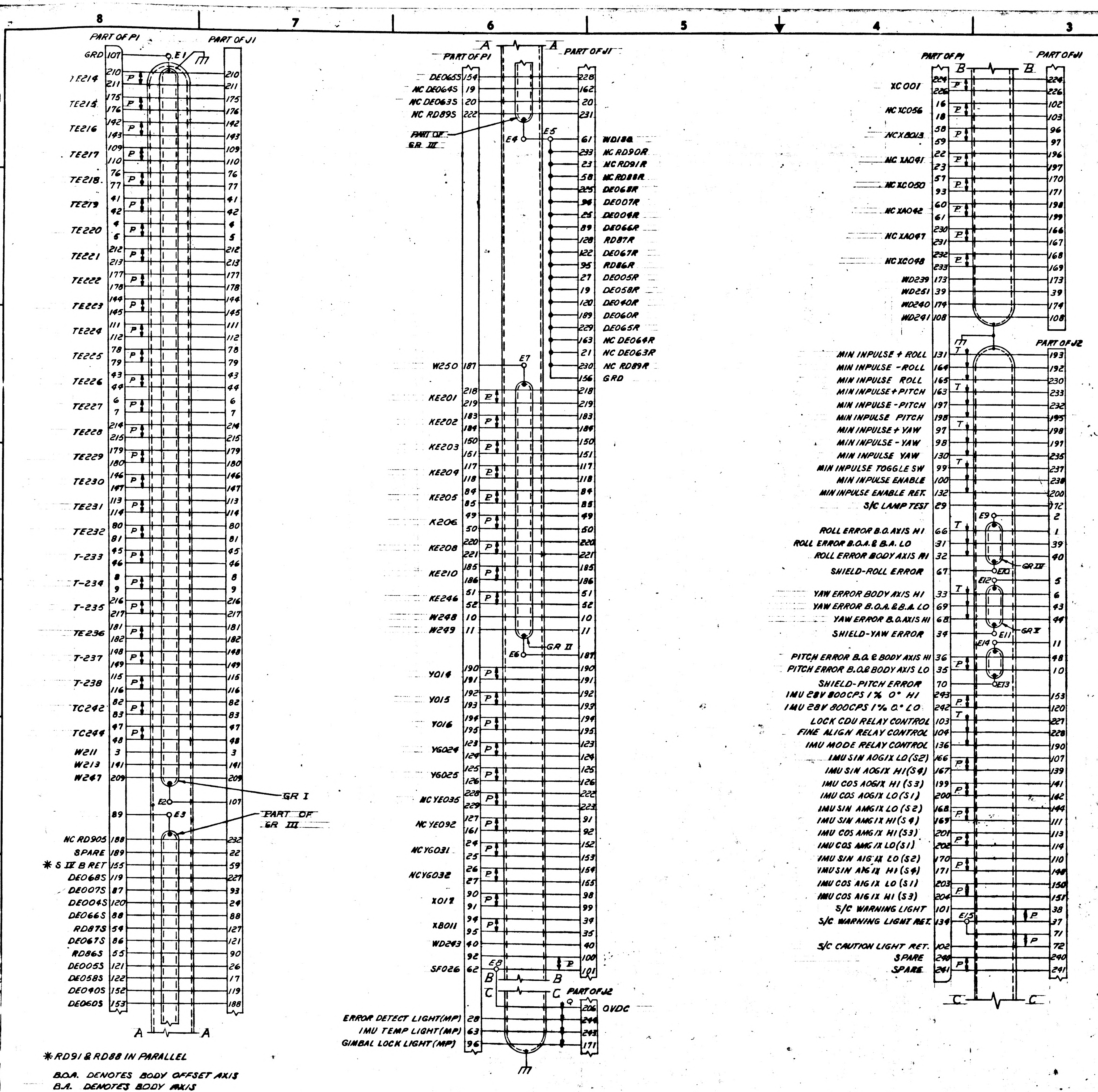
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

2016334 E

2016334 E

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
E	CLASS A RELEASED PER TDRR 27699	4-4	



PART OF P1
PART OF J1
GRD 107
E1
TE214
TE215
TE216
TE217
TE218
TE219
TE220
TE221
TE222
TE223
TE224
TE225
TE226
TE227
TE228
TE229
TE230
TE231
TE232
T-233
T-234
T-235
TE236
T-237
T-238
TC242
TC244
W211
W213
W247
GR I
E2
E3
PART OF GR III
NC RD90S
SPARE
S IV B RET
DE068S
DE007S
DE004S
DE066S
RD87S
DE067S
RD86S
DE005S
DE058S
DE040S
DE060S
A
A
DE065S
NC DE064S
NC DE063S
NC RD89S
PART OF GR III
E4
E5
WD188
NC RD90R
NC RD91R
NC RD88R
DE068R
DE007R
DE004R
DE066R
RD87R
DE067R
RD86R
DE005R
DE058R
DE040R
DE060R
DE065R
NC DE064R
NC DE063R
NC RD89R
GRD
W250
E7
KE201
KE202
KE203
KE204
KE205
K206
KE208
KE210
KE246
W248
W249
GR II
E6
Y014
Y015
Y016
Y6024
Y6025
NC YE035
NC YE092
NC YG031
NC YG032
X012
X8011
WD243
SF026
E8
B
C
PART OF J2
0VDC
ERROR DETECT LIGHT(MP)
IMU TEMP LIGHT(MP)
GIMBAL LOCK LIGHT(MP)
XC001
NC XC056
NC XB013
NC XA091
NC XC050
NC XA042
NC XA097
NC XC098
WD239
WD251
WD240
WD241
MIN INPULSE + ROLL
MIN INPULSE - ROLL
MIN INPULSE ROLL
MIN INPULSE + PITCH
MIN INPULSE - PITCH
MIN INPULSE PITCH
MIN INPULSE + YAW
MIN INPULSE - YAW
MIN INPULSE YAW
MIN INPULSE TOGGLE SW
MIN INPULSE ENABLE
MIN INPULSE ENABLE RET.
S/C LAMP TEST
ROLL ERROR B.O. AXIS HI
ROLL ERROR B.O.A. & B.A. LO
ROLL ERROR BODY AXIS HI
SHIELD-ROLL ERROR
E9
E10
GR IV
YAW ERROR BODY AXIS HI
YAW ERROR B.O.A. & B.A. LO
YAW ERROR B.O. AXIS HI
SHIELD-YAW ERROR
E11
E12
GR V
PITCH ERROR B.O. & BODY AXIS HI
PITCH ERROR B.O.& BODY AXIS LO
SHIELD-PITCH ERROR
E13
E14
IMU 28V 800CPS 1% 0° HI
IMU 28V 800CPS 1% 0° LO
LOCK CDU RELAY CONTROL
FINE ALIGN RELAY CONTROL
IMU MODE RELAY CONTROL
IMU SIN AOGIX LO (S2)
IMU SIN AOGIX HI (S4)
IMU COS AOGIX HI (S3)
IMU COS AOGIX LO (S1)
IMU SIN AMGIX LO (S2)
IMU SIN AMGIX HI (S4)
IMU COS AMGIX HI (S3)
IMU COS AMGIX LO (S1)
IMU SIN AIGIX LO (S2)
IMU SIN AIGIX HI (S4)
IMU COS AIGIX LO (S1)
IMU COS AIGIX HI (S3)
S/C WARNING LIGHT
S/C WARNING LIGHT RET.
E15
S/C CAUTION LIGHT RET.
SPARE
SPARE
P
T

* RD91 & RD88 IN PARALLEL

B.O.A. DENOTES BODY OFFSET AXIS
B.A. DENOTES BODY AXIS

2016334 E

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN G. G. Bin DATE 11 MAR 66
CHECKED 15 MAR 66
APPROVAL 15 MAR 66
APPROVAL D. O'Bryant 15 MAR 66
APPROVAL M. J. Ban 15 MAR 66
C. METZGER
NASA APPROVAL
MIT APPROVAL M. G. Mosby 4-4-66
MIT APPROVAL A. Hasano 3-29-66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

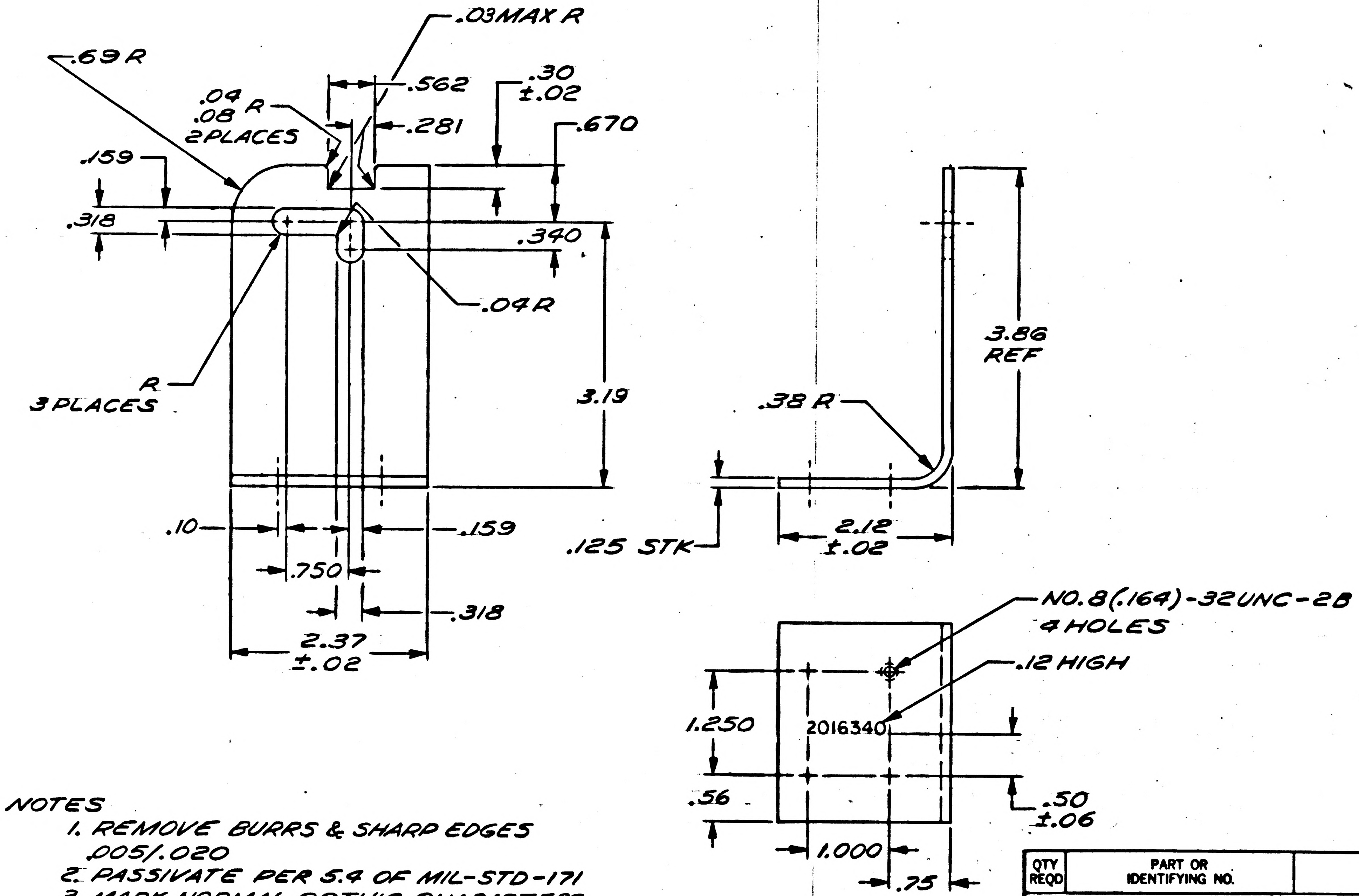
AGC/PSA/SC ADAPTER ASSY

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016334
SCALE NONE
WT
SHEET 3 OF 3

2016334 E

2016340 | —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
0	RELEASED PER CCA R25515		
—	CLASS A RELEASED PER TDRR 25472		



.03 MAX R
.69 R
.04 R
.08
2 PLACES
.562
.281
.30
±.02
.670
.159
.318
.340
.04 R
R
3 PLACES
3.19
.10
.159
.750
.318
2.37
±.02
3.86
REF
.38 R
.125 STK
2.12
±.02
NO. 8(.164)-32UNC-2B
4 HOLES
.12 HIGH
1.250
2016340
.56
.50
±.06
1.000
.75

NOTES

1. REMOVE BURRS & SHARP EDGES .005/.020
2. PASSIVATE PER 5.4 OF MIL-STD-171
3. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019, USING BLACK INK 1006271-10

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

2014366	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.01
DECIMALS .XXX ±.005
ANGLES ±

DO NOT SCALE DRAWING

MATERIAL
CRES, CLASS 302
COND A, FINISH 2B
SPEC QQ-S-766

RAYTHEON
RAYTHEON CO.
LEXINGTON, MASS.

CONTRACT NO. NAS 9-497
DRAWN [illegible] DATE 5 Nov 65
CHECKED [illegible] 11 Nov 65
APPROVAL [illegible] 12 Nov 65
APPROVAL [illegible] 11/12/65
APPROVAL [illegible] 11/12/65
NASA APPROVAL A. C. METZGER
MIT APPROVAL [illegible]
MIT APPROVAL C [illegible] 1/21/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BRACKET, R H
SELF TEST
COMPUTER TEST SET

SIZE	CODE IDENT NO.	NASA DRAWING NO.
C	49956	2016340

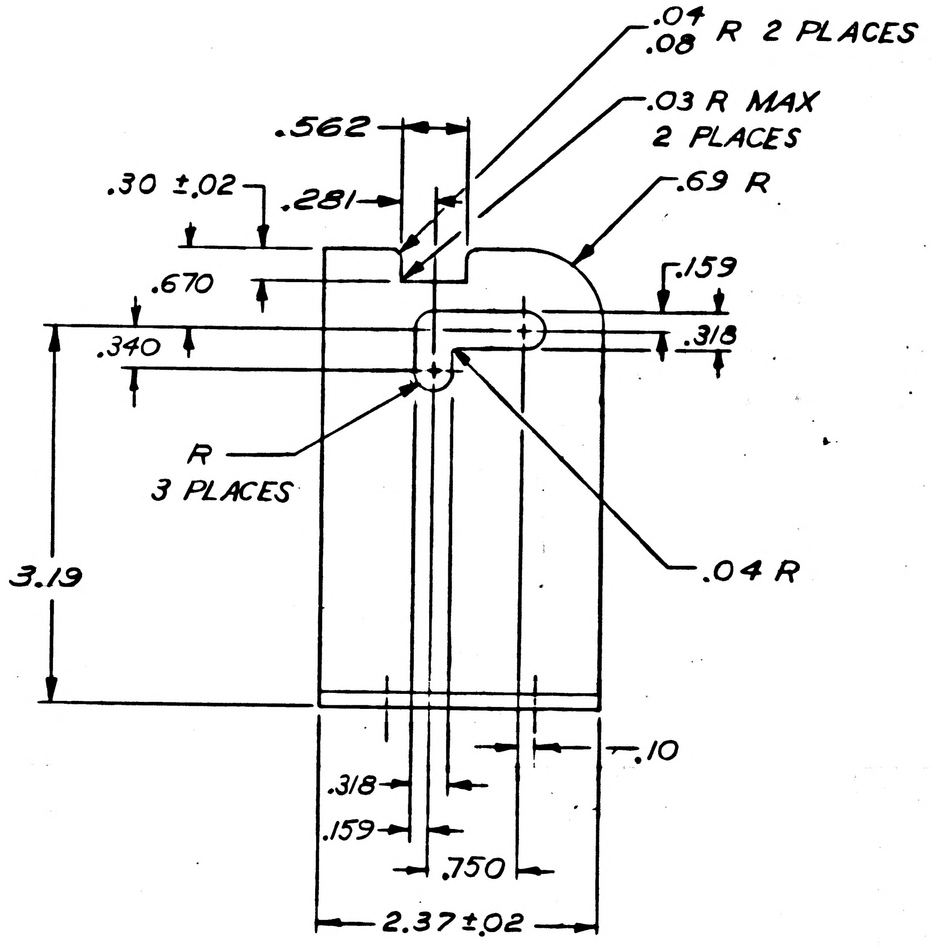
SCALE 1/1 | WT | SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

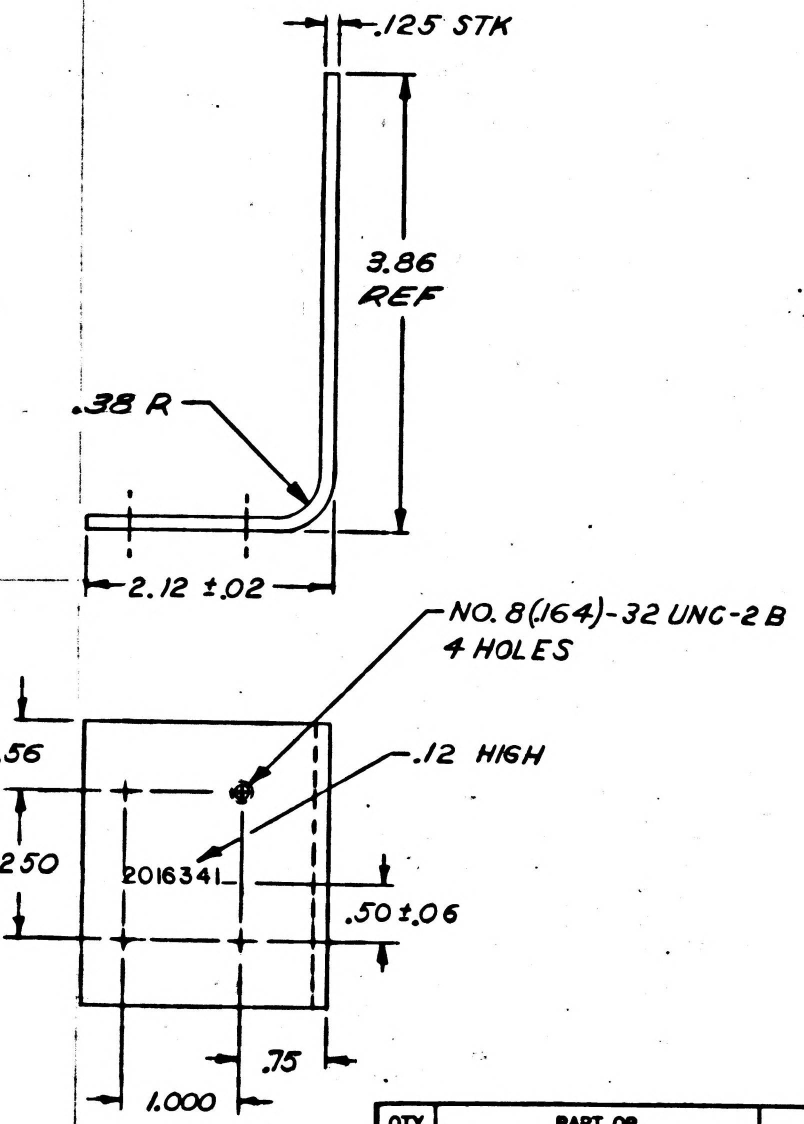
MODERN BLUE PRINT CO., INC. 02089

2016341 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
O	RELEASED PER CCA R25515		
—	CLASS A RELEASED PER TDRR 25472		



.04 / .08 R 2 PLACES
.03 R MAX 2 PLACES
.69 R
.562
.30 ±.02
.281
.670
.340
.159
.318
R 3 PLACES
.04 R
3.19
.10
.318
.159
.750
2.37±.02



.125 STK
3.86 REF
.38 R
2.12 ±.02
NO. 8(.164)-32 UNC-2B 4 HOLES
.12 HIGH
.56
1.250
2016341
.50±.06
.75
1.000

NOTES

1. REMOVE BURRS & SHARP EDGES .005/.020
2. PASSIVATE PER 5.4 OF MIL-STD-171
3. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006271-10

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

2014366	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON

DECIMALS .XX	DECIMALS .XXX	ANGLES ±
±.01	±.005	

DO NOT SCALE DRAWING

MATERIAL
CRES, CLASS 302
COND A FINISH 2B
SPEC QQ-S-766

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 6 NOV 65
CHECKED 11 Nov 65
APPROVAL 12 Nov 65
APPROVAL D. J. Bryant 11/12/65
APPROVAL 11/11/65
NASA APPROVAL A. C. METZGER
MIT APPROVAL 4 Jan 66
MIT APPROVAL C Sterling 1/24

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BRACKET, LH
SELF TEST
COMPUTER TEST SET

SIZE	CODE IDENT NO.	NASA DRAWING NO.
C	49956	2016341

SCALE 1/1 WT SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MODERN BLUE PRINT CO., INC. 02089

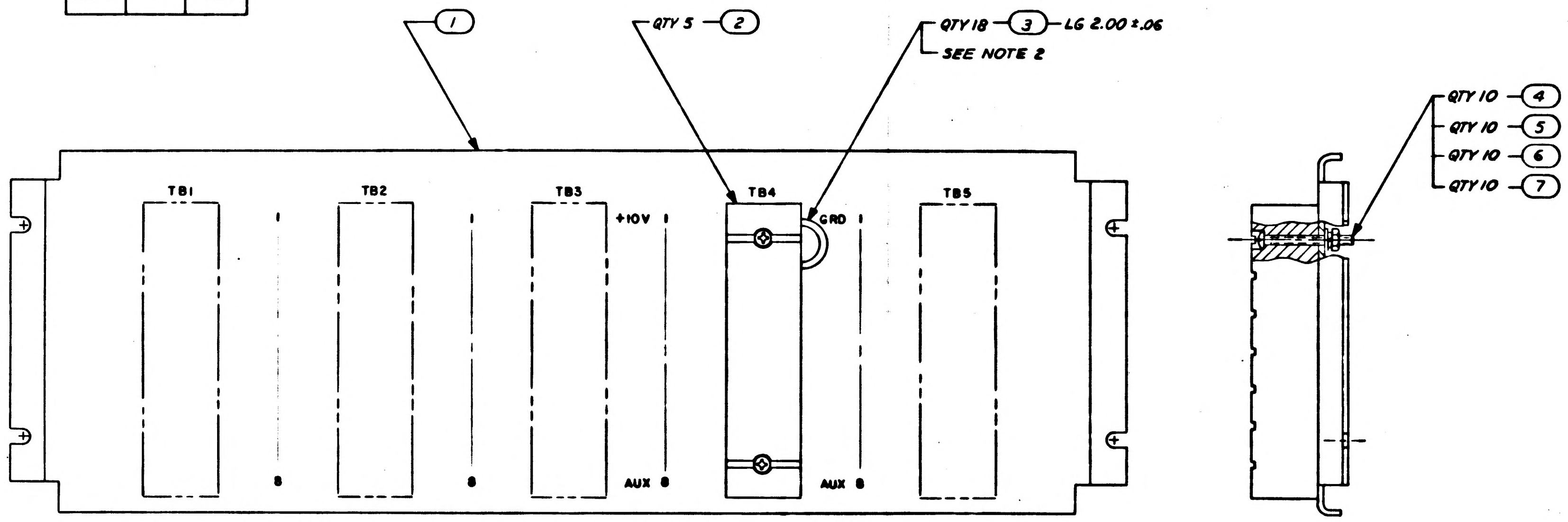
2016341 —

2016346 -

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
0	RELEASED PER CCA R25073		
-	CLASS A RELEASED PER TDRR 25472		

JUMPER LIST

TERM STRIP	FROM	TO
TB2	1	2
	2	3
	3	4
	4	5
	5	6
	6	7
	7	8
TB3	1	2
	2	3
	3	4
	4	5
TB4	1	2
	2	3
	3	4
	4	5
	5	6
TB5	1	2
	3	4



NOTES
1. MIL-W-16878/4, TYPE E-14, WHITE
2. STRIP LEADS .25±.06 BOTH ENDS & TIN PER ND1002071

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
10	MS35649-64	NUT, HEX	7
10	MS35338-79	WASHER, LOCK	6
10	MS15795-808	WASHER, FLAT	5
10	MS51957-36	SCREW, PAN HD, CROSS-RECESSED	4
* 3.5	SEE NOTE 1	WIRE, ELEC	3
5	1006859-7	BOARD, TERMINAL	2
1	2016345	BRACKET	1
-011	LIST OF MATERIALS		

* DENOTES LENGTH IN FEET

NEXT ASSY	USED ON
2014042	
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 21 DEC 65
CHECKED 28 DEC 65
APPROVAL 29 Dec 65
APPROVAL D. A. 1/4/66
APPROVAL 1/4/66
NASA APPROVAL A. C. METZGER
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TERMINAL BOARD ASSY

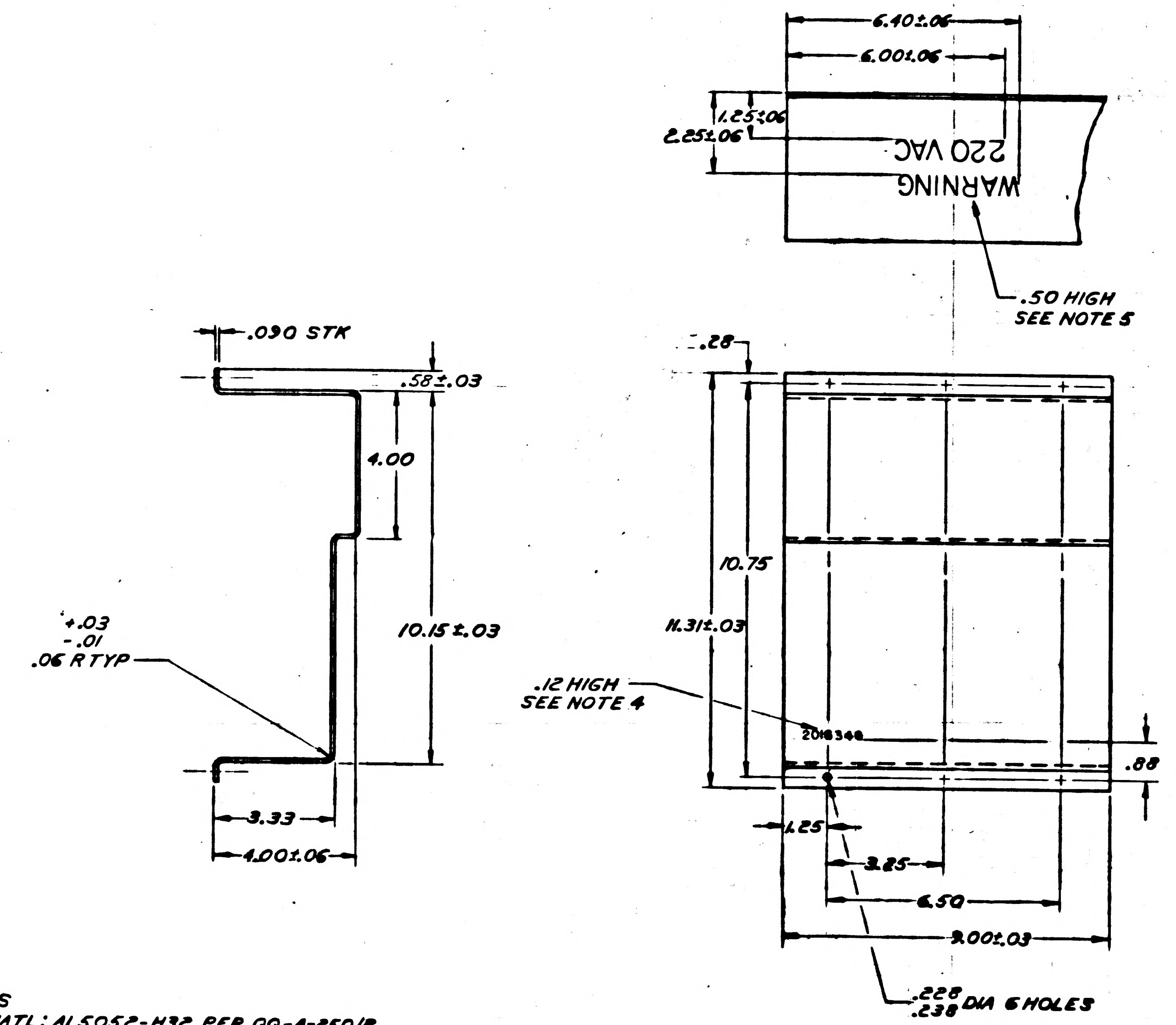
CODE IDENT NO. 49956
SIZE F
NASA DRAWING NO. 2016346
SCALE 1/1
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016346 -

-	2016348

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
0	RELEASED PER CCA R25729		
-	CLASS A RELEASED PER TDRR 25476		



6.40±.06
6.00±.06
1.25±.06
2.25±.06
WARNING
220 VAC
.50 HIGH
SEE NOTE 5
.030 STK
.58±.03
4.00
10.15±.03
+.03
-.01
.06 R TYP
3.33
4.00±.06
.28
10.75
11.31±.03
.12 HIGH
SEE NOTE 4
2016348
.88
1.25
3.25
6.50
9.00±.03
.228
.238 DIA 6 HOLES

NOTES
1. MATL: AL5052-H32 PER QQ-A-250/8
2. REMOVE BURRS & SHARP EDGES .005/.020
3. CHROMATE PER MIL-C-5541 EXCEPT TO BE ELEC COND
4. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006271-10
5. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING RED INK 1006271-8

2016348	-

MA TER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

2014302	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON

DECIMALS .XX	DECIMALS .XXX	ANGLES ±
±.02	±	

DO NOT SCALE DRAWING

MATERIAL
SEE NOTE 1

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 17 DEC 65
CHECKED 27 Dec '65
APPROVAL 29 Dec '65
APPROVAL 1/4/66
APPROVAL 1/5/66
NASA APPROVAL A. C. METZGER
MIT APPROVAL 21 Jan 66
MIT APPROVAL 1/7/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

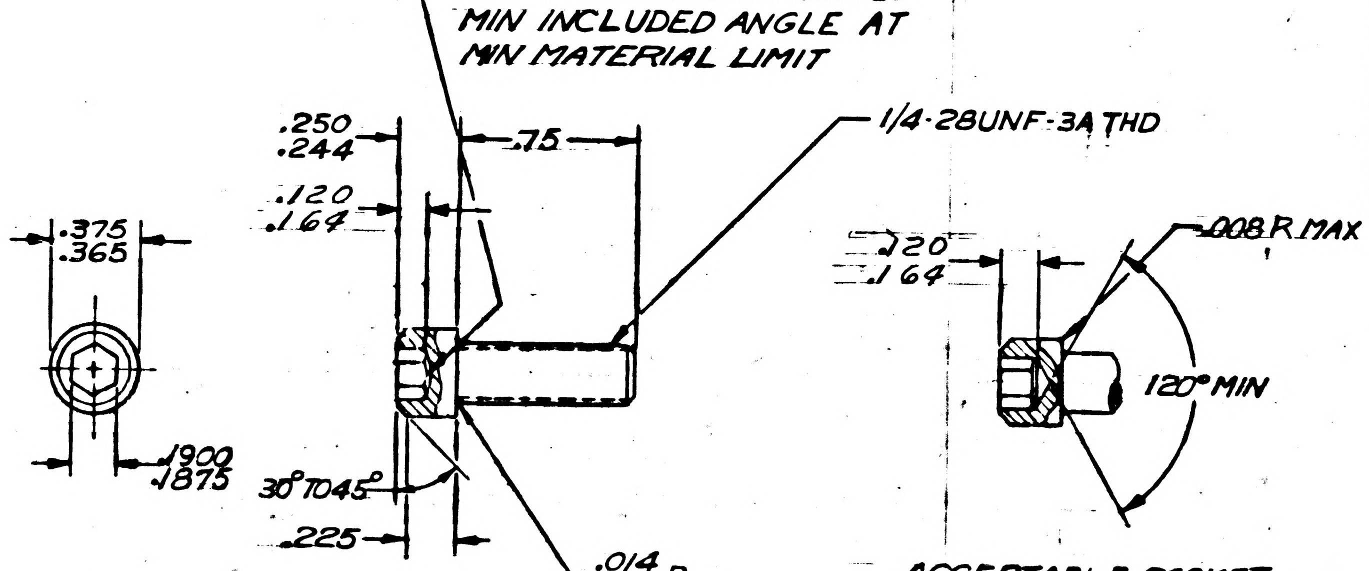
COVER

CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	D	2016348

SCALE 1/2 WT SHEET 1 OF 1

2016351 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 26676	2-26-66	MGM
A	CHANGED PER TDRR 27908 DR Q.J. Bison CHK C DeGrellis APPD RED	7/23/66	


FORM MUST BE WITHIN 120° MIN INCLUDED ANGLE AT MIN MATERIAL LIMIT
.250
.244
.75
1/4-28UNF-3A THD
.120
.164
.375
.365
.1900
.1875
30° TO 45°
.225
.014
.009 R
.120
.164
.008 R MAX
120° MIN

ACCEPTABLE SOCKET DESIGN

NOTES:

1. MATL: 416 CRES PER QQ-S-763, CLASS 416 COND H, (ROCKWELL C30 TO C36)
ALT: 410 CRES PER QQ-S-763, CLASS 410 COND H, (ROCKWELL C30 TO C36)
2. FINISH: PASSIVATE PER MIL-I-14072, E300. TYPE I,
~~SURFACE FINISH: 63~~
3. THREADS: THE THREADS SHALL BE IN ACCORDANCE WITH SPECIFICATION MIL-S-7742

2016351 A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1020001	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.01
DECIMALS .XXX ±.005
ANGLES ±
DO NOT SCALE DRAWING
MATERIAL
SEE NOTE 1

RAYTHEON
RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN Q.J. Bison DATE 21 JAN 66
CHECKED C DeGrellis 25 JAN 66
APPROVAL 4 FEB 66
APPROVAL D. O'Bryant 2/4/66
APPROVAL 1/ /66
NASA APPROVAL A. C. METZGER
MIT APPROVAL M G Mundy 2-26-66
MIT APPROVAL 4/21/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, SOCKET HEAD-HEXAGON

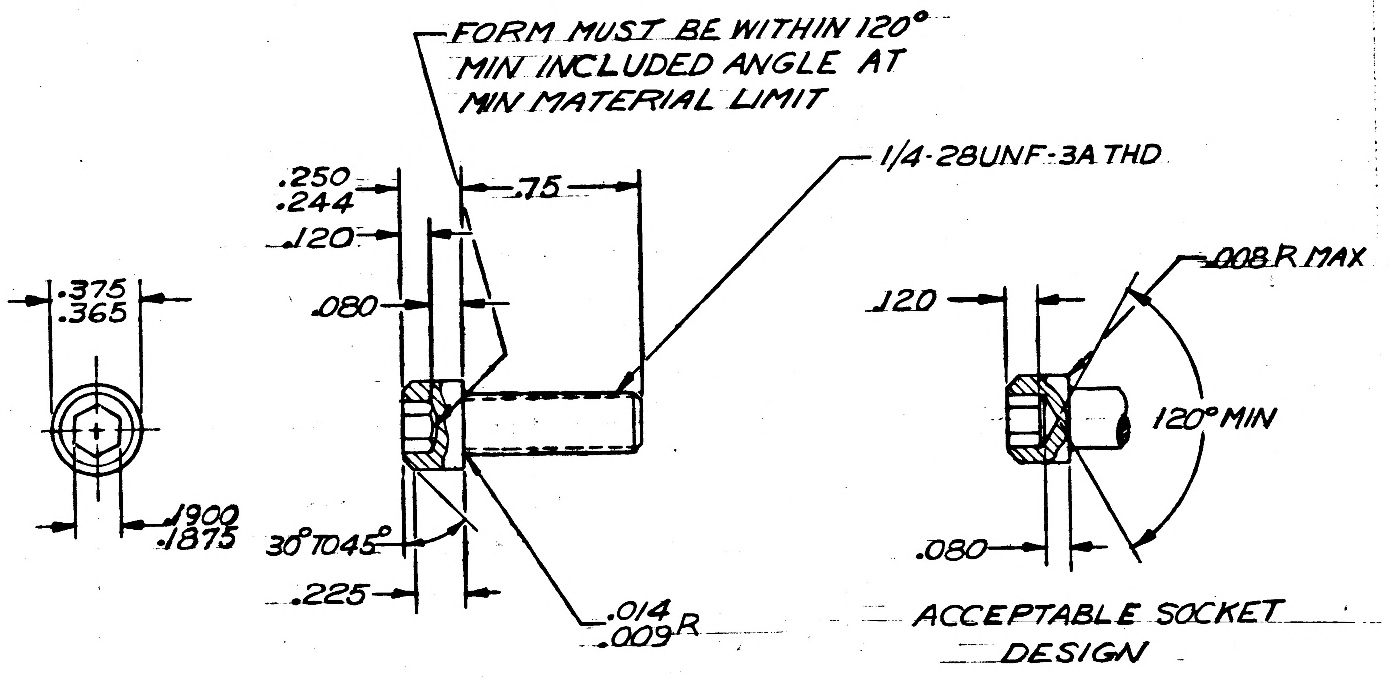
CODE IDENT NO. 49956
SIZE C
NASA DRAWING NO. 2016351
SCALE 2/1
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MODERN BLUE PRINT CO., INC.

— 2016351

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 26676	2-26-66	MGM



FORM MUST BE WITHIN 120° MIN INCLUDED ANGLE AT MIN MATERIAL LIMIT
1/4-28UNF-3A THD
.250
.244
.75
.120
.375
.365
.080
.1900
.1875
30° TO 45°
.225
.014
.009 R
.120
.008 R MAX
120° MIN
.080
ACCEPTABLE SOCKET DESIGN

NOTES:

1. MAT'L: 416 CRES PER QQ-S-763, CLASS 416 COND H, (ROCKWELL C30 TO C36)
   ALT: 410 CRES PER QQ-S-763, CLASS 410 COND H, (ROCKWELL C30 TO C36)
2. FINISH: PASSIVATE PER MIL-I-14072, E300 TYPE I,
   SURFACE FINISH: 63/
3. THREADS: THE THREADS SHALL BE IN ACCORDANCE WITH SPECIFICATION MIL-S-7742

2016351 —

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1020001	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

DECIMALS .xx	DECIMALS .xxx	ANGLES
±.01	±.005	±

DO NOT SCALE DRAWING

MATERIAL SEE NOTE 1

RAYTHEON CO.
LEXINGTON, MASS.

CONTRACT NO.

DRAWN J. Busco DATE 21 JAN 66

CHECKED C. DeHollmia 25 JAN 66

APPROVAL J. Frazier 4 FEB 66

APPROVAL D. O'Bryant 2/4/66

APPROVAL K E Brown 2/15/66

NASA APPROVAL A. C. METZGER

MIT APPROVAL M G Mundy 2-26-66

MIT APPROVAL A Harano 2/21/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, SOCKET HEAD-HEXAGON

CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	C	2016351

SCALE 2/1 WT SHEET 1 OF 1

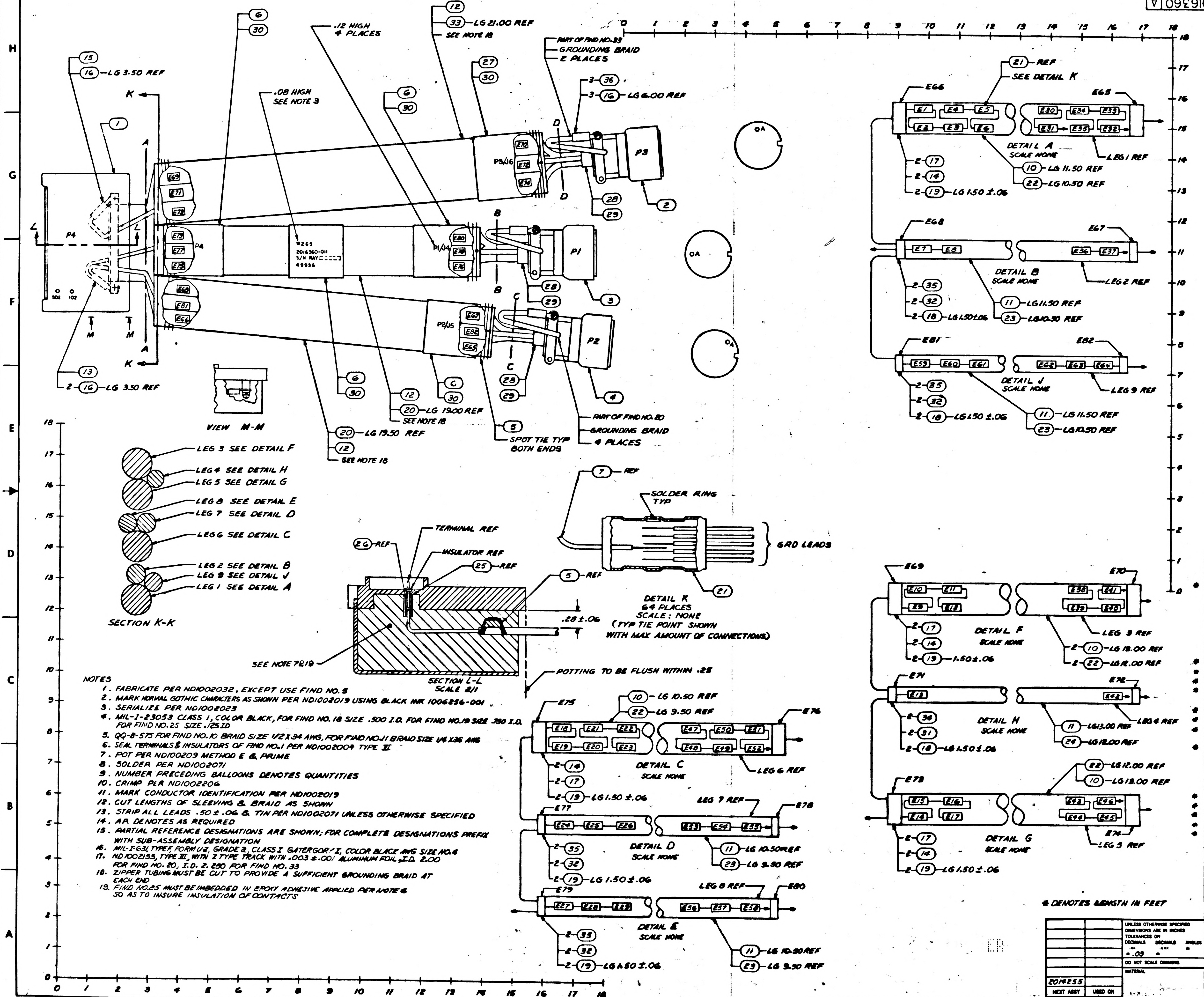
MS 4996-23

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MODERN BLUE PRINT CO., INC. 02620

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
—	CLASS A RELEASED PER TDRR 27699	7-1-66	
A	CHANGED PER TDRR 28263 DR. P. CHK APPD.	6 May	



(15)
(16)—LG 3.50 REF
K
(1)
A
L
P4
L
502 102
M
M
A
K
(13)
2-(16)—LG 3.50 REF
(6)
(30)
.08 HIGH
SEE NOTE 3
.12 HIGH
4 PLACES
(12)
(33)—LG 21.00 REF
SEE NOTE 18
(27)
(30)
(6)
(30)
PART OF FIND NO. 33
GROUNDING BRAID
2 PLACES
3-(36)
3-(16)—LG 6.00 REF
D
D
E69
E71
E73
E75
E77
E79
E80
E81
E66
P4
W265
2016360-011
S/N RAY
49956
P3/J6
E70
E72
E74
P3
(28)
(29)
(2)
P1/J4
E80
E78
E76
B
B
P1
(28)
(29)
(3)
C
C
P2/J5
E67
E82
E65
P2
(28)
(29)
(4)
(6)
(30)
(12)
(20)—LG 19.00 REF
SEE NOTE 18
(6)
(30)
(5)
SPOT TIE TYP
BOTH ENDS
PART OF FIND NO. 20
GROUNDING BRAID
4 PLACES
(20)—LG 19.50 REF
(12)
SEE NOTE 18
VIEW M-M
OA
OA
OA
LEG 3 SEE DETAIL F
LEG 4 SEE DETAIL H
LEG 5 SEE DETAIL G
LEG 8 SEE DETAIL E
LEG 7 SEE DETAIL D
LEG 6 SEE DETAIL C
LEG 2 SEE DETAIL B
LEG 9 SEE DETAIL J
LEG 1 SEE DETAIL A
SECTION K-K
(26)—REF
TERMINAL REF
INSULATOR REF
(25)—REF
.28 ± .06
SEE NOTE 7 & 19
SECTION L-L
SCALE 2/1
POTTING TO BE FLUSH WITHIN .25
(5)—REF
(7)—REF
SOLDER RING
TYP
GRD LEADS
(21)
DETAIL K
64 PLACES
SCALE: NONE
(TYP TIE POINT SHOWN
WITH MAX AMOUNT OF CONNECTIONS)
(21)—REF
SEE DETAIL K
E66
E65
E1 E4 E5 E2 E3 E6
E30 E34 E33 E31 E35 E32
DETAIL A
SCALE NONE
LEG 1 REF
2-(17)
2-(14)
2-(19)—LG 1.50 ±.06
(10)—LG 11.50 REF
(22)—LG 10.50 REF
E68
E67
E7 E8
E36 E37
DETAIL B
SCALE NONE
LEG 2 REF
2-(35)
2-(32)
2-(18)—LG 1.50 ±.06
(11)—LG 11.50 REF
(23)—LG 10.50 REF
E81
E82
E59 E60 E61
E62 E63 E64
DETAIL J
SCALE NONE
LEG 9 REF
2-(35)
2-(32)
2-(18)—LG 1.50 ±.06
(11)—LG 11.50 REF
(23)—LG 10.50 REF
E69
E70
E10 E11 E9 E12
E38 E41 E39 E40
DETAIL F
SCALE NONE
LEG 3 REF
2-(17)
2-(14)
2-(19)—1.50 ±.06
2-(10)—LG 13.00 REF
2-(22)—LG 12.00 REF
E71
E72
E18
E42
DETAIL H
SCALE NONE
LEG 4 REF
2-(34)
2-(31)
2-(18)—LG 1.50 ±.06
(11)—LG 13.00 REF
(24)—LG 12.00 REF
E73
E74
E13 E16 E14 E17
E43 E45 E44 E46
DETAIL G
SCALE NONE
LEG 5 REF
(22)—LG 12.00 REF
(10)—LG 13.00 REF
2-(17)
2-(14)
2-(19)—LG 1.50 ±.06
E75
E76
E18 E21 E22 E19 E20 E23
E47 E50 E51 E48 E49 E52
DETAIL C
SCALE NONE
LEG 6 REF
(10)—LG 10.50 REF
(22)—LG 9.50 REF
2-(14)
2-(17)
2-(19)—LG 1.50 ±.06
E77
E78
E24 E25 E26
E53 E54 E55
LEG 7 REF
DETAIL D
SCALE NONE
2-(35)
2-(32)
2-(19)—LG 1.50 ±.06
(11)—LG 10.50 REF
(23)—LG 9.50 REF
E79
E80
E27 E28 E29
E56 E57 E58
LEG 8 REF
DETAIL E
SCALE NONE
2-(35)
2-(32)
2-(19)—LG 1.50 ±.06
(11)—LG 10.50 REF
(23)—LG 9.50 REF

NOTES

1. FABRICATE PER ND1002032, EXCEPT USE FIND NO. 5
2. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006256-001
3. SERIALIZE PER ND1002023
4. MIL-I-23053 CLASS I, COLOR BLACK, FOR FIND NO. 18 SIZE .500 I.D. FOR FIND NO. 19 SIZE .750 I.D. FOR FIND NO. 25 SIZE .125 ID
5. QQ-B-575 FOR FIND NO. 10 BRAID SIZE 1/2 X 34 AWG, FOR FIND NO. 11 BRAID SIZE 1/4 X 36 AWG
6. SEAL TERMINALS & INSULATORS OF FIND NO. 1 PER ND1002004 TYPE II
7. POT PER ND100209 METHOD E & PRIME
8. SOLDER PER ND1002071
9. NUMBER PRECEDING BALLOONS DENOTES QUANTITIES
10. CRIMP PER ND1002206
11. MARK CONDUCTOR IDENTIFICATION PER ND1002019
12. CUT LENGTHS OF SLEEVING & BRAID AS SHOWN
13. STRIP ALL LEADS .50 ± .06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED
14. AR DENOTES AS REQUIRED
15. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATION
16. MIL-I-631, TYPE F, FORM U2, GRADE 2, CLASS I GATERGORY I, COLOR BLACK AWG SIZE NO. 4
17. ND1002155, TYPE III, WITH Z TYPE TRACK WITH .003 ± .001 ALUMINUM FOIL, I.D. 2.00 FOR FIND NO. 20, I.D. 2.250 FOR FIND NO. 33
18. ZIPPER TUBING MUST BE CUT TO PROVIDE A SUFFICIENT GROUNDING BRAID AT EACH END
19. FIND NO. 25 MUST BE IMBEDDED IN EPOXY ADHESIVE APPLIED PER NOTE 6 SO AS TO INSURE INSULATION OF CONTACTS

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	3	MS25036-53	TERMINAL LUG	36
	8	1000243-31	FERRULE, ELEC COND	35
	2	1000243-27	FERRULE, ELEC COND	34
*	1.9	SEE NOTE 17	ZIPPER TUBING, PLASTIC	33
	8	1000242-29	FERRULE, ELEC COND	32
	2	1000242-26	FERRULE, ELEC COND	31
	AR	1006253	ADHESIVE	30
	3	1020371-16	BUSHING	29
	3	1020371-13	BUSHING	28
	1	1006415-145	BANDMARKER, CABLE	27
	123	1006248	CONTACT, ELEC	26
*	6.5	SEE NOTE 4	SLEEVING, SHRINK	25
*	1.5	1006696-2	ZIPPER TUBING	24
*	4.8	1006696-3	ZIPPER TUBING	23
*	4.5	1006696-4	ZIPPER TUBING	22
	64	1010402-1	SLEEVE, SOLDER	21
*	3.3	SEE NOTE 17	ZIPPER TUBING, PLASTIC	20
*	0.8	SEE NOTE 4	SLEEVING SHRINK	19
*	0.4	SEE NOTE 4	SLEEVING SHRINK	18
	8	1000243-34	FERRULE, ELEC COND	17
*	2.5	SEE NOTE 16	INSULATION, ELEC	16
	1	MS25036-6	TERMINAL, LUG	15
	8	1000242-32	FERRULE, ELEC COND	14
	1	MS25036-11	TERMINAL, LUG	13
	AR	1006699	SOLVENT	12
*	5.5	SEE NOTE 5	BRAID, WIRE	11
*	4.5	SEE NOTE 5	BRAID, WIRE	10
*	235	MIL-W-16878/4 E24	WIRE, ELEC, BLK	9
*	235	MIL-W-16878/4 E24	WIRE, ELEC, WHT	8
*	120	MIL-W-16878/4 E22	WIRE, ELEC, BLK	7
	4	1006415-144	BANDMARKER CABLE	6
	AR	1006458-004	TAPE, LACING	5
	1	MS3126F-24-61PZ	CONNECTOR	4
	1	MS3126F-24-61PX	CONNECTOR	3
	1	MS3126F-24-61PY	CONNECTOR	2
	1	2016358-011	TEST CONNECTOR	1
	011	LIST OF MATERIALS		

* DENOTES LENGTH IN FEET

2014255	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± .03 DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN DATE 22 FEB 66
CHECKED 9 MAR 66
APPROVAL P. Vazquez 10 MAR 66
APPROVAL 3/1/66
APPROVAL 3/1/66
A. C. METZGER
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

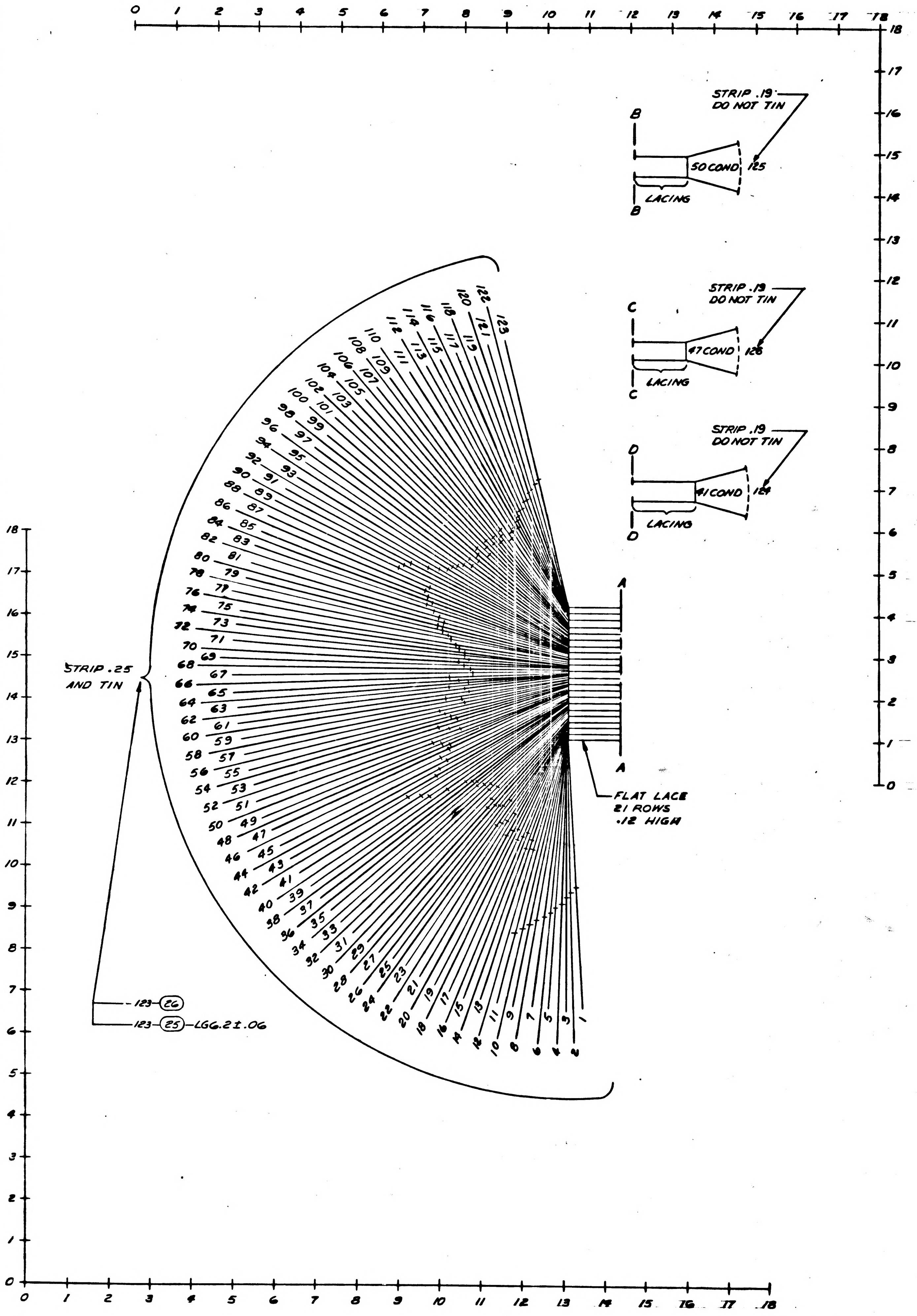
CABLE ASSY
W265

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016360
SCALE 1/1
WT
SHEET 1 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016360 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 27699	4-4-66	
A	CHANGED PER TDRR 28263 DR. P Butler CHK C. APPD.		



ASSEMBLY INFORMATION CHART									
FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
LEG 1 REF	A1	20	P4-504	WHT	24	8	126	P2-u	TWIST
	A2	Δ	E1	BLK		9	Δ	E30	
	A3	17	P4-503	WHT		8	126	P2-s	
	A4	Δ	E1	BLK		9	Δ	E30	
	A5	29	P4-506	WHT		8	126	P2-X	
	A6	Δ	E1	BLK		9	Δ	E30	
	A7	24	P4-505	WHT		8	126	P2-v	
	A8	Δ	E1	BLK		9	Δ	E30	
	A9	19	P4-404	WHT		8	126	P2-d	
	A10	Δ	E2	BLK		9	Δ	E31	
	A11	28	P4-406	WHT		8	126	P2-s	
	A12	Δ	E2	BLK		9	Δ	E31	
	A13	14	P4-502	WHT		8	126	P2-W	
	A14	Δ	E2	BLK		9	Δ	E31	
	A15	30	P4-407	WHT		8	126	P2-FF	
	A16	Δ	E3	BLK		9	Δ	E32	
	A17	32	P4-408	WHT		8	126	P2-NN	
	A18	Δ	E3	BLK		9	Δ	E32	
	A19	36	P4-212	WHT		8	126	P2-JJ	
	A20	Δ	E3	BLK		9	Δ	E32	
	A21	31	P4-208	WHT		8	126	P2-g	
	A22	Δ	E4	BLK		9	Δ	E33	
	A23	26	P4-206	WHT		8	126	P2-x	
	A24	Δ	E4	BLK		9	Δ	E33	
	A25	37	P4-213	WHT		8	126	P2-r	
	A26	Δ	E4	BLK		9	Δ	E33	
	A27	39	P4-218	WHT		8	126	P2-EE	
	A28	Δ	E4	BLK		9	Δ	E33	
	A29	12	P4-301	WHT		8	126	P2-MM	
	A30	Δ	E5	BLK		9	Δ	E34	
	A31	13	P4-302	WHT		8	126	P2-PP	
	A32	Δ	E5	BLK		9	Δ	E34	
	A33	41	P4-224	WHT		8	126	P2-BB	
	A34	Δ	E5	BLK		9	Δ	E34	
	A35	38	P4-313	WHT		8	126	P2-CC	
	A36	Δ	E5	BLK		9	Δ	E34	
	A37	23	P4-405	WHT		8	126	P2-m	
	A38	Δ	E6	BLK		9	Δ	E35	
	A39	33	P4-109	WHT		8	126	P2-k	
	A40	Δ	E6	BLK		9	Δ	E35	
	A41	40	P4-222	WHT		8	126	P2-GG	TWIST
	A42	Δ	E6	BLK	24	9	Δ	E35	
		Δ	E66	SHLD			Δ	E65	
	A43	Δ	E65	BLK	22	7	126	P2-A	
LEG 2 REF	A44	16	P4-303	WHT	24	8	126	P2-KK	TWIST
	A45	Δ	E7	BLK		9	Δ	E36	
	A46	18	P4-304	WHT		8	126	P2-v	
	A47	Δ	E7	BLK		9	Δ	E36	
	A48	22	P4-305	WHT		8	126	P2-f	
	A49	Δ	E7	BLK		9	Δ	E36	
	A50	27	P4-306	WHT		8	126	P2-g	
	A51	Δ	E7	BLK		9	Δ	E36	
	A52	34	P4-310	WHT		8	126	P2-DD	
	A53	Δ	E7	BLK		9	Δ	E36	
	A54	35	P4-311	WHT		8	126	P2-LL	
	A55	Δ	E8	BLK		9	Δ	E37	
	A56	15	P4-203	WHT		8	126	P2-z	
	A57	Δ	E8	BLK		9	Δ	E37	
	A58	21	P4-105	WHT		8	126	P2-q	
	A59	Δ	E8	BLK		9	Δ	E37	
	A60	25	P4-106	WHT		8	126	P2-e	TWIST
	A61	Δ	E8	BLK	24	9	Δ	E37	
		Δ	E68	SHLD			Δ	E67	
	A62	Δ	E67	BLK	22	7	126	P2-a	
	A63	42	P4-326	BLK	22	7	Δ	E68	
PART OF LEG 3 REF	A64	99	P4-216	WHT	24	8	124	P3-BB	TWIST
	A65	Δ	E9	BLK		9	Δ	E38	
	A66	92	P4-410	WHT		8	124	P3-x	
	A67	Δ	E9	BLK		9	Δ	E38	
	A68	93	P4-411	WHT		8	124	P3-q	
	A69	Δ	E9	BLK		9	Δ	E38	
	A70	94	P4-412	WHT		8	124	P3-r	
	A71	Δ	E9	BLK		9	Δ	E38	
	A72	95	P4-413	WHT		8	124	P3-EE	
	A73	Δ	E9	BLK		9	Δ	E38	
	A74	96	P4-414	WHT		8	124	P3-MM	
	A75	Δ	E10	BLK		9	Δ	E39	
	A76	98	P4-415	WHT		8	124	P3-PP	
	A77	Δ	E10	BLK		9	Δ	E39	
	A78	101	P4-416	WHT		8	124	P3-KK	TWIST
	A79	Δ	E10	BLK	24	9	Δ	E39	

Δ DENOTES INTERNAL CONNECTION

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.03 DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 25 FEB 66
CHECKED 2 MAR 66
APPROVAL 10 MAR 66
APPROVAL 3/4/66
APPROVAL 3/28/66
NASA APPROVAL R. C. METZGER
MIT APPROVAL 4-4-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSY
W265

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016360
SCALE 1/1 WT SHEET 2 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016360 A

2016360 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 27699	4-1-66	
A	CHANGED PER TDRR 28263 DR. P. Bott CHK APPD		

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
PART OF LEG 3 REF	A80	104	P4-417	WHT	24	8	124	P3-y	TWIST
	A81	△	E10	BLK		9	△	E39	
	A82	106	P4-418	WHT		8	124	P3-f	
	A83	△	E11	BLK		9	△	E40	
	A84	109	P4-419	WHT		8	124	P3-q	
	A85	△	E11	BLK		9	△	E40	
	A86	112	P4-420	WHT		8	124	P3-DD	
	A87	△	E11	BLK		9	△	E40	
	A88	114	P4-421	WHT		8	124	P3-LL	
	A89	△	E11	BLK		9	△	E40	
	A90	116	P4-422	WHT		8	124	P3-z	
	A91	△	E12	BLK		9	△	E41	
	A92	118	P4-423	WHT		8	124	P3-g	
	A93	△	E12	BLK		9	△	E41	
	A94	120	P4-424	WHT		8	124	P3-p	
	A95	△	E12	BLK		9	△	E41	
	A96	122	P4-425	WHT		8	124	P3-CC	TWIST
	A97	△	E12	BLK	24	9	△	E41	
		△	E69	SHLD			△	E70	
	A98	△	E70	BLK	22	7	124	P3-B	
LEG 4 REF	A99	107	P4-219	WHT	24	8	124	P3-X	TWIST
	A100	△	E13	BLK		9	△	E42	
	A101	110	P4-220	WHT		8	124	P3-u	TWIST
	A102	△	E13	BLK		9	△	E42	
	A103	91	P4-107	WHT		8	124	P3-v	TWIST
	A104	△	E13	BLK	24	9	△	E42	
		△	E71	SHLD			△	E72	
	A105	△	E72	BLK	22	7	124	P3-a	
LEG 5 REF	A106	102	P4-217	WHT	24	8	124	P3-AA	TWIST
	A107	△	E14	BLK		9	△	E43	
	A108	89	P4-402	WHT		8	124	P3-m	
	A109	△	E14	BLK		9	△	E43	
	A110	90	P4-403	WHT		8	124	P3-b	
	A111	△	E14	BLK		9	△	E43	
	A112	97	P4-315	WHT		8	124	P3-c	
	A113	△	E14	BLK		9	△	E43	
	A114	100	P4-316	WHT		8	124	P3-d	
	A115	△	E15	BLK		9	△	E44	
	A116	103	P4-317	WHT		8	124	P3-W	
	A117	△	E15	BLK		9	△	E44	
	A118	105	P4-318	WHT		8	124	P3-t	
	A119	△	E15	BLK		9	△	E44	
	A120	108	P4-319	WHT		8	124	P3-GG	
	A121	△	E16	BLK		9	△	E45	
	A122	111	P4-320	WHT		8	124	P3-HH	
	A123	△	E16	BLK		9	△	E45	
	A124	113	P4-321	WHT		8	124	P3-w	
	A125	△	E16	BLK		9	△	E45	
	A126	115	P4-322	WHT		8	124	P3-V	
	A127	△	E16	BLK		9	△	E45	
	A128	117	P4-323	WHT		8	124	P3-S	
	A129	△	E17	BLK		9	△	E46	
	A130	119	P4-324	WHT		8	124	P3-FF	
	A131	△	E17	BLK		9	△	E46	
	A132	121	P4-325	WHT		8	124	P3-NN	
	A133	△	E17	BLK		9	△	E46	
	A134	88	P4-401	WHT		8	124	P3-JJ	TWIST
	A135	△	E17	BLK	24	9	△	E46	
		△	E73	SHLD			△	E74	
	A136	△	E74	BLK	22	7	124	P3-Y	
	A137	123	P4-426	BLK	22	7	△	E73	
PART OF LEG 6 REF	A138	58	P4-110	WHT	24	8	125	P1-V	TWIST
	A139	△	E18	BLK		9	△	E47	
	A140	61	P4-111	WHT		8	125	P1-s	
	A141	△	E18	BLK		9	△	E47	
	A142	64	P4-112	WHT		8	125	P1-FF	
	A143	△	E18	BLK		9	△	E47	
	A144	67	P4-113	WHT		8	125	P1-NN	
	A145	△	E18	BLK		9	△	E47	
	A146	68	P4-114	WHT		8	125	P1-JJ	
	A147	△	E19	BLK		9	△	E48	
	A148	71	P4-115	WHT		8	125	P1-x	
	A149	△	E19	BLK		9	△	E48	
	A150	73	P4-116	WHT		8	125	P1-e	
	A151	△	E19	BLK		9	△	E48	
	A152	74	P4-117	WHT		8	125	P1-r	
	A153	△	E19	BLK		9	△	E48	
	A154	75	P4-118	WHT		8	125	P1-EE	
	A155	△	E20	BLK		9	△	E49	
	A156	76	P4-119	WHT		8	125	P1-MM	
	A157	△	E20	BLK		9	△	E49	
	A158	77	P4-120	WHT		8	125	P1-PP	
	A159	△	E20	BLK		9	△	E49	
	A160	78	P4-121	WHT		8	125	P1-KK	
	A161	△	E20	BLK		9	△	E49	
	A162	80	P4-122	WHT		8	125	P1-y	
	A163	△	E21	BLK		9	△	E50	
	A164	81	P4-123	WHT		8	125	P1-t	TWIST
	A165	△	E21	BLK	24	9	△	E50	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
PART OF LEG 6 REF	A166	84	P4-125	WHT	24	8	125	P1-q	TWIST
	A167	△	E21	BLK		9	△	E50	
	A168	48	P4-207	WHT		8	125	P1-DD	
	A169	△	E22	BLK		9	△	E51	
	A170	79	P4-221	WHT		8	125	P1-LL	
	A171	△	E22	BLK		9	△	E51	
	A172	85	P4-225	WHT		8	125	P1-z	
	A173	△	E22	BLK		9	△	E51	
	A174	49	P4-307	WHT		8	125	P1-e	
	A175	△	E22	BLK		9	△	E51	
	A176	55	P4-309	WHT		8	125	P1-g	
	A177	△	E23	BLK		9	△	E52	
	A178	70	P4-314	WHT		8	125	P1-CC	
	A179	△	E23	BLK		9	△	E52	
	A180	59	P4-210	WHT		8	125	P1-BB	
	A181	△	E23	BLK		9	△	E52	
	A182	54	P4-209	WHT		8	125	P1-AA	TWIST
	A183	△	E23	BLK	24	9	△	E52	
		△	E75	SHLD			△	E76	
	A184	△	E76	BLK	22	7	125	P1-B	
LEG 7 REF	A185	53	P4-508	WHT	24	8	125	P1-[illegible]	TWIST
	A186	△	E24	BLK		9	△	E53	
	A187	57	P4-509	WHT		8	125	P1-k	
	A188	△	E24	BLK		9	△	E53	
	A189	83	P4-524	WHT		8	125	P1-HH	
	A190	△	E24	BLK		9	△	E53	
	A191	86	P4-525	WHT		8	125	P1-w	
	A192	△	E24	BLK		9	△	E53	
	A193	72	P4-215	WHT		8	125	P1-u	
	A194	△	E25	BLK		9	△	E54	
	A195	52	P4-308	WHT		8	125	P1-y	
	A196	△	E25	BLK		9	△	E54	
	A197	44	P4-202	WHT		8	125	P1-c	
	A198	△	E25	BLK		9	△	E54	
	A199	46	P4-204	WHT		8	125	P1-d	
	A200	△	E26	BLK		9	△	E55	
	A201	47	P4-205	WHT		8	125	P1-f	
	A202	△	E26	BLK		9	△	E55	
	A203	50	P4-507	WHT		8	125	P1-GG	
	A204	△	E26	BLK		9	△	E55	
	A205	56	P4-409	WHT		8	125	P1-W	TWIST
	A206	△	E26	BLK	24	9	△	E55	
		△	E77	SHLD			△	E78	
	A207	△	E78	BLK	22	7	125	P1-a	
LEG 8 REF	A208	60	P4-510	WHT	24	8	125	P1-G	TWIST
	A209	△	E27	BLK		9	△	E56	
	A210	63	P4-511	WHT		8	125	P1-H	
	A211	△	E27	BLK		9	△	E56	
	A212	66	P4-512	WHT		8	125	P1-J	
	A213	△	E27	BLK		9	△	E56	
	A214	45	P4-104	WHT		8	125	P1-L	
	A215	△	E27	BLK		9	△	E56	
	A216	51	P4-108	WHT		8	125	P1-M	
	A217	△	E28	BLK		9	△	E57	
	A218	43	P4-201	WHT		8	125	P1-N	
	A219	△	E28	BLK		9	△	E57	
	A220	62	P4-211	WHT		8	125	P1-C	
	A221	△	E28	BLK		9	△	E57	
	A222	69	P4-214	WHT		8	125	P1-D	
	A223	△	E29	BLK		9	△	E58	
	A224	82	P4-223	WHT		8	125	P1-E	
	A225	△	E29	BLK		9	△	E58	
	A226	65	P4-312	WHT		8	125	P1-F	TWIST
	A227	△	E29	BLK	24	9	△	E58	
		△	E79	SHLD			△	E80	
	A228	△	E80	BLK	22	7	125	P1-b	
	A229	87	P4-226	BLK	22	7	△	E79	
LEG 9 REF	A230	1	P4-513	WHT	24	8	126	P2-D	TWIST
	A231	△	E59	BLK		9	△	E62	
	A232	2	P4-514	WHT		8	126	P2-E	
	A233	△	E59	BLK		9	△	E62	
	A234	3	P4-515	WHT		8	126	P2-L	
	A235	△	E59	BLK		9	△	E62	
	A236	4	P4-516	WHT		8	126	P2-M	
	A237	△	E60	BLK		9	△	E63	
	A238	5	P4-517	WHT		8	126	P2-N	
	A239	△	E60	BLK		9	△	E63	
	A240	6	P4-518	WHT		8	126	P2-P	
	A241	△	E60	BLK		9	△	E63	
	A242	7	P4-519	WHT		8	126	P2-F	
	A243	△	E60	BLK		9	△	E63	
	A244	8	P4-520	WHT		8	126	P2-G	
	A245	△	E61	BLK		9	△	E64	
	A246	9	P4-521	WHT		8	126	P2-H	
	A247	△	E61	BLK		9	△	E64	
	A248	10	P4-522	WHT		8	126	P2-J	
	A249	△	E61	BLK		9	△	E64	
	A250	11	P4-523	WHT		8	126	P2-K	TWIST
	A251	△	E61	BLK	24	9	△	E64	
		△	E81	SHLD			△	E82	
	A252	△	E82	BLK	22	7	126	P2-Z	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A253	△	E6	BLK	22	7	△	E5	
	A254		E5					E4	
	A255		E4					E3	
	A256		E3					E2	
	A257		E2					E1	
	A258		E1					E66	
	A259		E66					E68	
	A260		E68					E7	
	A261		E7					E8	
	A262		E12					E11	
	A263		E11					E10	
	A264		E10					E9	
	A265		E9					E69	
	A266		E69					E71	
	A267		E13					E71	
	A268		E71					E73	
	A269		E73					E14	
	A270		E14					E15	
	A271		E15					E16	
	A272		E16					E17	
	A273		E23					E22	
	A274		E22					E21	
	A275		E21					E20	
	A276		E20					E19	
	A277		E19					E18	
	A278		E18					E76	
	A279		E77					E24	
	A280		E24					E25	
	A281		E25					E26	
	A282		E79					E27	
	A283		E27					E28	
	A284		E28					E29	
	A285		E75					E77	
	A286		E77					E79	
	A287		E30				△	E31	
	A288		E31				126	P2-B	
	A289		E35				△	E34	
	A290		E34				△	E33	
	A291		E33				△	E32	
	A292		E32				126	P2-g	
	A293		E36				△	E37	
	A294		E37				126	P2-Y	
	A295		E33				△	E39	
	A296		E39				△	E40	
	A297		E40				△	E41	
	A298		E41				124	P3-A	
	A299		E42				124	P3-Z	
	A300		E43				△	E44	
	A301		E44				△	E45	
	A302		E45				△	E46	
	A303		E46				124	P3-h	
	A304		E47				△	E48	
	A305		E48					E49	
	A306		E49					E50	
	A307		E50					E51	
	A308		E51				△	E52	
	A309		E52				125	P1-A	
	A310		E53				△	E54	
	A311		E54				△	E55	
	A312		E55				125	P1-Z	
	A313		E56				△	E57	
	A314		E57				△	E58	
	A315		E58				125	P1-Y	
	A316		E61				△	E60	
	A317		E60					E59	
	A318		E59					E81	
	A319		E81					E68	
	A320		E62					E63	
	A321		E63					E64	
	A322	△	E64	BLK	22	7	△	E82	

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN J. Moy DATE 25 FEB 1966
CHECKED 9 MAR 66
APPROVAL 10 MAR 66
APPROVAL 3/10/66
APPROVAL
NASA APPROVAL C METZLER
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSY
W265

SIZE	CODE IDENT NO.	NASA DRAWING NO.
J	49956	2016360

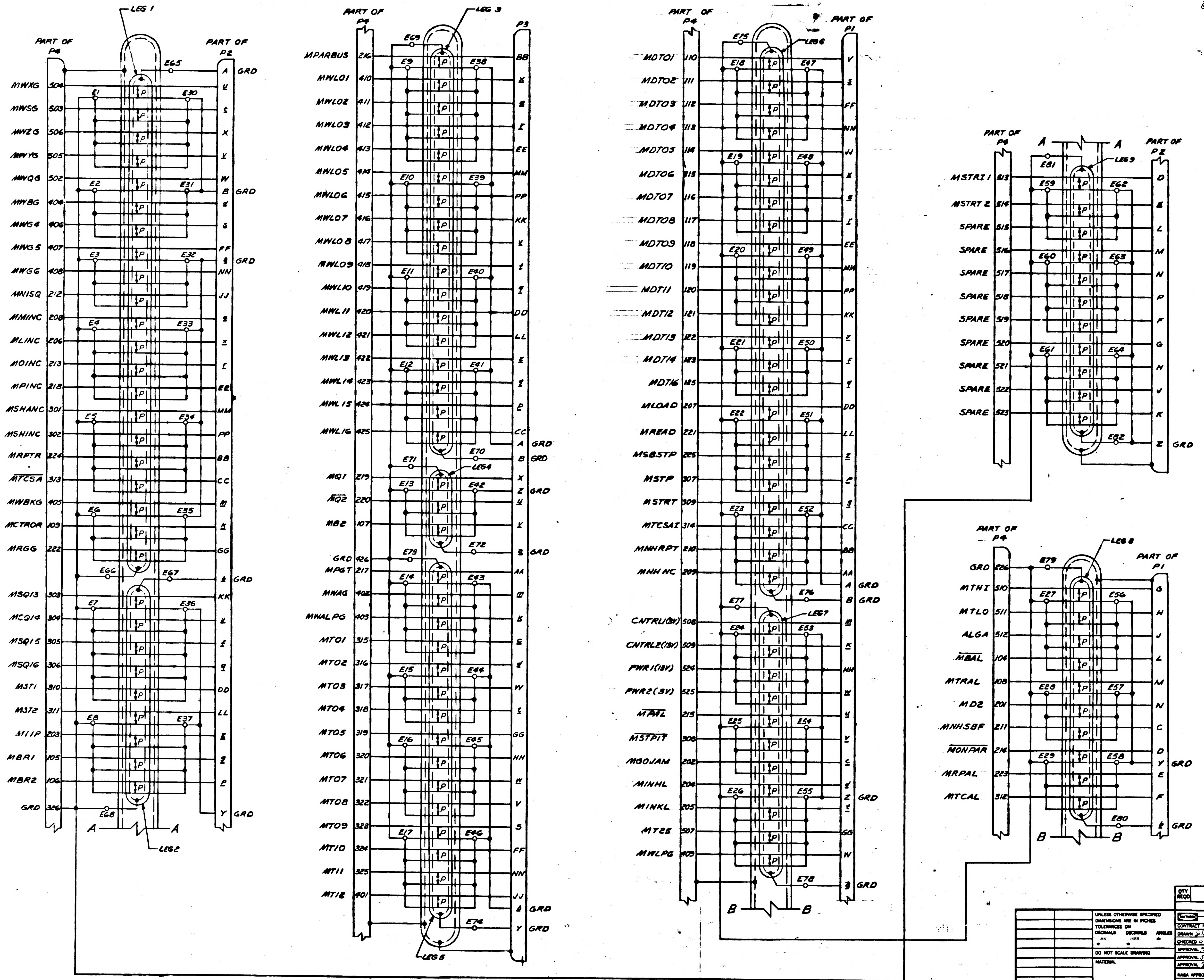
SCALE NONE WT SHEET 3 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016360 A

2016360 A

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 27699	4-4-66	
A	CHANGED PER TDRR 28263 DR. P. CHKG. APPD.		



PART OF P4
PART OF P2
LEG 1
LEG 2
E65
GRD
MWXG 504
MWSG 503
MWZG 506
MWYG 505
MWQG 502
MWBG 408
MWG4 406
MWG5 407
MWGG 408
MNISQ 212
MMINC 208
MLINC 206
MOINC 213
MPINC 218
MSHANC 301
MSHINC 302
MRPTR 224
MTCSA 313
MWBKG 405
MCTROR 109
MRGG 222
MSQ13 303
MCQ14 304
MSQ15 305
MSQ16 306
MST1 310
MST2 311
M11P 203
MBR1 105
MBR2 106
GRD 326
E1 E2 E3 E4 E5 E6 E7 E8
E30 E31 E32 E33 E34 E35 E36 E37
E66 E67 E68
A
P
PART OF P4
PART OF P3
LEG 3
LEG 4
LEG 5
MPARBUS 216
MWL01 410
MWL02 411
MWL03 412
MWL04 413
MWL05 414
MWL06 415
MWL07 416
MWL08 417
MWL09 418
MWL10 419
MWL11 420
MWL12 421
MWL13 422
MWL14 423
MWL15 424
MWL16 425
MQ1 219
MQ2 220
MB2 107
GRD 426
MPGT 217
MWAG 402
MWALPG 403
MT01 315
MT02 316
MT03 317
MT04 318
MT05 319
MT06 320
MT07 321
MT08 322
MT09 323
MT10 324
MT11 325
MT12 401
E9 E10 E11 E12 E13 E14 E15 E16 E17
E38 E39 E40 E41 E42 E43 E44 E45 E46
E69 E70 E71 E72 E73 E74
PART OF P4
PART OF P1
LEG 6
LEG 7
MDT01 110
MDT02 111
MDT03 112
MDT04 113
MDT05 114
MDT06 115
MDT07 116
MDT08 117
MDT09 118
MDT10 119
MDT11 120
MDT12 121
MDT13 122
MDT14 123
MDT16 125
MLOAD 207
MREAD 221
MSBSTP 225
MSTP 307
MSTRT 309
MTCSAI 314
MNHRPT 210
MNHNC 209
CNTRL1(3V) 508
CNTRL2(13V) 509
PWR1(13V) 524
PWR2(3V) 525
MPAL 215
MSTPIT 308
MGOJAM 202
MINHL 204
MINKL 205
MT25 507
MWLPG 409
E18 E19 E20 E21 E22 E23 E24 E25 E26
E47 E48 E49 E50 E51 E52 E53 E54 E55
E75 E76 E77 E78
B
PART OF P4
PART OF P2
LEG 9
MSTR1 1 513
MSTRT 2 514
SPARE 515
SPARE 516
SPARE 517
SPARE 518
SPARE 519
SPARE 520
SPARE 521
SPARE 522
SPARE 523
D E L M N P F G H V K Z
E81 E59 E60 E61 E62 E63 E64 E82
PART OF P4
PART OF P1
LEG 8
GRD 226
MTHI 510
MTLO 511
ALGA 512
MBAL 104
MTRAL 108
MD2 201
MNHSBF 211
MONPAR 214
MRPAL 223
MTCAL 312
G H J L M N C D Y E F
E79 E27 E28 E29 E56 E57 E58 E80

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 3 AUG 66
CHECKED
APPROVAL 10 MAR 66
APPROVAL 3/11/66
APPROVAL 3/12/66
NASA APPROVAL R. B. METZLER
MIT APPROVAL 4-1-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSY
W265

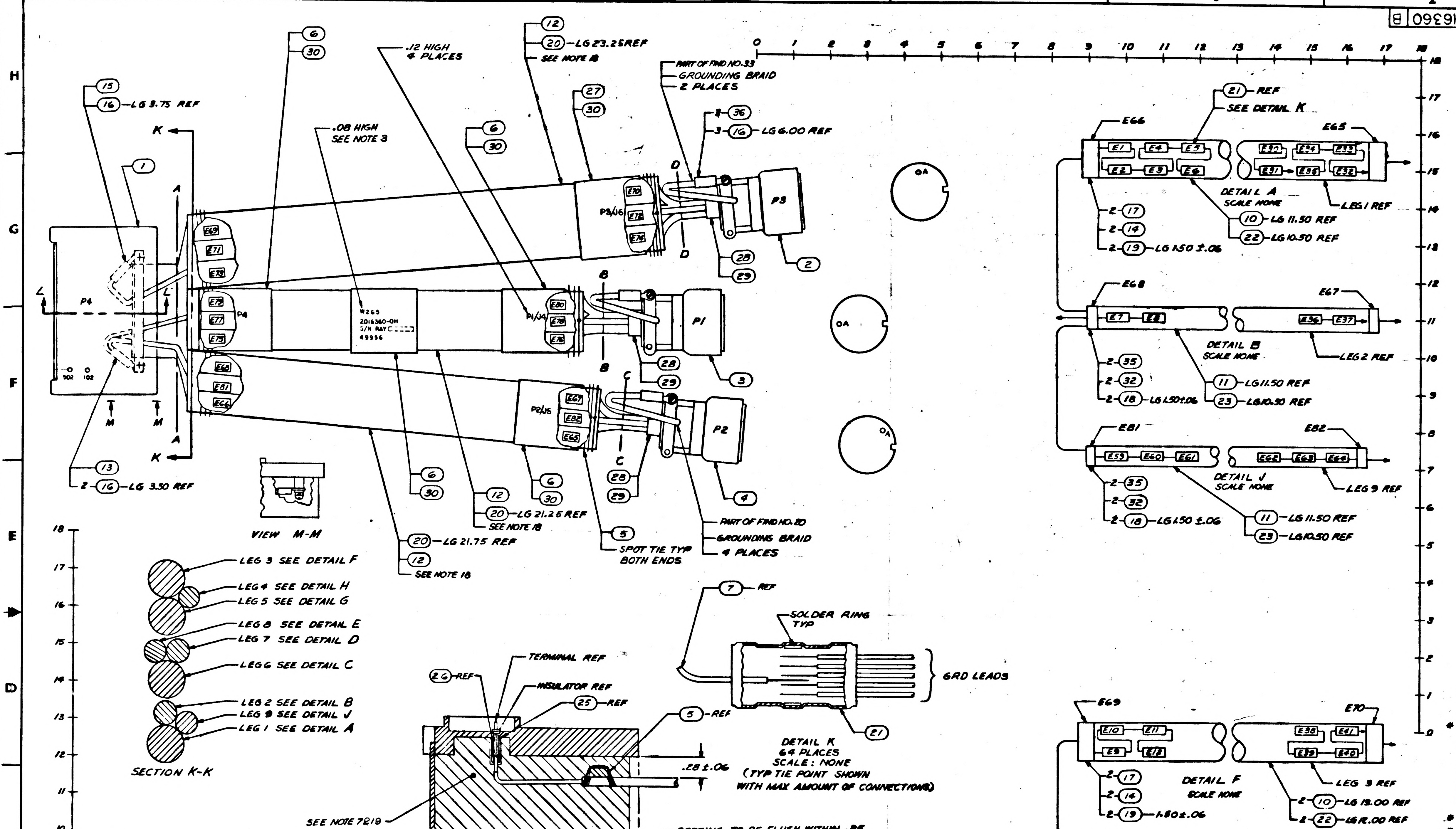
SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016360
SCALE NONE | WT | SHEET 4 OF 4

2016360 A

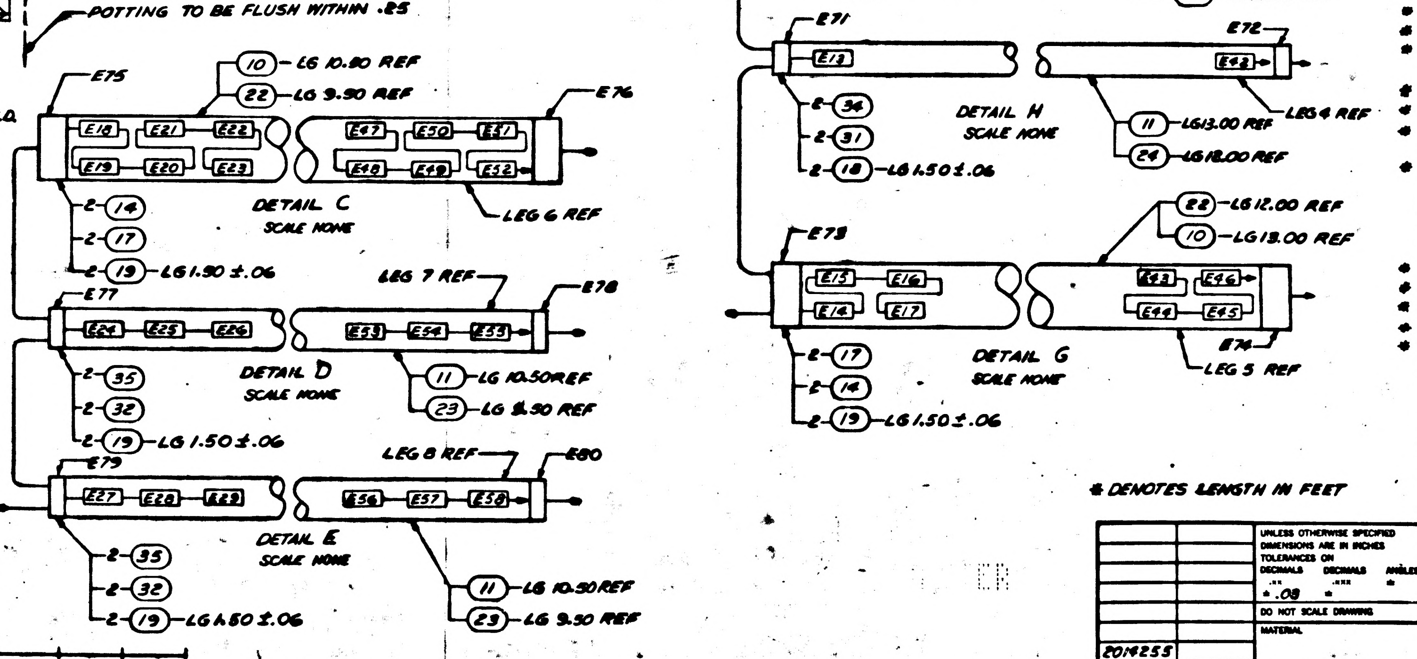
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016360 A

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 27699	9-1-66	
A	CHANGED PER TDRR 28263 DR P. CHK APPD		
B	CHANGED PER TDRR 29333 DR CHK APPD	11/22/66	



(15)
(16)—LG 3.75 REF
K
(1)
A
P4
L
M
502
102
(13)
2—(16)—LG 3.50 REF
E69
E71
E73
E75
E77
E79
E80
E81
E66
(6)
(30)
.08 HIGH
SEE NOTE 3
.12 HIGH
4 PLACES
W265
2016360-011
S/N RAY
49956
(12)
(20)—LG 23.25 REF
SEE NOTE 18
(27)
(30)
P3/J6
E70
E72
E74
PART OF FIND NO. 33
GROUNDING BRAID
2 PLACES
8—(36)
3—(16)—LG 6.00 REF
D
P3
(28)
(29)
(2)
B
P1/J4
E78
E76
P1
(3)
C
P2/J5
E67
E82
E65
P2
(4)
PART OF FIND NO. 20
GROUNDING BRAID
4 PLACES
(5)
SPOT TIE TYP
BOTH ENDS
(20)—LG 21.25 REF
SEE NOTE 18
(20)—LG 21.75 REF
SEE NOTE 18
VIEW M-M
OA
LEG 3 SEE DETAIL F
LEG 4 SEE DETAIL H
LEG 5 SEE DETAIL G
LEG 8 SEE DETAIL E
LEG 7 SEE DETAIL D
LEG 6 SEE DETAIL C
LEG 2 SEE DETAIL B
LEG 9 SEE DETAIL J
LEG 1 SEE DETAIL A
SECTION K-K
(26)—REF
TERMINAL REF
INSULATOR REF
(25)—REF
SEE NOTE 7&19
SECTION L-L
SCALE 2/1
(5)—REF
.28 ± .06
(7)—REF
SOLDER RING
TYP
GRD LEADS
(21)
DETAIL K
64 PLACES
SCALE: NONE
(TYP TIE POINT SHOWN
WITH MAX AMOUNT OF CONNECTIONS)
(21)—REF
SEE DETAIL K
E66
E65
E1 E4 E5 E30 E34 E33
E2 E3 E6 E31 E35 E32
DETAIL A
SCALE NONE
LEG 1 REF
2—(17)
2—(14)
2—(19)—LG 1.50 ± .06
(10)—LG 11.50 REF
(22)—LG 10.50 REF
E68
E67
E7 E8 E36 E37
DETAIL B
SCALE NONE
LEG 2 REF
2—(35)
2—(32)
2—(18)—LG 1.50 ± .06
(11)—LG 11.50 REF
(23)—LG 10.50 REF
E81
E82
E59 E60 E61 E62 E63 E64
DETAIL J
SCALE NONE
LEG 9 REF
2—(35)
2—(32)
2—(18)—LG 1.50 ± .06
(11)—LG 11.50 REF
(23)—LG 10.50 REF



POTTING TO BE FLUSH WITHIN .25
E75
(10)—LG 10.50 REF
(22)—LG 9.50 REF
E76
E18 E21 E22 E47 E50 E51
E19 E20 E23 E48 E49 E52
DETAIL C
SCALE NONE
LEG 6 REF
2—(14)
2—(17)
2—(19)—LG 1.50 ± .06
LEG 7 REF
E77
E78
E24 E25 E26 E53 E54 E55
DETAIL D
SCALE NONE
2—(35)
2—(32)
2—(19)—LG 1.50 ± .06
(11)—LG 10.50 REF
(23)—LG 9.50 REF
LEG 8 REF
E79
E80
E27 E28 E29 E56 E57 E58
DETAIL E
SCALE NONE
2—(35)
2—(32)
2—(19)—LG 1.50 ± .06
(11)—LG 10.50 REF
(23)—LG 9.50 REF
E69
E70
E10 E11 E38 E41
E9 E12 E39 E40
DETAIL F
SCALE NONE
LEG 3 REF
2—(17)
2—(14)
2—(19)—1.50 ± .06
2—(10)—LG 13.00 REF
2—(22)—LG 12.00 REF
E71
E72
E13 E42
DETAIL H
SCALE NONE
LEG 4 REF
2—(34)
2—(31)
2—(18)—LG 1.50 ± .06
(11)—LG 13.00 REF
(24)—LG 12.00 REF
E73
E74
E15 E16 E43 E46
E14 E17 E44 E45
DETAIL G
SCALE NONE
LEG 5 REF
2—(17)
2—(14)
2—(19)—LG 1.50 ± .06
(22)—LG 12.00 REF
(10)—LG 13.00 REF

NOTES

1. FABRICATE PER ND1002032, EXCEPT USE FIND NO. 6
2. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006256-001
3. SERIALIZE PER ND1002023
4. MIL-I-23053 CLASS 1, COLOR BLACK, FOR FIND NO. 18 SIZE .500 I.D. FOR FIND NO. 19 SIZE .750 I.D. FOR FIND NO. 25 SIZE .125 ID
5. QQ-B-575 FOR FIND NO. 10 BRAID SIZE 1/2 X 34 AWG, FOR FIND NO. 11 BRAID SIZE 1/4 X 36 AWG
6. SEAL TERMINALS & INSULATORS OF FIND NO. 1 PER ND1002004 TYPE II
7. POT PER ND100209 METHOD E & PRIME
8. SOLDER PER ND1002071
9. NUMBER PRECEDING BALLOONS DENOTES QUANTITIES
10. CRIMP PER ND1002206
11. MARK CONDUCTOR IDENTIFICATION PER ND1002019
12. CUT LENGTHS OF SLEEVING & BRAID AS SHOWN
13. STRIP ALL LEADS .50 ± .06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED
14. AR DENOTES AS REQUIRED
15. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATION
16. MIL-I-631, TYPE F, FORM U2, GRADE 2, CLASS I CATERGORY I, COLOR BLACK AWG SIZE NO. 4
17. ND1002155, TYPE III, WITH 2 TYPE TRACK WITH .003 ± .001 ALUMINUM FOIL I.D. 150 FOR FIND NO. 20
18. ZIPPER TUBING MUST BE CUT TO PROVIDE A SUFFICIENT GROUNDING BRAID AT EACH END
19. FIND NO. 25 MUST BE IMBEDDED IN EPOXY ADHESIVE APPLIED PER NOTE 6 SO AS TO INSURE INSULATION OF CONTACTS

* DENOTES LENGTH IN FEET

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	8	MS25036-53	TERMINAL LUG	36
	8	1000243-31	FERRULE, ELEC COND	35
	2	1000243-27	FERRULE, ELEC COND	34
*	~~1.9~~	~~SEE NOTE 17~~	~~ZIPPER TUBING, PLASTIC~~	~~33~~
	8	1000242-29	FERRULE, ELEC COND	32
	2	1000242-26	FERRULE, ELEC COND	31
	AR	1006253	ADHESIVE	30
	3	1020371-16	BUSHING	29
	3	1020371-13	BUSHING	28
	1	1006415-145	BANDMARKER, CABLE	27
	123	1006248	CONTACT, ELEC	26
*	6.5	SEE NOTE 4	SLEEVING, SHRINK	25
*	1.5	1006696-2	ZIPPER TUBING	24
*	4.8	1006696-3	ZIPPER TUBING	23
*	4.5	1006696-4	ZIPPER TUBING	22
	64	1010402-1	SLEEVE, SOLDER	21
*	6.0	SEE NOTE 17	ZIPPER TUBING, PLASTIC	20
*	0.8	SEE NOTE 4	SLEEVING SHRINK	19
*	0.4	SEE NOTE 4	SLEEVING SHRINK	18
	8	1000243-34	FERRULE, ELEC COND	17
*	2.5	SEE NOTE 16	INSULATION, ELEC	16
	1	MS25036-6	TERMINAL, LUG	15
	8	1000242-32	FERRULE, ELEC COND	14
	1	MS25036-11	TERMINAL, LUG	13
	AR	1006699	SOLVENT	12
*	5.5	SEE NOTE 5	BRAID, WIRE	11
*	4.5	SEE NOTE 5	BRAID, WIRE	10
*	235	MIL-W-16878/4 E24	WIRE, ELEC, BLK	9
*	235	MIL-W-16878/4 E24	WIRE, ELEC, WHT	8
*	120	MIL-W-16878/4 E22	WIRE, ELEC, BLK	7
	4	1006415-144	BANDMARKER CABLE	6
	AR	1006458-004	TAPE, LACING	5
	1	MS3126F-24-61PZ	CONNECTOR	4
	1	MS3126F-24-61PX	CONNECTOR	3
	1	MS3126F-24-61PY	CONNECTOR	2
	1	2016358-011	TEST CONNECTOR	1
	011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2014255	
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± .03 DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 22 FEB 66
CHECKED 9 MAR 66
APPROVAL P. 10 MAR 66
APPROVAL 3/1/66
APPROVAL 3/16/66
NASA APPROVAL A. C. METZGER
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

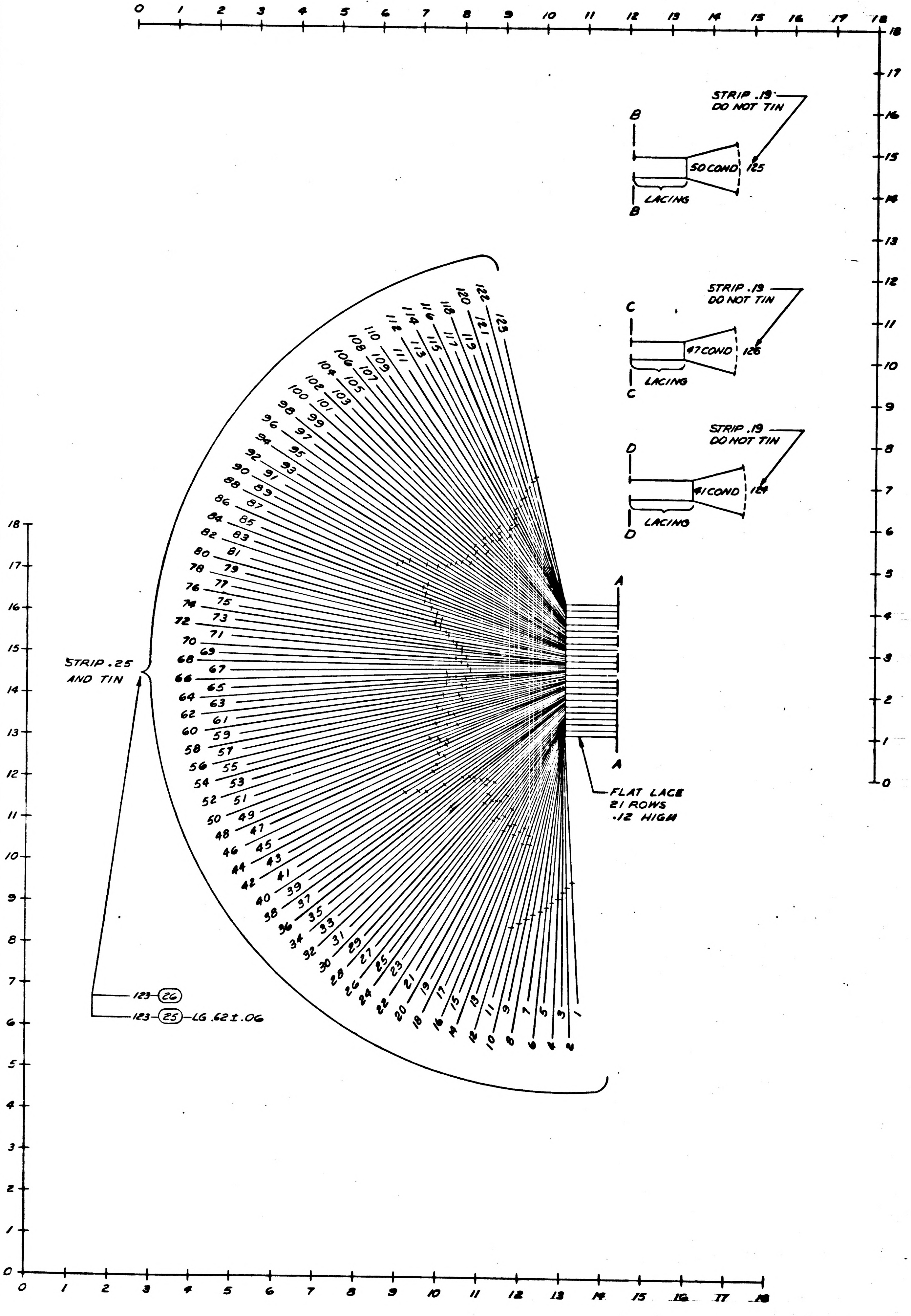
CABLE ASSY
W265

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016360
SCALE 1/1
WT
SHEET 1 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 27699		
A	CHANGED PER TDRR 28263 DR. P Bator CHK C. Dellheim APPD. R Cowley		
B	CHANGED PER TDRR 29333 DR J Roberts CHK C. Dellheim APPD P.C.B.		



ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
LEG 1 REF	A1	20	P4-504	WHT	24	8	126	P2-u	TWIST
	A2	Δ	E1	BLK		9	Δ	E30	
	A3	17	P4-503	WHT		8	126	P2-s	
	A4	Δ	E1	BLK		9	Δ	E30	
	A5	29	P4-506	WHT		8	126	P2-X	
	A6	Δ	E1	BLK		9	Δ	E30	
	A7	24	P4-505	WHT		8	126	P2-v	
	A8	Δ	E1	BLK		9	Δ	E30	
	A9	19	P4-404	WHT		8	126	P2-z	
	A10	Δ	E2	BLK		9	Δ	E31	
	A11	28	P4-406	WHT		8	126	P2-s	
	A12	Δ	E2	BLK		9	Δ	E31	
	A13	14	P4-502	WHT		8	126	P2-W	
	A14	Δ	E2	BLK		9	Δ	E31	
	A15	30	P4-407	WHT		8	126	P2-FF	
	A16	Δ	E3	BLK		9	Δ	E32	
	A17	32	P4-408	WHT		8	126	P2-NN	
	A18	Δ	E3	BLK		9	Δ	E32	
	A19	36	P4-212	WHT		8	126	P2-JJ	
	A20	Δ	E3	BLK		9	Δ	E32	
	A21	31	P4-208	WHT		8	126	P2-g	
	A22	Δ	E4	BLK		9	Δ	E33	
	A23	26	P4-206	WHT		8	126	P2-x	
	A24	Δ	E4	BLK		9	Δ	E33	
	A25	37	P4-213	WHT		8	126	P2-r	
	A26	Δ	E4	BLK		9	Δ	E33	
	A27	39	P4-218	WHT		8	126	P2-EE	
	A28	Δ	E4	BLK		9	Δ	E33	
	A29	12	P4-301	WHT		8	126	P2-MM	
	A30	Δ	E5	BLK		9	Δ	E34	
	A31	13	P4-302	WHT		8	126	P2-PP	
	A32	Δ	E5	BLK		9	Δ	E34	
	A33	41	P4-224	WHT		8	126	P2-BB	
	A34	Δ	E5	BLK		9	Δ	E34	
	A35	38	P4-313	WHT		8	126	P2-CC	
	A36	Δ	E5	BLK		9	Δ	E34	
	A37	23	P4-405	WHT		8	126	P2-m	
	A38	Δ	E6	BLK		9	Δ	E35	
	A39	33	P4-109	WHT		8	126	P2-k	
	A40	Δ	E6	BLK		9	Δ	E35	
	A41	40	P4-222	WHT		8	126	P2-GG	TWIST
	A42	Δ	E6	BLK	24	9	Δ	E35	
		Δ	E66	SHLD			Δ	E65	
	A43	Δ	E65	BLK	22	7	126	P2-A	
LEG 2 REF	A44	16	P4-303	WHT	24	8	126	P2-KK	TWIST
	A45	Δ	E7	BLK		9	Δ	E36	
	A46	18	P4-304	WHT		8	126	P2-y	
	A47	Δ	E7	BLK		9	Δ	E36	
	A48	22	P4-305	WHT		8	126	P2-f	
	A49	Δ	E7	BLK		9	Δ	E36	
	A50	27	P4-306	WHT		8	126	P2-g	
	A51	Δ	E7	BLK		9	Δ	E36	
	A52	34	P4-310	WHT		8	126	P2-DD	
	A53	Δ	E7	BLK		9	Δ	E36	
	A54	35	P4-311	WHT		8	126	P2-LL	
	A55	Δ	E8	BLK		9	Δ	E37	
	A56	15	P4-203	WHT		8	126	P2-e	
	A57	Δ	E8	BLK		9	Δ	E37	
	A58	21	P4-105	WHT		8	126	P2-j	
	A59	Δ	E8	BLK		9	Δ	E37	
	A60	25	P4-106	WHT		8	126	P2-p	TWIST
	A61	Δ	E8	BLK	24	9	Δ	E37	
		Δ	E68	SHLD			Δ	E67	
	A62	Δ	E67	BLK	22	7	126	P2-b	
	A63	42	P4-326	BLK	22	7	Δ	E68	
PART OF LEG 3 REF	A64	99	P4-216	WHT	24	8	124	P3-BB	TWIST
	A65	Δ	E9	BLK		9	Δ	E38	
	A66	92	P4-410	WHT		8	124	P3-x	
	A67	Δ	E9	BLK		9	Δ	E38	
	A68	93	P4-411	WHT		8	124	P3-g	
	A69	Δ	E9	BLK		9	Δ	E38	
	A70	94	P4-412	WHT		8	124	P3-t	
	A71	Δ	E9	BLK		9	Δ	E38	
	A72	95	P4-413	WHT		8	124	P3-EE	
	A73	Δ	E9	BLK		9	Δ	E38	
	A74	96	P4-414	WHT		8	124	P3-MM	
	A75	Δ	E10	BLK		9	Δ	E39	
	A76	98	P4-415	WHT		8	124	P3-PP	
	A77	Δ	E10	BLK		9	Δ	E39	
	A78	101	P4-416	WHT		8	124	P3-KK	TWIST
	A79	Δ	E10	BLK	24	9	Δ	E39	

Δ DENOTES INTERNAL CONNECTION

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.03 DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN J. Wray DATE 25 FEB 66
CHECKED Mitchell 9 MAR 66
APPROVAL P Bagnon 10 MAR 66
APPROVAL A Shepard 3/11/66
APPROVAL 7/25/66
NASA APPROVAL E. C. METZGER
MIT APPROVAL McMurphy 4/66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSY
W265

SIZE	CODE IDENT NO.	NASA DRAWING NO.
J	49956	2016360

SCALE 1/1 WT SHEET 2 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A80	104	P4-417	WHT	24	8	124	P3-y	TWIST
	A81	⚠	E10	BLK		9	⚠	E39	
	A82	106	P4-418	WHT		8	124	P3-f	
	A83	⚠	E11	BLK		9	⚠	E40	
	A84	109	P4-419	WHT		8	124	P3-g	
	A85	⚠	E11	BLK		9	⚠	E40	
	A86	112	P4-420	WHT		8	124	P3-DD	
	A87	⚠	E11	BLK		9	⚠	E40	
	A88	114	P4-421	WHT		8	124	P3-LL	
PART OF LEG 3 REF	A89	⚠	E11	BLK		9	⚠	E40	
	A90	116	P4-422	WHT		8	124	P3-z	
	A91	⚠	E12	BLK		9	⚠	E41	
	A92	118	P4-423	WHT		8	124	P3-q	
	A93	⚠	E12	BLK		9	⚠	E41	
	A94	120	P4-424	WHT		8	124	P3-p	
	A95	⚠	E12	BLK		9	⚠	E41	
	A96	122	P4-425	WHT		8	124	P3-CC	TWIST
	A97	⚠	E12	BLK	24	9	⚠	E41	
		⚠	E69	SHLD			⚠	E70	
	A98	⚠	E70	BLK	22	7	124	P3-B	
	A99	107	P4-219	WHT	24	8	124	P3-X	TWIST
	A100	⚠	E13	BLK		9	⚠	E42	
	A101	110	P4-220	WHT		8	124	P3-u	TWIST
LEG 4 REF	A102	⚠	E13	BLK		9	⚠	E42	
	A103	91	P4-107	WHT		8	124	P3-v	TWIST
	A104	⚠	E13	BLK	24	9	⚠	E42	
		⚠	E71	SHLD			⚠	E72	
	A105	⚠	E72	BLK	22	7	124	P3-a	
	A106	102	P4-217	WHT	24	8	124	P3-AA	TWIST
	A107	⚠	E14	BLK		9	⚠	E43	
	A108	89	P4-402	WHT		8	124	P3-m	
	A109	⚠	E14	BLK		9	⚠	E43	
	A110	90	P4-403	WHT		8	124	P3-k	
	A111	⚠	E14	BLK		9	⚠	E43	
	A112	97	P4-315	WHT		8	124	P3-c	
	A113	⚠	E14	BLK		9	⚠	E43	
	A114	100	P4-316	WHT		8	124	P3-d	
	A115	⚠	E15	BLK		9	⚠	E44	
	A116	103	P4-317	WHT		8	124	P3-W	
	A117	⚠	E15	BLK		9	⚠	E44	
	A118	105	P4-318	WHT		8	124	P3-t	
	A119	⚠	E15	BLK		9	⚠	E44	
LEG 5 REF	A120	108	P4-319	WHT		8	124	P3-GG	
	A121	⚠	E16	BLK		9	⚠	E45	
	A122	111	P4-320	WHT		8	124	P3-HH	
	A123	⚠	E16	BLK		9	⚠	E45	
	A124	113	P4-321	WHT		8	124	P3-w	
	A125	⚠	E16	BLK		9	⚠	E45	
	A126	115	P4-322	WHT		8	124	P3-V	
	A127	⚠	E16	BLK		9	⚠	E45	
	A128	117	P4-323	WHT		8	124	P3-S	
	A129	⚠	E17	BLK		9	⚠	E46	
	A130	119	P4-324	WHT		8	124	P3-FF	
	A131	⚠	E17	BLK		9	⚠	E46	
	A132	121	P4-325	WHT		8	124	P3-NN	
	A133	⚠	E17	BLK		9	⚠	E46	
	A134	88	P4-401	WHT		8	124	P3-JJ	TWIST
	A135	⚠	E17	BLK	24	9	⚠	E46	
		⚠	E73	SHLD			⚠	E74	
	A136	⚠	E74	BLK	22	7	124	P3-Y	
	A137	123	P4-426	BLK	22	7	⚠	E73	
	A138	58	P4-110	WHT	24	8	125	P1-V	TWIST
	A139	⚠	E18	BLK		9	⚠	E47	
	A140	61	P4-111	WHT		8	125	P1-s	
	A141	⚠	E18	BLK		9	⚠	E47	
	A142	64	P4-112	WHT		8	125	P1-FF	
	A143	⚠	E18	BLK		9	⚠	E47	
	A144	67	P4-113	WHT		8	125	P1-NN	
	A145	⚠	E18	BLK		9	⚠	E47	
	A146	68	P4-114	WHT		8	125	P1-JJ	
	A147	⚠	E19	BLK		9	⚠	E48	
	A148	71	P4-115	WHT		8	125	P1-x	
	A149	⚠	E19	BLK		9	⚠	E48	
	A150	73	P4-116	WHT		8	125	P1-g	
PART OF LEG 6 REF	A151	⚠	E19	BLK		9	⚠	E48	
	A152	74	P4-117	WHT		8	125	P1-f	
	A153	⚠	E19	BLK		9	⚠	E48	
	A154	75	P4-118	WHT		8	125	P1-EE	
	A155	⚠	E20	BLK		9	⚠	E49	
	A156	76	P4-119	WHT		8	125	P1-MM	
	A157	⚠	E20	BLK		9	⚠	E49	
	A158	77	P4-120	WHT		8	125	P1-PP	
	A159	⚠	E20	BLK		9	⚠	E49	
	A160	78	P4-121	WHT		8	125	P1-KK	
	A161	⚠	E20	BLK		9	⚠	E49	
	A162	80	P4-122	WHT		8	125	P1-y	
	A163	⚠	E21	BLK		9	⚠	E50	
	A164	81	P4-123	WHT		8	125	P1-z	TWIST
	A165	⚠	E21	BLK	24	9	⚠	E50	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A166	84	P4-125	WHT	24	8	125	P1-q	TWIST
	A167	⚠	E21	BLK		9	⚠	E50	
	A168	48	P4-207	WHT		8	125	P1-DD	
	A169	⚠	E22	BLK		9	⚠	E51	
	A170	79	P4-221	WHT		8	125	P1-LL	
	A171	⚠	E22	BLK		9	⚠	E51	
	A172	85	P4-225	WHT		8	125	P1-z	
	A173	⚠	E22	BLK		9	⚠	E51	
	A174	49	P4-307	WHT		8	125	P1-p	
PART OF LEG 6 REF	A175	⚠	E22	BLK		9	⚠	E51	
	A176	55	P4-309	WHT		8	125	P1-g	
	A177	⚠	E23	BLK		9	⚠	E52	
	A178	70	P4-314	WHT		8	125	P1-CC	
	A179	⚠	E23	BLK		9	⚠	E52	
	A180	59	P4-210	WHT		8	125	P1-BB	
	A181	⚠	E23	BLK		9	⚠	E52	
	A182	54	P4-209	WHT		8	125	P1-AA	TWIST
	A183	⚠	E23	BLK	24	9	⚠	E52	
		⚠	E75	SHLD			⚠	E76	
	A184	⚠	E76	BLK	22	7	125	P1-B	
	A185	53	P4-508	WHT	24	8	125	P1-a	TWIST
	A186	⚠	E24	BLK		9	⚠	E53	
	A187	57	P4-509	WHT		8	125	P1-b	
	A188	⚠	E24	BLK		9	⚠	E53	
	A189	83	P4-524	WHT		8	125	P1-HH	
	A190	⚠	E24	BLK		9	⚠	E53	
	A191	86	P4-525	WHT		8	125	P1-w	
	A192	⚠	E24	BLK		9	⚠	E53	
	A193	72	P4-215	WHT		8	125	P1-u	
	A194	⚠	E25	BLK		9	⚠	E54	
	A195	52	P4-308	WHT		8	125	P1-y	
LEG 7 REF	A196	⚠	E25	BLK		9	⚠	E54	
	A197	44	P4-202	WHT		8	125	P1-c	
	A198	⚠	E25	BLK		9	⚠	E54	
	A199	46	P4-204	WHT		8	125	P1-d	
	A200	⚠	E26	BLK		9	⚠	E55	
	A201	47	P4-205	WHT		8	125	P1-s	
	A202	⚠	E26	BLK		9	⚠	E55	
	A203	50	P4-507	WHT		8	125	P1-GG	
	A204	⚠	E26	BLK		9	⚠	E55	
	A205	56	P4-409	WHT		8	125	P1-W	TWIST
	A206	⚠	E26	BLK	24	9	⚠	E55	
		⚠	E77	SHLD			⚠	E78	
	A207	⚠	E78	BLK	22	7	125	P1-a	
	A208	60	P4-510	WHT	24	8	125	P1-G	TWIST
	A209	⚠	E27	BLK		9	⚠	E56	
	A210	63	P4-511	WHT		8	125	P1-H	
	A211	⚠	E27	BLK		9	⚠	E56	
	A212	66	P4-512	WHT		8	125	P1-J	
	A213	⚠	E27	BLK		9	⚠	E56	
	A214	45	P4-104	WHT		8	125	P1-L	
	A215	⚠	E27	BLK		9	⚠	E56	
	A216	51	P4-108	WHT		8	125	P1-M	
	A217	⚠	E28	BLK		9	⚠	E57	
	A218	43	P4-201	WHT		8	125	P1-N	
LEG 8 REF	A219	⚠	E28	BLK		9	⚠	E57	
	A220	62	P4-211	WHT		8	125	P1-C	
	A221	⚠	E28	BLK		9	⚠	E57	
	A222	69	P4-214	WHT		8	125	P1-D	
	A223	⚠	E29	BLK		9	⚠	E58	
	A224	82	P4-223	WHT		8	125	P1-E	
	A225	⚠	E29	BLK		9	⚠	E58	
	A226	65	P4-312	WHT		8	125	P1-F	TWIST
	A227	⚠	E29	BLK	24	9	⚠	E58	
		⚠	E79	SHLD			⚠	E80	
	A228	⚠	E80	BLK	22	7	125	P1-h	
	A229	87	P4-226	BLK	22	7	⚠	E79	
	A230	1	P4-513	WHT	24	8	126	P2-D	TWIST
	A231	⚠	E59	BLK		9	⚠	E62	
	A232	2	P4-514	WHT		8	126	P2-E	
	A233	⚠	E59	BLK		9	⚠	E62	
	A234	3	P4-515	WHT		8	126	P2-L	
	A235	⚠	E59	BLK		9	⚠	E62	
	A236	4	P4-516	WHT		8	126	P2-M	
	A237	⚠	E60	BLK		9	⚠	E63	
	A238	5	P4-517	WHT		8	126	P2-N	
	A239	⚠	E60	BLK		9	⚠	E63	
	A240	6	P4-518	WHT		8	126	P2-P	
LEG 9 REF	A241	⚠	E60	BLK		9	⚠	E63	
	A242	7	P4-519	WHT		8	126	P2-F	
	A243	⚠	E60	BLK		9	⚠	E63	
	A244	8	P4-520	WHT		8	126	P2-G	
	A245	⚠	E61	BLK		9	⚠	E64	
	A246	9	P4-521	WHT		8	126	P2-H	
	A247	⚠	E61	BLK		9	⚠	E64	
	A248	10	P4-522	WHT		8	126	P2-J	
	A249	⚠	E61	BLK		9	⚠	E64	
	A250	11	P4-523	WHT		8	126	P2-K	TWIST
	A251	⚠	E61	BLK	24	9	⚠	E64	
		⚠	E81	SHLD			⚠	E82	
	A252	⚠	E82	BLK	22	7	126	P2-Z	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A253	⚠	E6	BLK	22	7	⚠	E5	
	A254		E5					E4	
	A255		E4					E3	
	A256		E3					E2	
	A257		E2					E1	
	A258		E1					E66	
	A259		E66					E68	
	A260		E68					E7	
	A261		E7					E8	
	A262		E12					E11	
	A263		E11					E10	
	A264		E10					E9	
	A265		E9					E69	
	A266		E69					E71	
	A267		E13					E71	
	A268		E71					E73	
	A269		E73					E14	
	A270		E14					E15	
	A271		E15					E16	
	A272		E16					E17	
	A273		E23					E22	
	A274		E22					E21	
	A275		E21					E20	
	A276		E20					E19	
	A277		E19					E18	
	A278		E18					E75	
	A279		E77					E24	
	A280		E24					E25	
	A281		E25					E26	
	A282		E79					E27	
	A283		E27					E28	
	A284		E28					E29	
	A285		E75					E77	
	A286		E77					E79	
	A287		E30				⚠	E31	
	A288		E31				126	P2-B	
	A289		E35				⚠	E34	
	A290		E34				⚠	E33	
	A291		E33				⚠	E32	
	A292		E32				126	P2-a	
	A293		E36				⚠	E37	
	A294		E37				126	P2-Y	
	A295		E38				⚠	E39	
	A296		E39				⚠	E40	
	A297		E40				⚠	E41	
	A298		E41				124	P3-A	
	A299		E42				124	P3-Z	
	A300		E43				⚠	E44	
	A301		E44				⚠	E45	
	A302		E45				⚠	E46	
	A303		E46				124	P3-b	
	A304		E47				⚠	E48	
	A305		E48					E49	
	A306		E49					E50	
	A307		E50					E51	
	A308		E51				⚠	E52	
	A309		E52				125	P1-A	
	A310		E53				⚠	E54	
	A311		E54				⚠	E55	
	A312		E55				125	P1-Z	
	A313		E56				⚠	E57	
	A314		E57				⚠	E58	
	A315		E58				125	P1-Y	
	A316		E61				⚠	E60	
	A317		E60					E59	
	A318		E59					E81	
	A319		E81					E68	
	A320		E62					E63	
	A321		E63					E64	
	A322	⚠	E64	BLK	22	7	⚠	E82	

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 27699	4-1-66	
A	CHANGED PER TDRR 28263 DR. P. Cutter CHK C. DeYoung APPD		
B	CHANGED PER TDRR 29333 DR. J. Abbott CHK C. DeYoung APPD C. S. R.		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE
CHECKED 9 MAR 66
APPROVAL 10 MAR 66
APPROVAL 3/10/66
APPROVAL
NASA APPROVAL C. METZGER
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

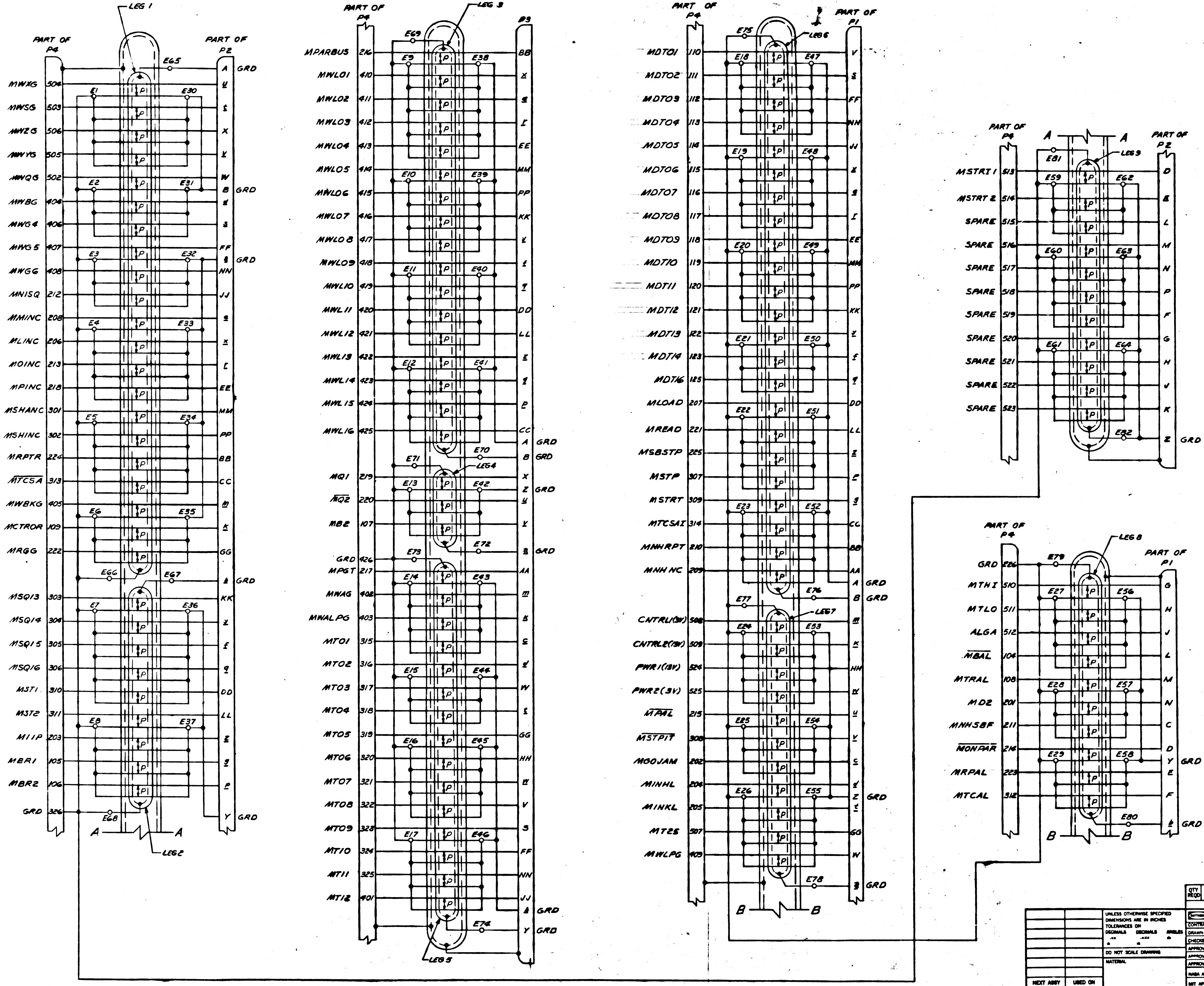
CABLE ASSY
W265

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016360
SCALE NONE
WT
SHEET 3 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016360 B

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 27699	4-4-66	
A	CHANGED PER TDRR 28263 DR. P. CHKC. APPD.		
B	CHANGED PER TDRR 29333 DR. J. Roberts CHKC. APPD	5/23/66	



LEG 1
PART OF P4
PART OF P2
E65
GRD
MWXG 504
MWSG 503
MWZG 506
MWYG 505
MWQG 502
MWBG 404
MWG4 406
MWG5 407
MWG6 408
MNISQ 212
MMINC 208
MLINC 206
MOINC 213
MPINC 218
MSHANC 301
MSHINC 302
MRPTR 224
MTCSA 313
MWBKG 405
MCTROR 109
MRGG 222
MSQ13 303
MSQ14 304
MSQ15 305
MSQ16 306
MST1 310
MST2 311
M11P 203
MBR1 105
MBR2 106
GRD 326
E1
E30
E2
E31
E3
E32
E4
E33
E5
E34
E6
E35
E66
E67
E7
E36
E8
E37
E68
A
A
LEG 2
P
PART OF P4
LEG 3
P3
MPARBUS 216
MWL01 410
MWL02 411
MWL03 412
MWL04 413
MWL05 414
MWL06 415
MWL07 416
MWL08 417
MWL09 418
MWL10 419
MWL11 420
MWL12 421
MWL13 422
MWL14 423
MWL15 424
MWL16 425
MQ1 219
MQ2 220
MB2 107
GRD 426
MPGT 217
MWAG 402
MWALPG 403
MT01 315
MT02 316
MT03 317
MT04 318
MT05 319
MT06 320
MT07 321
MT08 322
MT09 323
MT10 324
MT11 325
MT12 401
E69
E9
E38
E10
E39
E11
E40
E12
E41
E70
E71
LEG4
E13
E42
E72
E73
E14
E43
E15
E44
E16
E45
E17
E46
E74
LEG 5
PART OF P4
PART OF P1
LEG6
MDT01 110
MDT02 111
MDT03 112
MDT04 113
MDT05 114
MDT06 115
MDT07 116
MDT08 117
MDT09 118
MDT10 119
MDT11 120
MDT12 121
MDT13 122
MDT14 123
MDT16 125
MLOAD 207
MREAD 221
MSBSTP 225
MSTP 307
MSTRT 309
MTCSA1 314
MNHRPT 210
MNHNC 209
CNTRL(3V) 508
CNTRL2(3V) 509
PWR1(18V) 524
PWR2(3V) 525
MPAL 215
MSTPIT 308
MGOJAM 202
MINHL 204
MINKL 205
MT2S 507
MWLPG 409
E75
E18
E47
E19
E48
E20
E49
E21
E50
E22
E51
E23
E52
E76
E77
LEG7
E24
E53
E25
E54
E26
E55
E78
B
B
PART OF P4
PART OF P2
A
A
E81
LEG9
MSTRT1 513
MSTRT2 514
SPARE 515
SPARE 516
SPARE 517
SPARE 518
SPARE 519
SPARE 520
SPARE 521
SPARE 522
SPARE 523
E59
E62
E60
E63
E61
E64
E82
Z GRD
PART OF P4
LEG8
PART OF P1
GRD 226
MTHI 510
MTLO 511
ALGA 512
MBAL 104
MTRAL 108
MD2 201
MNHSBF 211
MONPAR 214
MRPAL 223
MTCAL 312
E79
E27
E56
E28
E57
E29
E58
E80
Y GRD
GRD
B
B

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.

CONTRACT NO. NAS 9-497
DRAWN DATE 3 MAR 66
CHECKED
APPROVAL 10 MAR 66
APPROVAL 3/11/66
APPROVAL 3/18/66
NASA APPROVAL
MIT APPROVAL 4-4-66
MIT APPROVAL

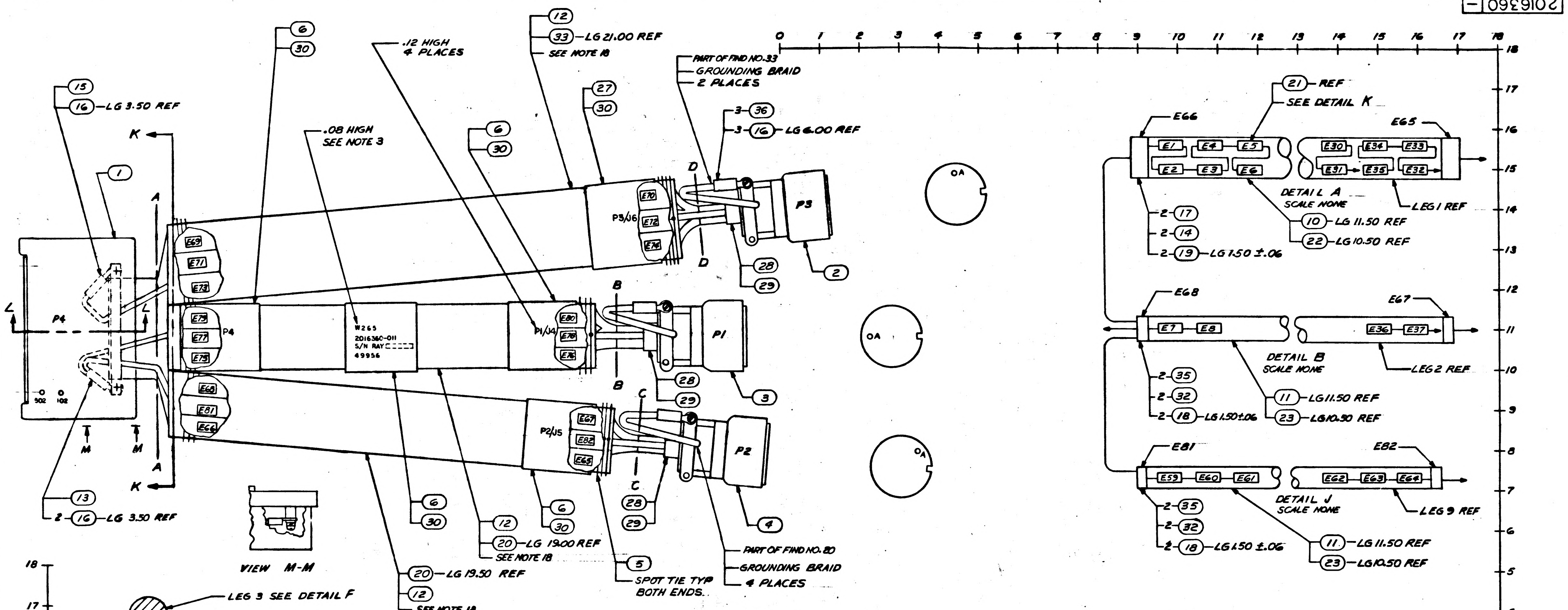
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSY
W265

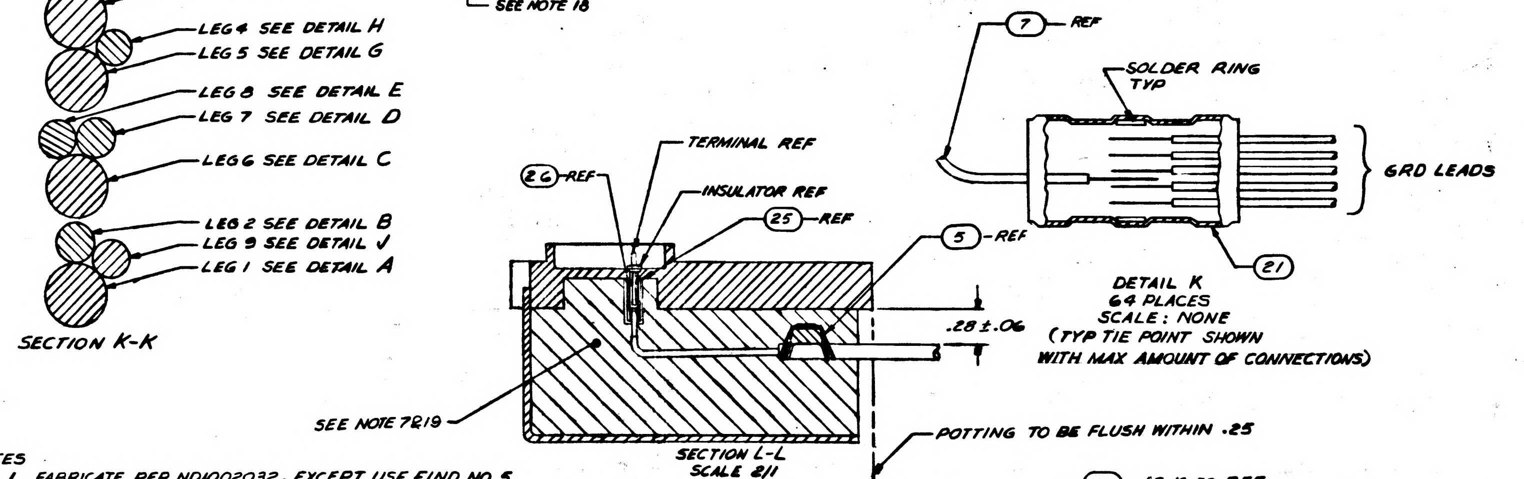
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016360
SCALE NONE
WT
SHEET 4 OF 4

2016360 B

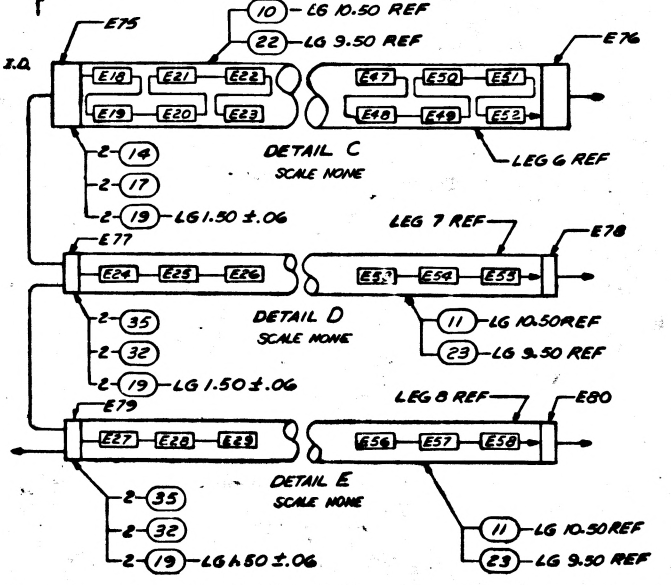
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 27699	9-1-66	



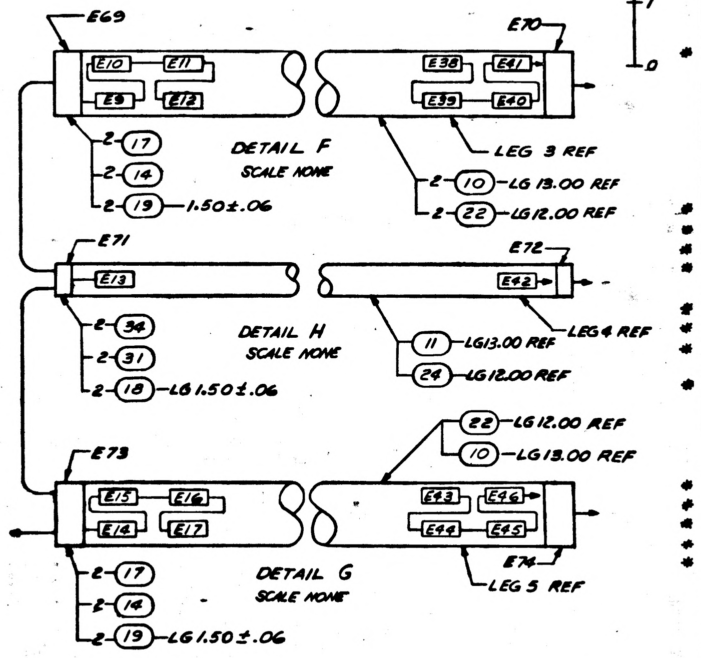
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
15
16 – LG 3.50 REF
K
1
A
P4
L
502 102
M
13
2 – 16 – LG 3.50 REF
6
30
.08 HIGH SEE NOTE 3
W265 2016360-011 S/N RAY 49956
.12 HIGH 4 PLACES
12
33 – LG 21.00 REF
SEE NOTE 18
27
30
PART OF FIND NO. 33 GROUNDING BRAID 2 PLACES
3 – 36
3 – 16 – LG 6.00 REF
D
P3/J6
P3
E70 E75 E76 E69 E71 E72 E73 E77 E79 E80 E78 E74 E68 E81 E66 E67 E82 E65
28
29
2
B
P1/J4
P1
3
C
P2/J5
P2
4
VIEW M-M
20 – LG 19.00 REF
SEE NOTE 18
20 – LG 19.50 REF
SEE NOTE 18
5
SPOT TIE TYP BOTH ENDS
PART OF FIND NO. 20 GROUNDING BRAID 4 PLACES
21 – REF
SEE DETAIL K
DETAIL A SCALE NONE
10 – LG 11.50 REF
22 – LG 10.50 REF
2 – 17
2 – 14
2 – 19 – LG 1.50 ±.06
LEG 1 REF
DETAIL B SCALE NONE
2 – 35
2 – 32
2 – 18 – LG 1.50 ±.06
11 – LG 11.50 REF
23 – LG 10.50 REF
LEG 2 REF
DETAIL J SCALE NONE
LEG 9 REF
E1 E4 E5 E2 E3 E6 E30 E34 E33 E31 E35 E32 E7 E8 E36 E37 E59 E60 E61 E62 E63 E64
OA



LEG 3 SEE DETAIL F
LEG 4 SEE DETAIL H
LEG 5 SEE DETAIL G
LEG 8 SEE DETAIL E
LEG 7 SEE DETAIL D
LEG 6 SEE DETAIL C
LEG 2 SEE DETAIL B
LEG 9 SEE DETAIL J
LEG 1 SEE DETAIL A
SECTION K-K
TERMINAL REF
26 – REF
INSULATOR REF
25 – REF
5 – REF
.28 ±.06
SEE NOTE 7 & 19
SECTION L-L SCALE 2/1
POTTING TO BE FLUSH WITHIN .25
7 – REF
SOLDER RING TYP
GRD LEADS
21
DETAIL K 64 PLACES SCALE: NONE (TYP TIE POINT SHOWN WITH MAX AMOUNT OF CONNECTIONS)



10 – LG 10.50 REF
22 – LG 9.50 REF
E75
E76
E18 E21 E22 E19 E20 E23 E47 E50 E51 E48 E49 E52
DETAIL C SCALE NONE
2 – 14
2 – 17
2 – 19 – LG 1.50 ±.06
LEG 6 REF
LEG 7 REF
E77 E78
E24 E25 E26 E53 E54 E55
DETAIL D SCALE NONE
2 – 35
2 – 32
2 – 19 – LG 1.50 ±.06
11 – LG 10.50 REF
23 – LG 9.50 REF
LEG 8 REF
E79 E80
E27 E28 E29 E56 E57 E58
DETAIL E SCALE NONE
2 – 35
2 – 32
2 – 19 – LG 1.50 ±.06
11 – LG 10.50 REF
23 – LG 9.50 REF



E69
E70
E10 E11 E38 E41 E9 E12 E39 E40
DETAIL F SCALE NONE
2 – 17
2 – 14
2 – 19 – 1.50 ±.06
LEG 3 REF
2 – 10 – LG 13.00 REF
2 – 22 – LG 12.00 REF
E71
E72
E13 E42
DETAIL H SCALE NONE
2 – 34
2 – 31
2 – 18 – LG 1.50 ±.06
11 – LG 13.00 REF
24 – LG 12.00 REF
LEG 4 REF
E73
E74
E15 E16 E14 E17 E43 E46 E44 E45
DETAIL G SCALE NONE
22 – LG 12.00 REF
10 – LG 13.00 REF
2 – 17
2 – 14
2 – 19 – LG 1.50 ±.06
LEG 5 REF

NOTES
1. FABRICATE PER ND1002032, EXCEPT USE FIND NO. 5
2. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006256-001
3. SERIALIZE PER ND1002023
4. MIL-I-23053 CLASS 1, COLOR BLACK, FOR FIND NO. 18 SIZE .500 I.D. FOR FIND NO. 19 SIZE .750 I.D. FOR FIND NO. 26 SIZE .125 ID
5. QQ-B-575 FOR FIND NO. 10 BRAID SIZE 1/2 X 34 AWG, FOR FIND NO. 11 BRAID SIZE 1/4 X 36 AWG
6. SEAL TERMINALS & INSULATORS OF FIND NO. 1 PER ND100204 TYPE II
7. POT PER ND100209 METHOD E & PRIME
8. SOLDER PER ND1002071
9. NUMBER PRECEDING BALLOONS DENOTES QUANTITIES
10. CRIMP PER ND1002206
11. MARK CONDUCTOR IDENTIFICATION PER ND1002019
12. CUT LENGTHS OF SLEEVING & BRAID AS SHOWN
13. STRIP ALL LEADS .50 ± .06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED
14. AR DENOTES AS REQUIRED
15. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATION
16. MIL-I-631, TYPE F, FORM U2, GRADE A, CLASS I GATERGORY I, COLOR BLACK AWG SIZE NO. 4
17. ND1002153, TYPE III, WITH Z TYPE TRACK WITH .003 ± .001 ALUMINUM FOIL, I.D. 2.00 FOR FIND NO. 20, I.D. 2.250 FOR FIND NO. 33
18. ZIPPER TUBING MUST BE CUT TO PROVIDE A SUFFICIENT GROUNDING BRAID AT EACH END
19. FIND NO. 25 MUST BE IMBEDDED IN EPOXY ADHESIVE APPLIED PER NOTE 6 SO AS TO INSURE INSULATION OF CONTACTS

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	3	MS25036-53	TERMINAL LUG	36
	8	1000243-31	FERRULE, ELEC COND	35
	2	1000243-27	FERRULE, ELEC COND	34
*	1.9	SEE NOTE 17	ZIPPER TUBING, PLASTIC	33
	8	1000242-29	FERRULE, ELEC COND	32
	2	1000242-26	FERRULE, ELEC COND	31
	AR	1006253	ADHESIVE	30
	3	1020371-16	BUSHING	29
	3	1020371-13	BUSHING	28
	1	1006415-145	BANDMARKER, CABLE	27
	123	1006248	CONTACT, ELEC	26
*	6.5	SEE NOTE 4	SLEEVING, SHRINK	25
*	1.5	1006696-2	ZIPPER TUBING	24
*	4.8	1006696-3	ZIPPER TUBING	23
*	4.5	1006696-4	ZIPPER TUBING	22
	64	1010402-1	SLEEVE, SOLDER	21
*	3.3	SEE NOTE 17	ZIPPER TUBING, PLASTIC	20
*	0.8	SEE NOTE 4	SLEEVING SHRINK	19
*	0.4	SEE NOTE 4	SLEEVING SHRINK	18
	8	1000243-34	FERRULE, ELEC COND	17
*	2.5	SEE NOTE 16	INSULATION, ELEC	16
	1	MS25036-6	TERMINAL, LUG	15
	8	1000242-32	FERRULE, ELEC COND	14
	1	MS25036-11	TERMINAL, LUG	13
	AR	1006699	SOLVENT	12
*	5.5	SEE NOTE 5	BRAID, WIRE	11
*	4.5	SEE NOTE 5	BRAID, WIRE	10
*	235	MIL-W-16878/4 E24	WIRE, ELEC, BLK	9
*	235	MIL-W-16878/4 E24	WIRE, ELEC, WHT	8
*	120	MIL-W-16878/4 E22	WIRE, ELEC, BLK	7
	4	1006415-144	BANDMARKER CABLE	6
	AR	1006458-004	TAPE, LACING	5
	1	MS3126F-24-61PZ	CONNECTOR	4
	1	MS3126F-24-61PX	CONNECTOR	3
	1	MS3126F-24-61PY	CONNECTOR	2
	1	2016358-011	TEST CONNECTOR	1
	011	LIST OF MATERIALS		

* DENOTES LENGTH IN FEET

2014255	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± .03 DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN D. Moy DATE 22 FEB 66
CHECKED 3 MAR 66
APPROVAL P. Frazier 10 MAR 66
APPROVAL 3/1/66
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL 4-1-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSY
W265

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016360
SCALE 1/1
WT
SHEET 1 OF 4

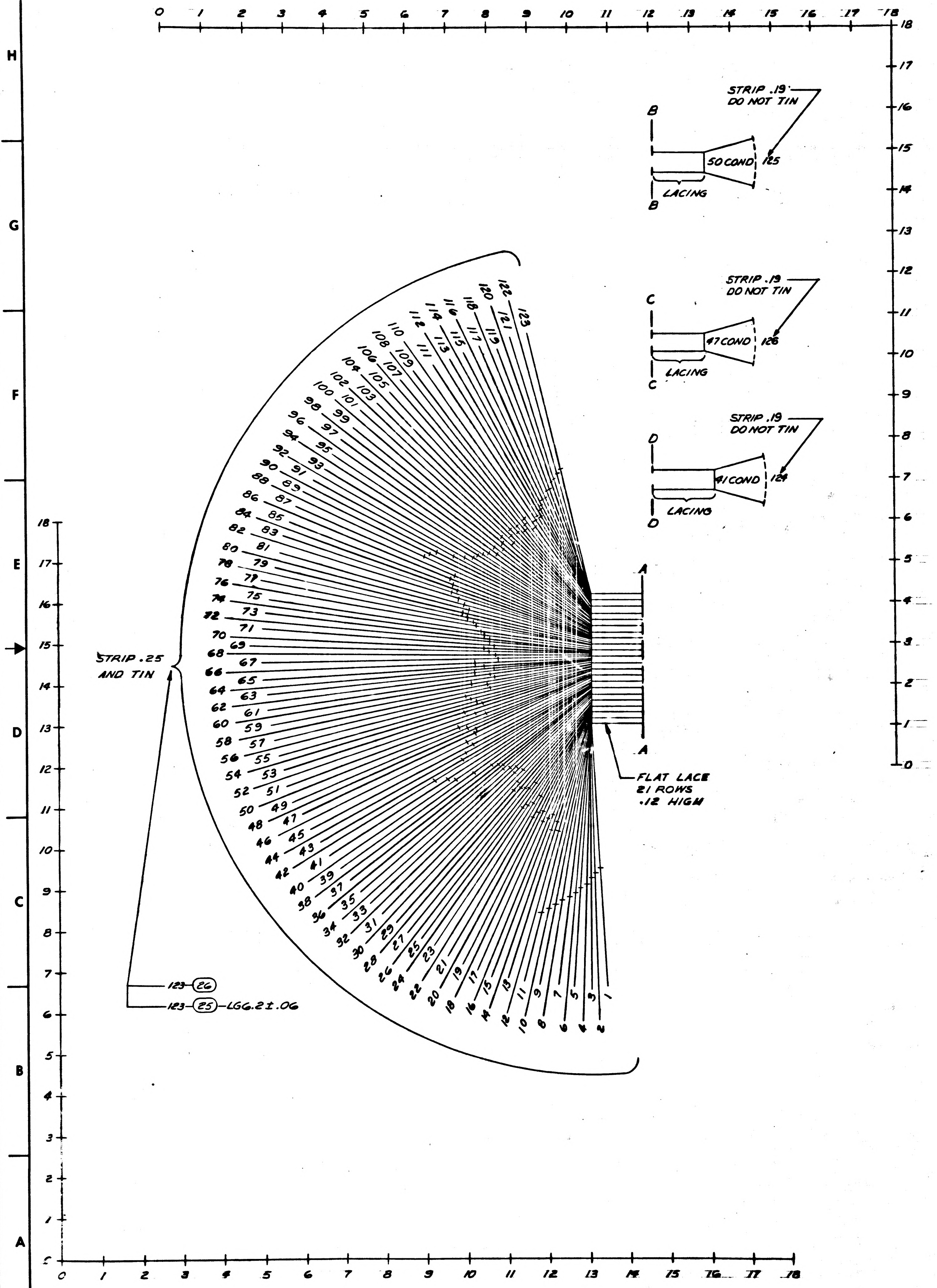
MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2H

2H

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 27699	4-1-66	



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
STRIP .19
DO NOT TIN
B
50 COND
125
LACING
B
STRIP .19
DO NOT TIN
C
47 COND
126
LACING
C
STRIP .19
DO NOT TIN
D
41 COND
124
LACING
D
A
A
FLAT LACE
21 ROWS
.12 HIGH
STRIP .25
AND TIN
123-26
123-25-LG6.2±.06
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
LEG 1 REF	A1	20	P4-504	WHT	24	8	126	P2-u	TWIST
	A2	△	E1	BLK		9	△	E30	
	A3	17	P4-503	WHT		8	126	P2-s	
	A4	△	E1	BLK		9	△	E30	
	A5	29	P4-506	WHT		8	126	P2-X	
	A6	△	E1	BLK		9	△	E30	
	A7	24	P4-505	WHT		8	126	P2-v	
	A8	△	E1	BLK		9	△	E30	
	A9	19	P4-404	WHT		8	126	P2-d	
	A10	△	E2	BLK		9	△	E31	
	A11	28	P4-406	WHT		8	126	P2-s	
	A12	△	E2	BLK		9	△	E31	
	A13	14	P4-502	WHT		8	126	P2-W	
	A14	△	E2	BLK		9	△	E31	
	A15	30	P4-407	WHT		8	126	P2-FF	
	A16	△	E3	BLK		9	△	E32	
	A17	32	P4-408	WHT		8	126	P2-NN	
	A18	△	E3	BLK		9	△	E32	
	A19	36	P4-212	WHT		8	126	P2-JJ	
	A20	△	E3	BLK		9	△	E32	
	A21	31	P4-208	WHT		8	126	P2-g	
	A22	△	E4	BLK		9	△	E33	
	A23	26	P4-206	WHT		8	126	P2-x	
	A24	△	E4	BLK		9	△	E33	
	A25	37	P4-213	WHT		8	126	P2-r	
	A26	△	E4	BLK		9	△	E33	
	A27	39	P4-218	WHT		8	126	P2-EE	
	A28	△	E4	BLK		9	△	E33	
	A29	12	P4-301	WHT		8	126	P2-MM	
	A30	△	E5	BLK		9	△	E34	
	A31	13	P4-302	WHT		8	126	P2-PP	
	A32	△	E5	BLK		9	△	E34	
	A33	41	P4-224	WHT		8	126	P2-BB	
	A34	△	E5	BLK		9	△	E34	
	A35	38	P4-313	WHT		8	126	P2-CC	
	A36	△	E5	BLK		9	△	E34	
	A37	23	P4-405	WHT		8	126	P2-m	
	A38	△	E6	BLK		9	△	E35	
	A39	33	P4-109	WHT		8	126	P2-k	
	A40	△	E6	BLK		9	△	E35	
	A41	40	P4-222	WHT		8	126	P2-GG	TWIST
	A42	△	E6	BLK	24	9	△	E35	
		△	E66	SHLD			△	E65	
	A43	△	E65	BLK	22	7	126	P2-A	
LEG 2 REF	A44	16	P4-303	WHT	24	8	126	P2-KK	TWIST
	A45	△	E7	BLK		9	△	E36	
	A46	18	P4-304	WHT		8	126	P2-y	
	A47	△	E7	BLK		9	△	E36	
	A48	22	P4-305	WHT		8	126	P2-f	
	A49	△	E7	BLK		9	△	E36	
	A50	27	P4-306	WHT		8	126	P2-q	
	A51	△	E7	BLK		9	△	E36	
	A52	34	P4-310	WHT		8	126	P2-DD	
	A53	△	E7	BLK		9	△	E36	
	A54	35	P4-311	WHT		8	126	P2-LL	
	A55	△	E8	BLK		9	△	E37	
	A56	15	P4-203	WHT		8	126	P2-z	
	A57	△	E8	BLK		9	△	E37	
	A58	21	P4-105	WHT		8	126	P2-q	
	A59	△	E8	BLK		9	△	E37	
	A60	25	P4-106	WHT		8	126	P2-p	TWIST
	A61	△	E8	BLK	24	9	△	E37	
		△	E68	SHLD			△	E67	
	A62	△	E67	BLK	22	7	126	P2-b	
	A63	42	P4-326	BLK	22	7	△	E68	
PART OF LEG 3 REF	A64	99	P4-216	WHT	24	8	124	P3-BB	TWIST
	A65	△	E9	BLK		9	△	E38	
	A66	92	P4-410	WHT		8	124	P3-x	
	A67	△	E9	BLK		9	△	E38	
	A68	93	P4-411	WHT		8	124	P3-g	
	A69	△	E9	BLK		9	△	E38	
	A70	94	P4-412	WHT		8	124	P3-r	
	A71	△	E9	BLK		9	△	E38	
	A72	95	P4-413	WHT		8	124	P3-EE	
	A73	△	E9	BLK		9	△	E38	
	A74	96	P4-414	WHT		8	124	P3-MM	
	A75	△	E10	BLK		9	△	E39	
	A76	98	P4-415	WHT		8	124	P3-PP	
	A77	△	E10	BLK		9	△	E39	
	A78	101	P4-416	WHT		8	124	P3-KK	TWIST
	A79	△	E10	BLK	24	9	△	E39	

△ DENOTES INTERNAL CONNECTION

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.03
DECIMALS .XXX ±
ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN G. Troy DATE 25 FEB 66
CHECKED G. Mitchell 2 MAR 66
APPROVAL P. Fagan 10 MAR 66
APPROVAL 3/4/66
APPROVAL 3/23/66
NASA APPROVAL E. C. METZGER
MIT APPROVAL 4-4-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSY
W265

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016360
SCALE 1/1
WT
SHEET 2 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016360 —

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS 4 RELEASED PER TDRR 27699	4-66	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
[illegible]T OF [illegible] 3 REF	A80	104	P4-417	WHT	24	8	124	P3-y	TWIST
	A81	△	E10	BLK		9	△	E39	
	A82	106	P4-418	WHT		8	124	P3-f	
	A83	△	E11	BLK		9	△	E40	
	A84	109	P4-419	WHT		8	124	P3-g	
	A85	△	E11	BLK		9	△	E40	
	A86	112	P4-420	WHT		8	124	P3-DD	
	A87	△	E11	BLK		9	△	E40	
	A88	114	P4-421	WHT		8	124	P3-LL	
	A89	△	E11	BLK		9	△	E40	
	A90	116	P4-422	WHT		8	124	P3-z	
	A91	△	E12	BLK		9	△	E41	
	A92	118	P4-423	WHT		8	124	P3-g	
	A93	△	E12	BLK		9	△	E41	
	A94	120	P4-424	WHT		8	124	P3-p	
	A95	△	E12	BLK		9	△	E41	
	A96	122	P4-425	WHT		8	124	P3-CC	TWIST
	A97	△	E12	BLK	24	9	△	E41	
		△	E69	SHLD			△	E70	
	A98	△	E70	BLK	22	7	124	P3-B	
LEG 4 REF	A99	107	P4-219	WHT	24	8	124	P3-X	TWIST
	A100	△	E13	BLK		9	△	E42	
	A101	110	P4-220	WHT		8	124	P3-u	TWIST
	A102	△	E13	BLK		9	△	E42	
	A103	91	P4-107	WHT		8	124	P3-v	TWIST
	A104	△	E13	BLK	24	9	△	E42	
		△	E71	SHLD			△	E72	
	A105	△	E72	BLK	22	7	124	P3-a	
LEG 5 REF	A106	102	P4-217	WHT	24	8	124	P3-AA	TWIST
	A107	△	E14	BLK		9	△	E43	
	A108	89	P4-402	WHT		8	124	P3-m	
	A109	△	E14	BLK		9	△	E43	
	A110	90	P4-403	WHT		8	124	P3-k	
	A111	△	E14	BLK		9	△	E43	
	A112	97	P4-315	WHT		8	124	P3-c	
	A113	△	E14	BLK		9	△	E43	
	A114	100	P4-316	WHT		8	124	P3-d	
	A115	△	E15	BLK		9	△	E44	
	A116	103	P4-317	WHT		8	124	P3-W	
	A117	△	E15	BLK		9	△	E44	
	A118	105	P4-318	WHT		8	124	P3-t	
	A119	△	E15	BLK		9	△	E44	
	A120	108	P4-319	WHT		8	124	P3-GG	
	A121	△	E16	BLK		9	△	E45	
	A122	111	P4-320	WHT		8	124	P3-HH	
	A123	△	E16	BLK		9	△	E45	
	A124	113	P4-321	WHT		8	124	P3-w	
	A125	△	E16	BLK		9	△	E45	
	A126	115	P4-322	WHT		8	124	P3-V	
	A127	△	E16	BLK		9	△	E45	
	A128	117	P4-323	WHT		8	124	P3-S	
	A129	△	E17	BLK		9	△	E46	
	A130	119	P4-324	WHT		8	124	P3-FF	
	A131	△	E17	BLK		9	△	E46	
	A132	121	P4-325	WHT		8	124	P3-NN	
	A133	△	E17	BLK		9	△	E46	
	A134	88	P4-401	WHT		8	124	P3-JJ	TWIST
	A135	△	E17	BLK	24	9	△	E46	
		△	E73	SHLD			△	E74	
	A136	△	E74	BLK	22	7	124	P3-Y	
	A137	123	P4-426	BLK	22	7	△	E73	
PART OF LEG 6 REF	A138	58	P4-110	WHT	24	8	125	P1-V	TWIST
	A139	△	E18	BLK		9	△	E47	
	A140	61	P4-111	WHT		8	125	P1-s	
	A141	△	E18	BLK		9	△	E47	
	A142	64	P4-112	WHT		8	125	P1-FF	
	A143	△	E18	BLK		9	△	E47	
	A144	67	P4-113	WHT		8	125	P1-NN	
	A145	△	E18	BLK		9	△	E47	
	A146	68	P4-114	WHT		8	125	P1-JJ	
	A147	△	E19	BLK		9	△	E48	
	A148	71	P4-115	WHT		8	125	P1-x	
	A149	△	E19	BLK		9	△	E48	
	A150	73	P4-116	WHT		8	125	P1-e	
	A151	△	E19	BLK		9	△	E48	
	A152	74	P4-117	WHT		8	125	P1-f	
	A153	△	E19	BLK		9	△	E48	
	A154	75	P4-118	WHT		8	125	P1-EE	
	A155	△	E20	BLK		9	△	E49	
	A156	76	P4-119	WHT		8	125	P1-MM	
	A157	△	E20	BLK		9	△	E49	
	A158	77	P4-120	WHT		8	125	P1-PP	
	A159	△	E20	BLK		9	△	E49	
	A160	78	P4-121	WHT		8	125	P1-KK	
	A161	△	E20	BLK		9	△	E49	
	A162	80	P4-122	WHT		8	125	P1-y	
	A163	△	E21	BLK		9	△	E50	
	A164	81	P4-123	WHT		8	125	P1-t	TWIST
	A165	△	E21	BLK	24	9	△	E50	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
PART OF LEG 6 REF	A166	84	P4-125	WHT	24	8	125	P1-g	TWIST
	A167	△	E21	BLK		9	△	E50	
	A168	48	P4-207	WHT		8	125	P1-DD	
	A169	△	E22	BLK		9	△	E51	
	A170	79	P4-221	WHT		8	125	P1-LL	
	A171	△	E22	BLK		9	△	E51	
	A172	85	P4-225	WHT		8	125	P1-z	
	A173	△	E22	BLK		9	△	E51	
	A174	49	P4-307	WHT		8	125	P1-e	
	A175	△	E22	BLK		9	△	E51	
	A176	55	P4-309	WHT		8	125	P1-g	
	A177	△	E23	BLK		9	△	E52	
	A178	70	P4-314	WHT		8	125	P1-CC	
	A179	△	E23	BLK		9	△	E52	
	A180	59	P4-210	WHT		8	125	P1-BB	
	A181	△	E23	BLK		9	△	E52	
	A182	54	P4-209	WHT		8	125	P1-AA	TWIST
	A183	△	E23	BLK	24	9	△	E52	
		△	E75	SHLD			△	E76	
	A184	△	E76	BLK	22	7	125	P1-B	
LEG 7 REF	A185	53	P4-508	WHT	24	8	125	P1-m	TWIST
	A186	△	E24	BLK		9	△	E53	
	A187	57	P4-509	WHT		8	125	P1-k	
	A188	△	E24	BLK		9	△	E53	
	A189	83	P4-524	WHT		8	125	P1-HH	
	A190	△	E24	BLK		9	△	E53	
	A191	86	P4-525	WHT		8	125	P1-w	
	A192	△	E24	BLK		9	△	E53	
	A193	72	P4-215	WHT		8	125	P1-u	
	A194	△	E25	BLK		9	△	E54	
	A195	52	P4-308	WHT		8	125	P1-x	
	A196	△	E25	BLK		9	△	E54	
	A197	44	P4-202	WHT		8	125	P1-c	
	A198	△	E25	BLK		9	△	E54	
	A199	46	P4-204	WHT		8	125	P1-d	
	A200	△	E26	BLK		9	△	E55	
	A201	47	P4-205	WHT		8	125	P1-t	
	A202	△	E26	BLK		9	△	E55	
	A203	50	P4-507	WHT		8	125	P1-GG	
	A204	△	E26	BLK		9	△	E55	
	A205	56	P4-409	WHT		8	125	P1-W	TWIST
	A206	△	E26	BLK	24	9	△	E55	
		△	E77	SHLD			△	E78	
	A207	△	E78	BLK	22	7	125	P1-z	
LEG 8 REF	A208	60	P4-510	WHT	24	8	125	P1-G	TWIST
	A209	△	E27	BLK		9	△	E56	
	A210	63	P4-511	WHT		8	125	P1-H	
	A211	△	E27	BLK		9	△	E56	
	A212	66	P4-512	WHT		8	125	P1-J	
	A213	△	E27	BLK		9	△	E56	
	A214	45	P4-104	WHT		8	125	P1-L	
	A215	△	E27	BLK		9	△	E56	
	A216	51	P4-108	WHT		8	125	P1-M	
	A217	△	E28	BLK		9	△	E57	
	A218	43	P4-201	WHT		8	125	P1-N	
	A219	△	E28	BLK		9	△	E57	
	A220	62	P4-211	WHT		8	125	P1-C	
	A221	△	E28	BLK		9	△	E57	
	A222	69	P4-214	WHT		8	125	P1-D	
	A223	△	E29	BLK		9	△	E58	
	A224	82	P4-223	WHT		8	125	P1-E	
	A225	△	E29	BLK		9	△	E58	
	A226	65	P4-312	WHT		8	125	P1-F	TWIST
	A227	△	E29	BLK	24	9	△	E58	
		△	E79	SHLD			△	E80	
	A228	△	E80	BLK	22	7	125	P1-b	
	A229	87	P4-226	BLK	22	7	△	E79	
LEG 9 REF	A230	1	P4-513	WHT	24	8	126	P2-D	TWIST
	A231	△	E59	BLK		9	△	E62	
	A232	2	P4-514	WHT		8	126	P2-E	
	A233	△	E59	BLK		9	△	E62	
	A234	3	P4-515	WHT		8	126	P2-L	
	A235	△	E59	BLK		9	△	E62	
	A236	4	P4-516	WHT		8	126	P2-M	
	A237	△	E60	BLK		9	△	E63	
	A238	5	P4-517	WHT		8	126	P2-N	
	A239	△	E60	BLK		9	△	E63	
	A240	6	P4-518	WHT		8	126	P2-P	
	A241	△	E60	BLK		9	△	E63	
	A242	7	P4-519	WHT		8	126	P2-F	
	A243	△	E60	BLK		9	△	E63	
	A244	8	P4-520	WHT		8	126	P2-G	
	A245	△	E61	BLK		9	△	E64	
	A246	9	P4-521	WHT		8	126	P2-H	
	A247	△	E61	BLK		9	△	E64	
	A248	10	P4-522	WHT		8	126	P2-J	
	A249	△	E61	BLK		9	△	E64	
	A250	11	P4-523	WHT		8	126	P2-K	TWIST
	A251	△	E61	BLK	24	9	△	E64	
		△	E81	SHLD			△	E82	
	A252	△	E82	BLK	22	7	125	P2-Z	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A253	△	E6	BLK	22	7	△	E5	
	A254		E5					E4	
	A255		E4					E3	
	A256		E3					E2	
	A257		E2					E1	
	A258		E1					E66	
	A259		E66					E68	
	A260		E68					E7	
	A261		E7					E8	
	A262		E12					E11	
	A263		E11					E10	
	A264		E10					E9	
	A265		E9					E69	
	A266		E69					E71	
	A267		E13					E71	
	A268		E71					E73	
	A269		E73					E74	
	A270		E14					E15	
	A271		E15					E16	
	A272		E16					E17	
	A273		E23					E22	
	A274		E22					E21	
	A275		E21					E20	
	A276		E20					E19	
	A277		E19					E18	
	A278		E18					E75	
	A279		E77					E24	
	A280		E24					E25	
	A281		E25					E26	
	A282		E79					E27	
	A283		E27					E28	
	A284		E28					E29	
	A285		E75					E77	
	A286		E77					E79	
	A287		E30				△	E31	
	A288		E31				126	P2-B	
	A289		E35				△	E34	
	A290		E34				△	E33	
	A291		E33				△	E32	
	A292		E32				126	P2-a	
	A293		E36				△	E37	
	A294		E37				126	P2-Y	
	A295		E38				△	E39	
	A296		E39				△	E40	
	A297		E40				△	E41	
	A298		E41				124	P3-A	
	A299		E42				124	P3-Z	
	A300		E43				△	E44	
	A301		E44				△	E45	
	A302		E45				△	E46	
	A303		E46				124	P3-b	
	A304		E47				△	E48	
	A305		E48					E49	
	A306		E49					E50	
	A307		E50					E51	
	A308		E51				△	E52	
	A309		E52				125	P1-A	
	A310		E53				△	E54	
	A311		E54				△	E55	
	A312		E55				125	P1-Z	
	A313		E56				△	E57	
	A314		E57				△	E58	
	A315		E58				125	P1-Y	
	A316		E61				△	E60	
	A317		E60					E59	
	A318		E59					E81	
	A319		E81					E68	
	A320		E62					E63	
	A321		E63					E64	
	A322	△	E64	BLK	22	7	△	E82	

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 28Feb66
CHECKED 9MAR66
APPROVAL 10MAR66
APPROVAL 3/11/66
APPROVAL 3/18/66
NASA APPROVAL C. METZGER
MIT APPROVAL 4-4-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSY
W265

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016360
SCALE NONE
WT
SHEET 3 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

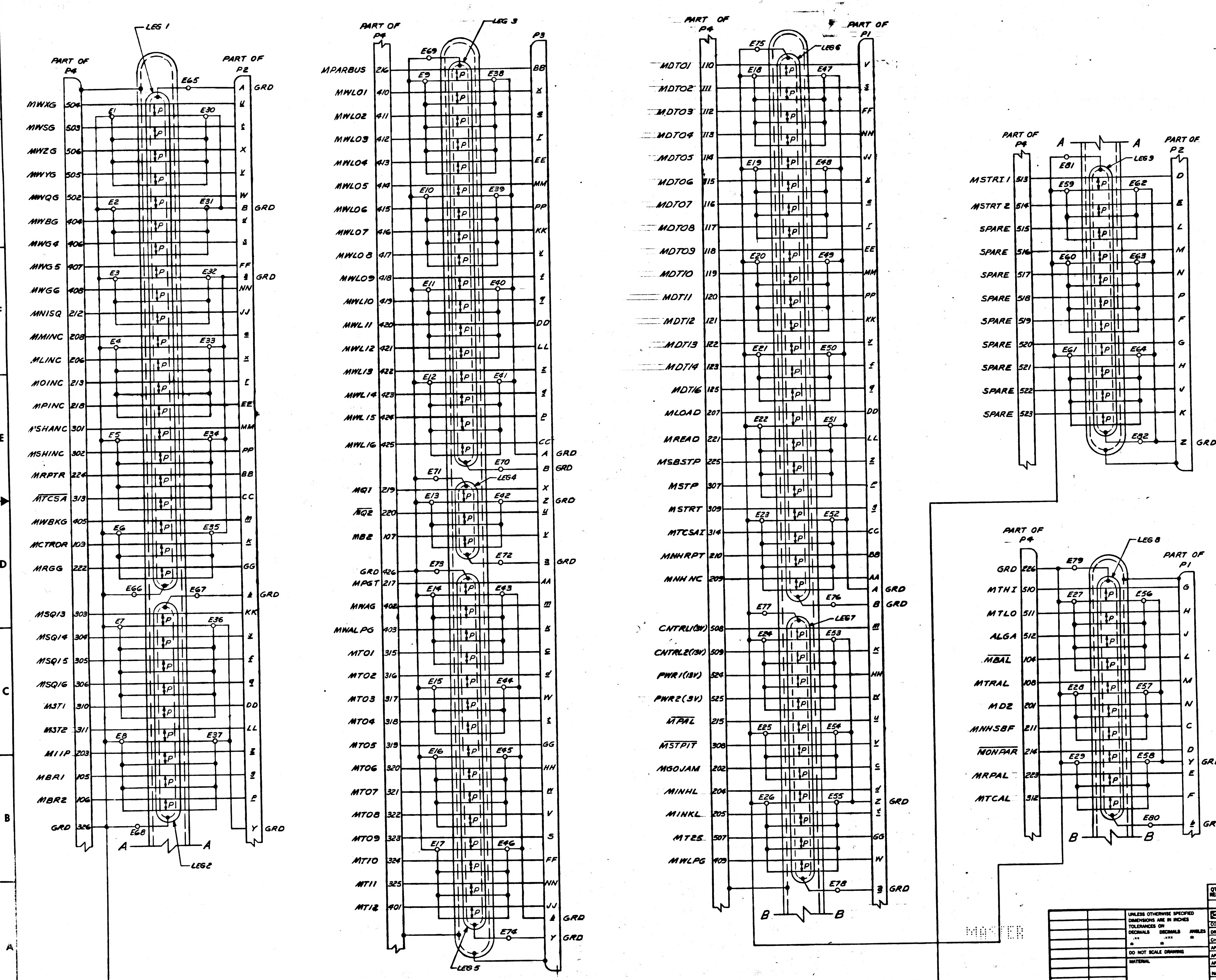
2016360 —

2H

2H

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER [illegible]	[illegible]	[illegible]


LEG 1
PART OF P4
PART OF P2
E65
MWXG 504
MWSG 503
MWZG 506
MWYG 505
MWQG 502
MWBG 404
MWG4 406
MWG5 407
MWGG 408
MNISQ 212
MMINC 208
MLINC 206
MOINC 213
MPINC 218
M'SHANC 301
MSHINC 302
MRPTR 224
MTCSA 313
MWBKG 405
MCTROR 103
MRGG 222
MSQ13 303
MSQ14 304
MSQ15 305
MSQ16 306
MST1 310
MST2 311
M11P 203
MBR1 105
MBR2 106
GRD 326
E68
LEG2
A
GRD
E66
E67
LEG 3
PART OF P4
P3
MPARBUS 216
MWL01 410
MWL02 411
MWL03 412
MWL04 413
MWL05 414
MWL06 415
MWL07 416
MWL08 417
MWL09 418
MWL10 419
MWL11 420
MWL12 421
MWL13 422
MWL14 423
MWL15 424
MWL16 425
MQ1 219
MQ2 220
MB2 107
GRD 426
MPGT 217
MWAG 402
MWALPG 403
MT01 315
MT02 316
MT03 317
MT04 318
MT05 319
MT06 320
MT07 321
MT08 322
MT09 323
MT10 324
MT11 325
MT12 401
LEG4
LEG 5
E69
E70
E71
E72
E73
E74
PART OF P4
PART OF P1
LEG6
E75
MDT01 110
MDT02 111
MDT03 112
MDT04 113
MDT05 114
MDT06 115
MDT07 116
MDT08 117
MDT09 118
MDT10 119
MDT11 120
MDT12 121
MDT13 122
MDT14 123
MDT16 125
MLOAD 207
MREAD 221
MSBSTP 225
MSTP 307
MSTRT 309
MTCSAI 314
MNHRPT 210
MNHNC 209
CNTRL1(3V) 508
CNTRL2(13V) 509
PWR1(13V) 524
PWR2(3V) 525
MPAL 215
MSTPIT 308
MGOJAM 202
MINHL 204
MINKL 205
MT25 507
MWLPG 409
LEG7
E76
E77
E78
B
PART OF P4
PART OF P2
LEG9
E81
E82
MSTRT1 513
MSTRT2 514
SPARE 515
SPARE 516
SPARE 517
SPARE 518
SPARE 519
SPARE 520
SPARE 521
SPARE 522
SPARE 523
Z GRD
PART OF P4
PART OF P1
LEG8
E79
E80
GRD 226
MTHI 510
MTLO 511
ALGA 512
MBAL 104
MTRAL 108
MDZ 201
MNHSBF 211
MONPAR 214
MRPAL 223
MTCAL 312
Y GRD
GRD
P
P1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .xx ± DECIMALS .xxx ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN D Troy DATE 3 MAR 66
CHECKED G Mitchell 9 MAR 66
APPROVAL P. Frazier 10 MAR 66
APPROVAL D. O. Bryant 3/11/66
APPROVAL 3/28/66
NASA APPROVAL E. B. METZLER
MIT APPROVAL 4-4-66
MIT APPROVAL A. Hopkins

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSY
#265

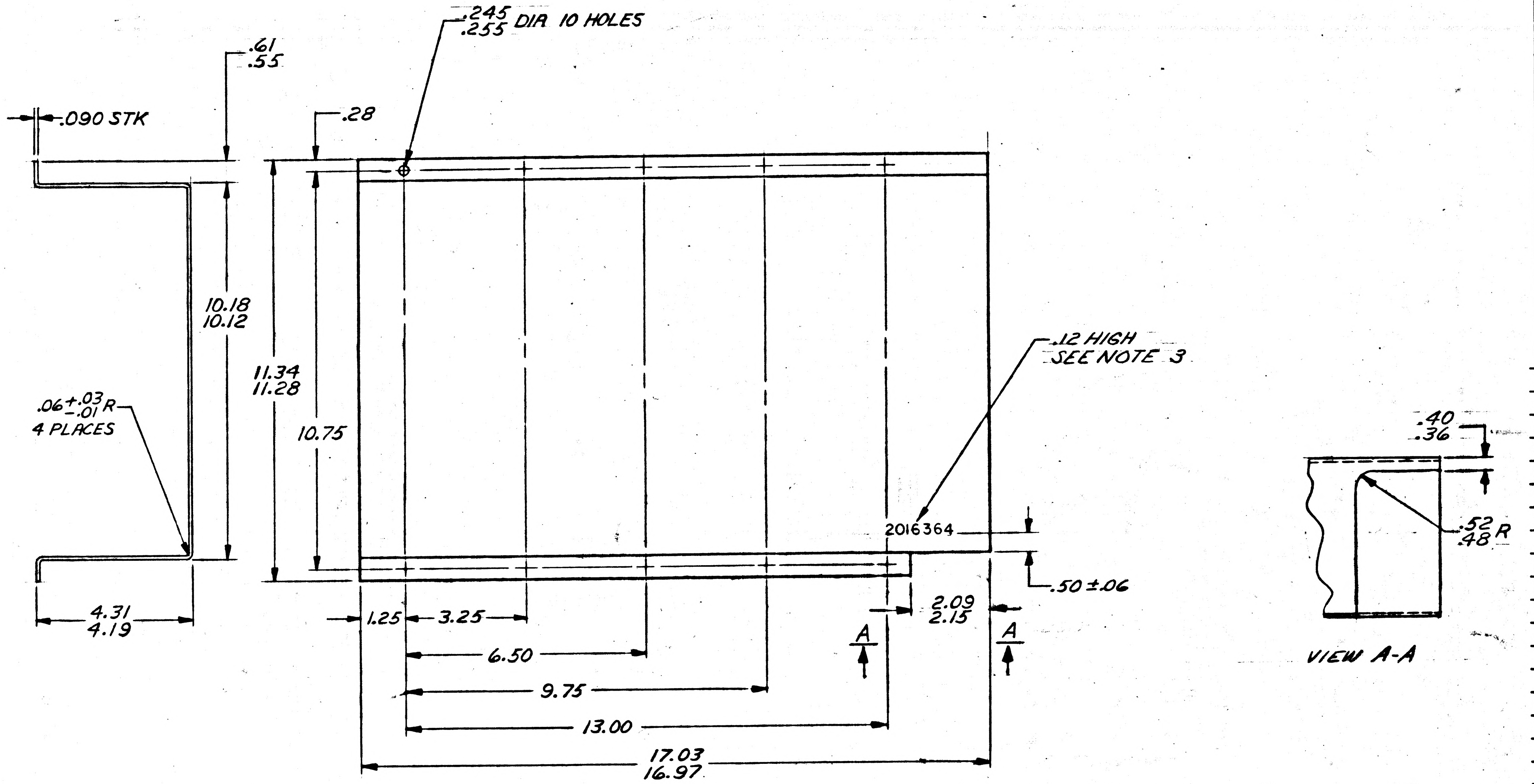
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016360
SCALE NONE
WT
SHEET 4 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

2016364 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 27693	4-1-66	



.245
.255 DIA 10 HOLES
.61
.55
.090 STK
.28
10.18
10.12
11.34
11.28
10.75
.06 +.03 −.01 R
4 PLACES
.12 HIGH
SEE NOTE 3
2016364
.50 ±.06
4.31
4.19
1.25
3.25
6.50
9.75
13.00
17.03
16.97
2.09
2.15
A
A
.40
.36
.52
.48 R
VIEW A-A

NOTES

1. REMOVE BURRS & SHARP EDGES .005/.020
2. CHROMATE PER MIL-C-5541
3. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006271-10

MASTER

2014302	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02
DECIMALS .XXX ±
ANGLES ±
DO NOT SCALE DRAWING
MATERIAL
AL 5052-H32 PER QQ-A-250/8

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

RAYTHEON
RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN BJPapia DATE 29 Jan 66
CHECKED B Jensen 28FEB66
APPROVAL 28 Feb 66
APPROVAL D. O'Bryant 2/28/66
APPROVAL 3/14/66
NASA APPROVAL A. C. [illegible]
MIT APPROVAL M G Murphy 4-1-66
MIT APPROVAL A Harano 3/29/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COVER

CODE IDENT NO. 49956
SIZE C
NASA DRAWING NO. 2016364
SCALE 1/2
WT
SHEET 1 OF 1

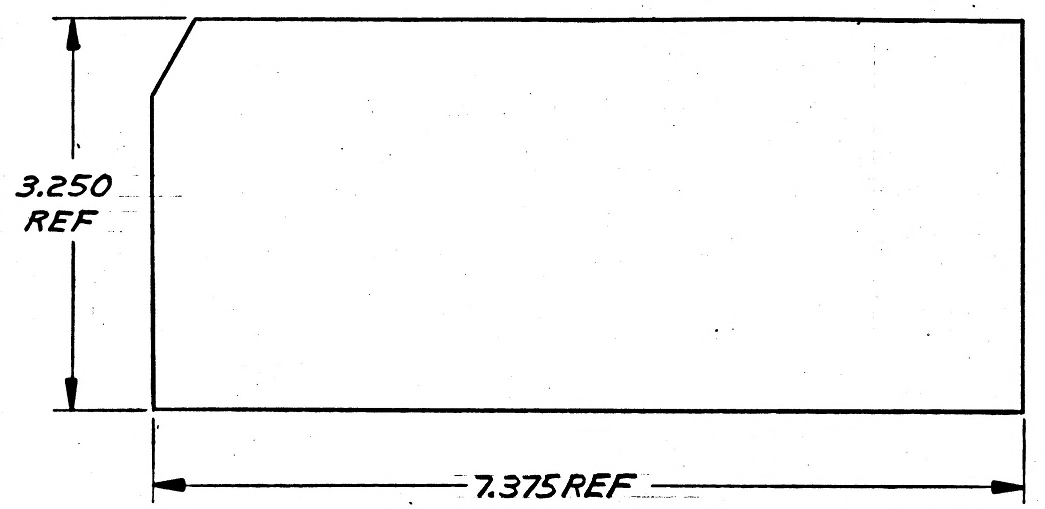
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MODERN BLUE PRINT CO., INC. 02620

2016364 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28096		

NO. OF CARDS 658



REFERENCE DRAWINGS
LOGIC DIAGRAM 2016388
MECH ASSY 2014352

NOTES
1. USE CARD FORM IBM U11897 OR EQUIVALENT
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 28MAR66
CHECKED C.A. 28MAR66
APPROVAL 30MAR66
APPROVAL 3/31/66
APPROVAL 4/13/66
NASA APPROVAL
MIT APPROVAL 4-18-66
MIT APPROVAL 4/14/66

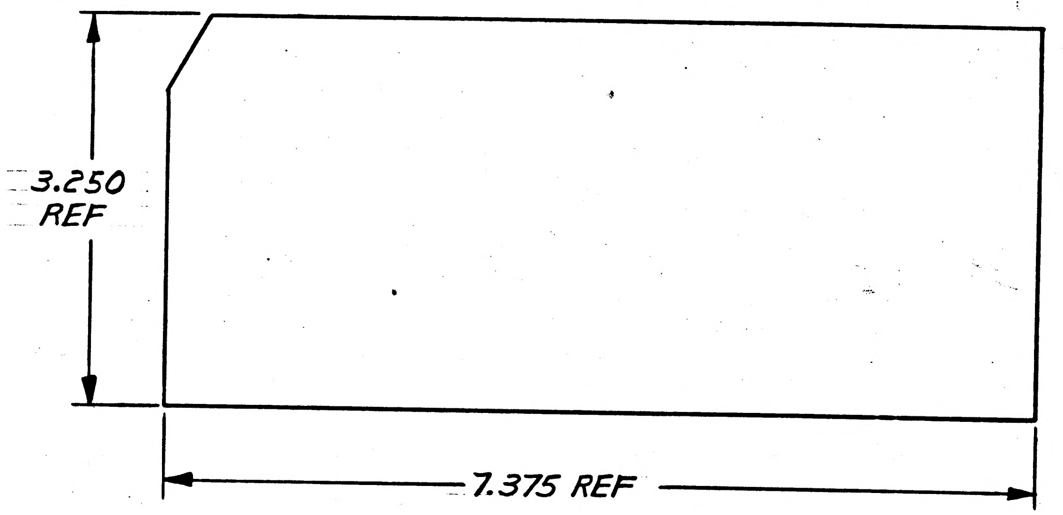
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE WRAP MACHINE CARDS
LOGIC PLATE I
PROGRAMMER & MONITOR
COMPUTER TEST SET

SIZE B
CODE IDENT NO. 49956
NASA DRAWING NO. 2016375
SCALE 1/1
WT
SHEET 1 OF 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28096		

NO. OF CARDS 698



REFERENCE DRAWINGS
LOGIC DIAG 2016390
MECH ASSY 2014336

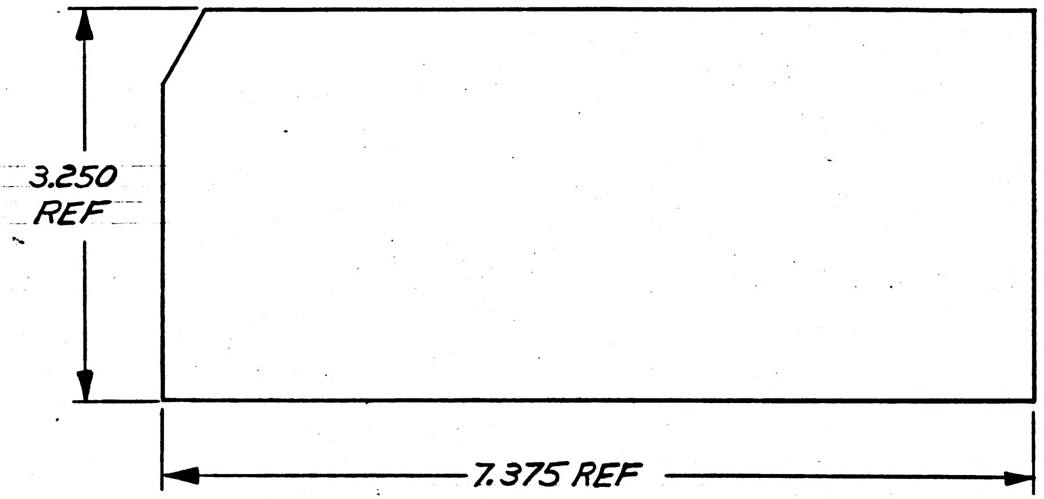
NOTES
1. USE CARD FORM IBM U11897 OR EQUIVALENT
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

RAYTHEON CO. LEXINGTON, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
CONTRACT NO. NAS 9-497	
DRAWN DATE 24MAR66	WIRE WRAP MACHINE CARDS LOGIC PLATE 3 PROGRAMMER & MONITOR COMPUTER TEST SET
CHECKED C.A. 26MAR66	
APPROVAL 30MAR66	
APPROVAL 4/1/66	
APPROVAL 4/14	
NASA APPROVAL	SIZE B · CODE IDENT NO. 49956 · NASA DRAWING NO. 2016377
MIT APPROVAL 4-18-66	
MIT APPROVAL	SCALE 1/1 · WT · SHEET 1 OF 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	*CLASS A RELEASED PER TDRR 28119*		

NO. OF CARDS 655



REFERENENCE DRAWINGS
LOGIC DIAGRAM 2016392
MECH ASSY 2014378

NOTES
1. USE CARD FORM IBM U11897 OR EQUIVALENT
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

RAYTHEON
RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO.
DRAWN DATE 25MAR66
CHECKED 29 MAR 66
APPROVAL 30 MAR 66
APPROVAL 30 MAR 66
APPROVAL 3/31/66
NASA APPROVAL
MIT APPROVAL 4-1-66
MIT APPROVAL 4/1/66

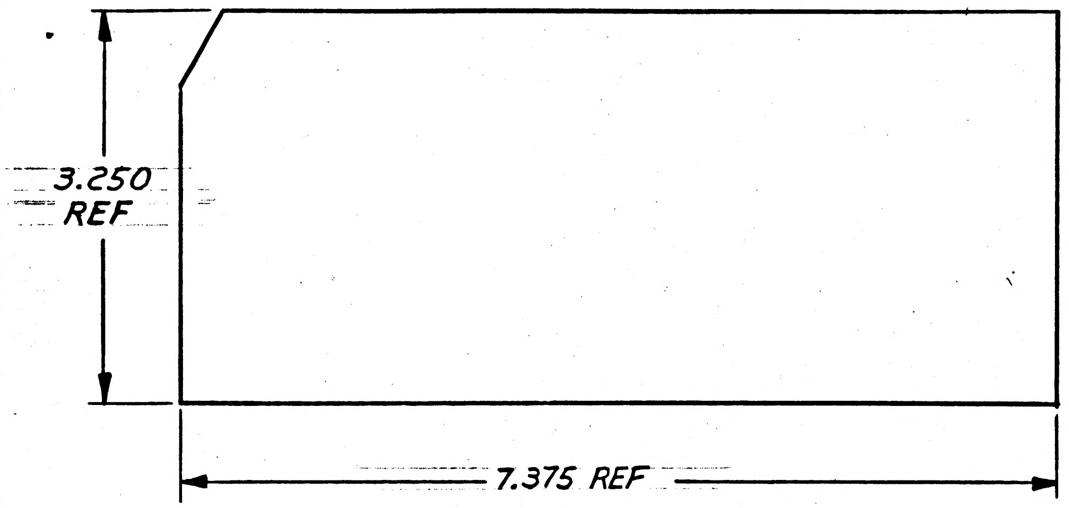
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE WRAP MACHINE CARDS
LOGIC PLATE 2
XY SYSTEM INTERFACE
COMPUTER TEST SET

SIZE
CODE IDENT NO. 49956
NASA DRAWING NO. 2016379
SCALE 1/1
WT
SHEET 1 OF 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28105		

NO. OF CARDS 512



REFERENCE DRAWINGS
LOGIC DIAG 2016393
MECH ASSY 2014046

NOTES
1. USE CARD FORM IBM U11897 OR EQUIVALENT
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

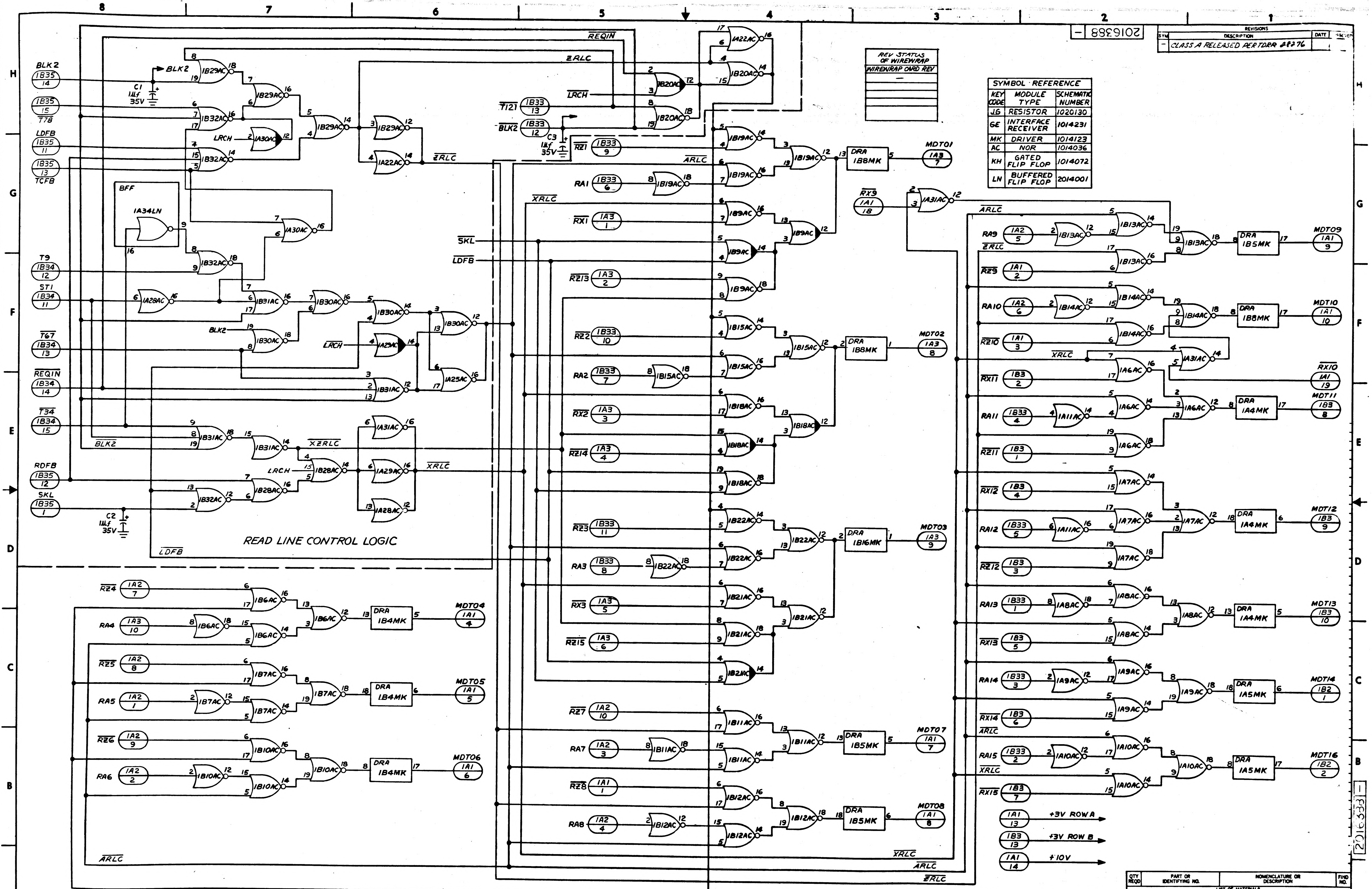
MASTER

RAYTHEON CO. LEXINGTON, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
CONTRACT NO. NAS 9-497	HAND WRAP MACHINE CARDS A18 INTERCONNECTION PLATE COMPUTER TEST SET		
DRAWN DATE 24MAR66			
CHECKED C.Q. Prestia 26MAR66			
APPROVAL P. Frazier 29MAR66			
APPROVAL D. O'Bryant 3/31/66			
APPROVAL 4/1/66			
NASA APPROVAL	SIZE B	CODE IDENT NO. 49956	NASA DRAWING NO. 2016382
MIT APPROVAL 4-18-66			
MIT APPROVAL A. Harano 4/1/66	SCALE 1/1	WT	SHEET 1 OF 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28276		

REV STATUS OF WIREWRAP
WIREWRAP CARD REV
–

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
JG	RESISTOR	1020130
GE	INTERFACE RECEIVER	1014231
MK	DRIVER	1014123
AC	NOR	1014036
KH	GATED FLIP FLOP	1014072
LN	BUFFERED FLIP FLOP	2014001



READ LINE CONTROL LOGIC
BFF
1A34LN
BLK2
C1 1µf 35V
C2 1µf 35V
C3 1µf 35V
T78
LDFB
TCFB
T9
ST1
T67
REQIN
T34
RDFB
SKL
ZRLC
LRCH
XZRLC
XRLC
ARLC
T121
RZ1
RA1
RX1
RZ13
RZ2
RA2
RX2
RZ14
RZ3
RA3
RX3
RZ15
RZ4
RA4
RZ5
RA5
RZ6
RA6
RZ7
RA7
RZ8
RA8
RX9
RA9
RZ9
RA10
RZ10
RX10
RX11
RA11
RZ11
RX12
RA12
RZ12
RA13
RX13
RA14
RX14
RA15
RX15
DRA
MDT01
MDT02
MDT03
MDT04
MDT05
MDT06
MDT07
MDT08
MDT09
MDT10
MDT11
MDT12
MDT13
MDT14
MDT16
+3V ROW A
+3V ROW B
+10V
2016388 –

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH SUB-ASSEMBLY DESIGNATIONS.

READ LINE LOGIC

REFERENCE:

1. ASSY DWG 2014352

2016388 –

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 8APR66
CHECKED 9APR66
APPROVAL 4/25/66
APPROVAL 4/25/66
APPROVAL 4/26/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
PLATE 1
PROGRAM & MONITOR

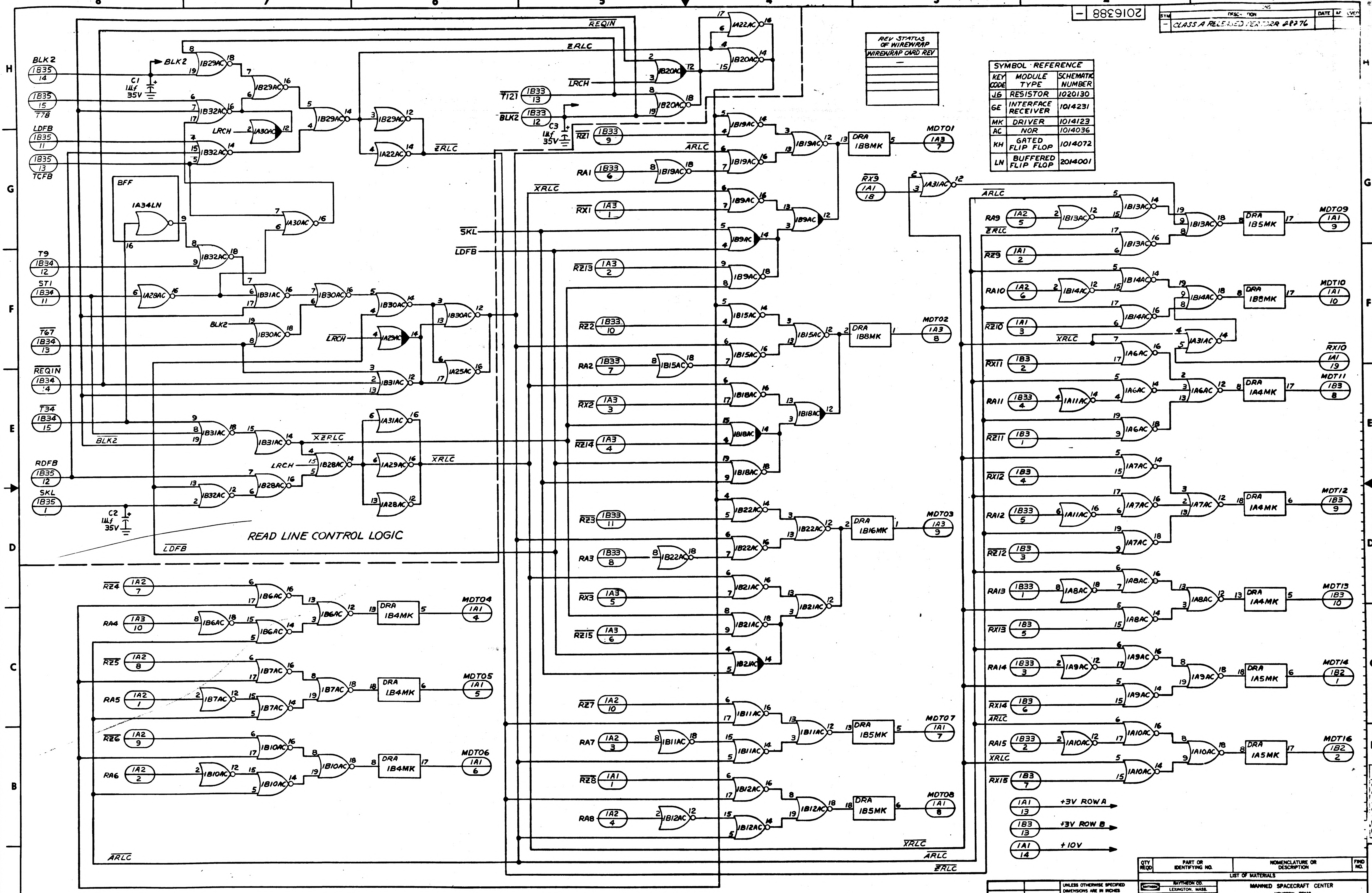
SIZE	CODE IDENT NO.	NASA DRAWING NO.
J	49956	2016388

SCALE NONE WT SHEET 1 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016388 -

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER DRR 28276		



BLK2
1B35 / 14
C1 1μf 35V
1B35 / 15
T78
LDFB
1B35 / 11
1B35 / 13
TCFB
BFF
1A34LN
T9
1B34 / 12
ST1
1B34 / 11
T67
1B34 / 13
REQIN
1B34 / 4
T34
1B34 / 15
RDFB
1B35 / 12
SKL
1B35 / 1
C2 1μf 35V
LRCH
XZRLC
XRLC
ZRLC
ARLC
T121
1B33 / 13
1B33 / 12
C3 1μf 35V
READ LINE CONTROL LOGIC
LDFB
1B29AC
1B32AC
1A30AC
1A22AC
1B20AC
1B31AC
1A28AC
1B30AC
1A29AC
1A25AC
1A31AC
1B28AC
DRA
1B8MK
MDT01
1A3 / 7
MDT02
1A3 / 8
MDT03
1A3 / 9
MDT04
1A1 / 4
MDT05
1A1 / 5
MDT06
1A1 / 6
MDT07
1A1 / 7
MDT08
1A1 / 8
MDT09
1A1 / 9
MDT10
1A1 / 10
MDT11
1B3 / 8
MDT12
1B3 / 9
MDT13
1B3 / 10
MDT14
1B2 / 1
MDT16
1B2 / 2
RX10
1A1 / 19
RX9
1A1 / 18
1B16MK
1B4MK
1B5MK
1A4MK
1A5MK
+3V ROW A
+3V ROW B
+10V
1A1 / 13
1B3 / 13
1A1 / 14

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
J6	RESISTOR	1020130
GE	INTERFACE RECEIVER	1014231
MK	DRIVER	1014123
AC	NOR	1014036
KH	GATED FLIP FLOP	1014072
LN	BUFFERED FLIP FLOP	2014001

REV STATUS OF WIREWRAP
WIREWRAP CARD REV
—

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH SUB-ASSEMBLY DESIGNATIONS.

READ LINE LOGIC

REFERENCE:

1. ASSY DWG 2014352

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE
CHECKED 8 APR 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

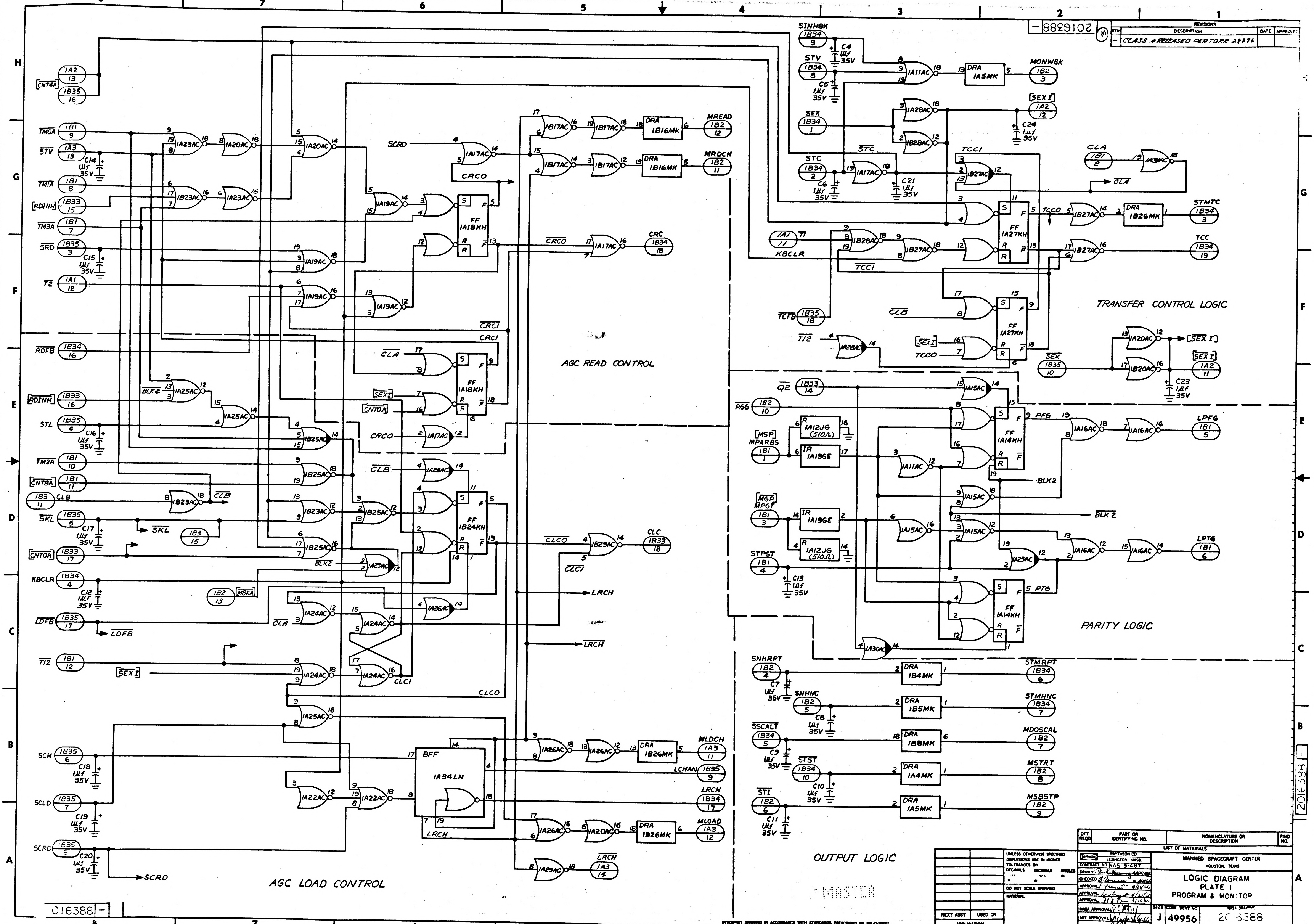
LOGIC DIAGRAM
PLATE 1
PROGRAM & MONITOR

SIZE J CODE IDENT NO. 49956 NASA DRAWING NO. 2016388
SCALE NONE WT SHEET 1 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

2016388 -


AGC READ CONTROL
AGC LOAD CONTROL
TRANSFER CONTROL LOGIC
PARITY LOGIC
OUTPUT LOGIC
MONWBK
MREAD
MRDCH
STMTC
TCC
[SEX I]
LPFG
LPTG
CRC
CLC
LRCH
STMRPT
STMHNC
MDOSCAL
MSTRT
MSBSTP
MLDCH
LCHAN
MLOAD
SINHBK
STV
SEX
STC
CLA
TMOA
TM1A
TM3A
TM2A
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SRD
T2
RDFB
STL
CNT8A
CLB
SKL
CNTOA
KBCLR
LDFB
T12
SCH
SCLD
SCRD
Q2
RGG
MSP
MPARBS
MGP
MPGT
STPGT
TCFB
SNHRPT
SNHNC
SSCALT
SFST
STI
BLK2
FF
BFF
DRA
MASTER

2016388 -

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28276		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

NEXT ASSY | USED ON

APPLICATION

RAYTHEON CO.
LEXINGTON, MASS.

CONTRACT NO NAS 9-497
DRAWN Paul A. Harmony 4APR66
CHECKED [illegible] 4/20/66
APPROVAL P. [illegible] 4/25/66
APPROVAL [illegible] 4/25/66
APPROVAL [illegible] 4/26/66
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
PLATE 1
PROGRAM & MONITOR

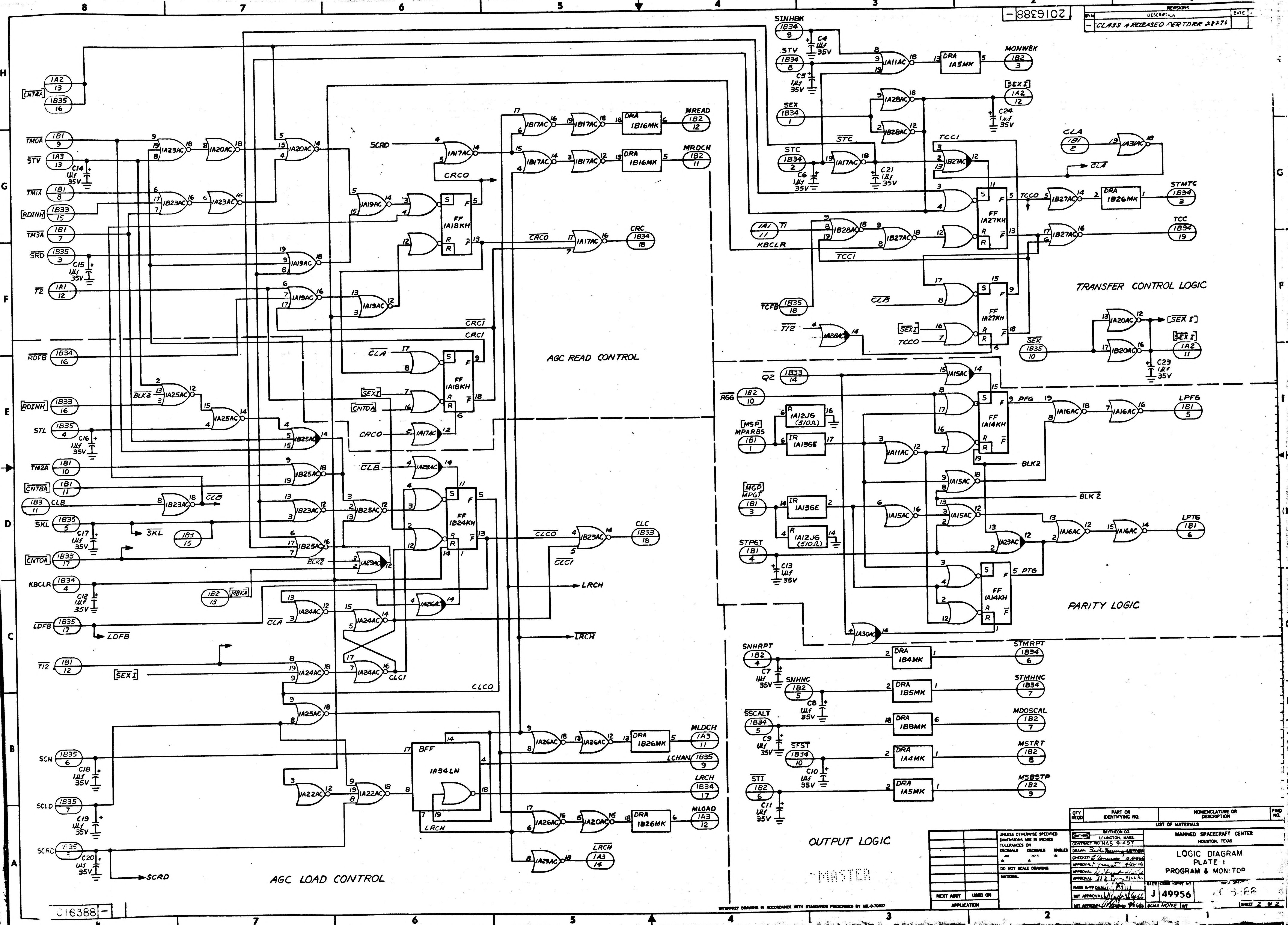
SIZE J | CODE IDENT NO. 49956 | NASA DRAWING 2016388

SCALE NONE | WT | SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016388 -

F2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AGC LOAD CONTROL
TRANSFER CONTROL LOGIC
PARITY LOGIC
OUTPUT LOGIC
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STV
TM1A
RDINH
TM3A
SRD
T2
RDFB
BLK2
STL
TM2A
CNTBA
CLB
SKL
CNTOA
KBCLR
MBKA
LDFB
T12
SEX I
SCH
SCLD
SCRD
SCRD
CRCO
CRC1
CLA
CLCO
CLC1
CLC
CRC
LRCH
LCHAN
MREAD
MRDCH
MLDCH
MLOAD
SINHBK
STV
SEX
STC
TCC1
TCCO
TCFB
MONWBK
STMTC
TCC
Q2
RGG
MSP
MPARBS
MGP
MPGT
STPGT
PFG
PTG
LPFG
LPTG
SNHRPT
SNHNC
SSCALT
SFST
STI
STMRPT
STMHNC
MDOSCAL
MSTRT
MSBSTP
BFF
IA94LN
MASTER
2016388

REVISIONS

SYM	DESCRIPTION	DATE
–	CLASS A RELEASED PER TDRR 28276	

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .xx ± DECIMALS .xxx ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

NEXT ASSY | USED ON
APPLICATION

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN
CHECKED
APPROVAL 4/25/66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

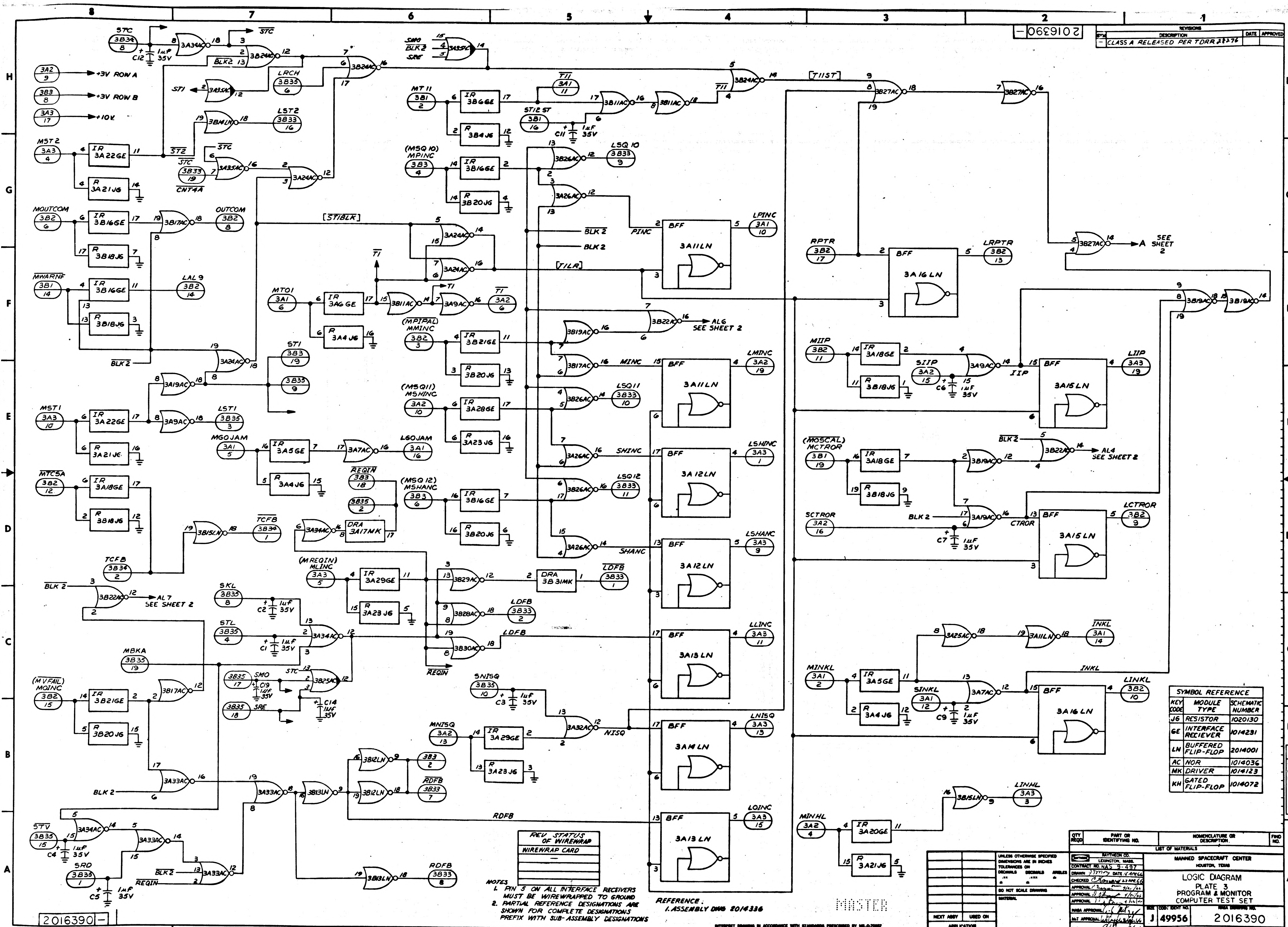
LOGIC DIAGRAM
PLATE 1
PROGRAM & MONITOR

SIZE J
CODE IDENT NO 49956
NASA DRAWING NO 2016388
SCALE NONE
SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28276		

2016390 —



STC 3B34 8
C12 1µf 35V
3A34AC
STC
3B24AC
BLK2
ST1
3A35AC
LRCH 3B35 6
3A2 9 +3V ROW A
3B3 8 +3V ROW B
3A3 17 +10V
3B14LN
LST2 3B33 16
MST2 3A3 4
IR 3A22GE
R 3A21J6
ST2
STC
3B33 19
CNT4A
3A35AC
3A24AC
MOUTCOM 3B2 6
IR 3B16GE
R 3B18J6
3B17AC
OUTCOM 3B2 8
MWARNF 3B1 14
IR 3B16GE
LAL9 3B2 14
R 3B18J6
BLK2
3A24AC
3A19AC
ST1 3B3 19
3B35 9
MST1 3A3 10
IR 3A22GE
R 3A21J6
3A9AC
LST1 3B35 3
MTC5A 3B2 12
IR 3A18GE
R 3B18J6
3B15LN
TCFB 3B34 1
TCFB 3B34 2
BLK2
3B22AC
AL7 SEE SHEET 2
MBKA 3B35 19
(MVFAIL) MQINC 3B2 15
IR 3B21GE
R 3B20J6
3B17AC
BLK2
3A33AC
STV 3B35 15
C4 1µf 35V
3A34AC
3A33AC
SRD 3B33 1
C5 1µf 35V
BLK2
REQIN
3A33AC
SMO
BLK2
SRE
3A35AC
[ST1BLK]
3A24AC
3A24AC
T1
MTO1 3A1 6
IR 3A6GE
R 3A4J6
3B11AC
3A9AC
T1
T1 3A2 6
MGOJAM 3A1 5
IR 3A5GE
R 3A4J6
3A7AC
LGOJAM 3A1 16
REQIN 3B3 18
3B35 2
3A34AC
DRA 3A17MK
(MREQIN) MLINC 3A3 5
IR 3A29GE
R 3A23J6
SKL 3B35 8
C2 1µf 35V
STL 3B35 4
C1 1µf 35V
3A34AC
3B35 17
SMO
C19 1µf 35V
3B25AC
C14 1µf 35V
3B35 18
SRE
STC
MNISQ 3A2 13
IR 3A29GE
R 3A23J6
3B12LN
3B12LN
3B3 2
RDFB 3B33 7
3A33AC
3B13LN
RDFB
3B13LN
RDFB 3B33 8
MT11 3B1 2
IR 3B6GE
R 3B4J6
T11 3A1 11
ST12 ST 3B1 16
C11 1µf 35V
3B11AC
3B11AC
T11
3B24AC
(MSQ10) MPINC 3B3 4
IR 3B16GE
R 3B20J6
3B26AC
LSQ10 3B33 9
3A26AC
BLK2
BLK2
PINC
BFF 3A11LN
LPINC 3A1 10
[T1LR]
3B22AC
AL6 SEE SHEET 2
(MPIPAL) MMINC 3B2 3
IR 3B21GE
R 3B20J6
3B19AC
3B17AC
MINC
BFF 3A11LN
LMINC 3A2 19
(MSQ11) MSHINC 3A2 10
IR 3A28GE
R 3A23J6
3B26AC
LSQ11 3B33 10
3A26AC
SHINC
BFF 3A12LN
LSHINC 3A3 1
(MSQ12) MSHANC 3B3 6
IR 3B16GE
R 3B20J6
3B26AC
LSQ12 3B33 11
3A26AC
SHANC
BFF 3A12LN
LSHANC 3A3 9
3B29AC
DRA 3B31MK
LDFB 3B33 1
3B28AC
LDFB 3B33 2
3B30AC
LDFB
REQIN
BFF 3A13LN
LLINC 3A3 11
SNISQ 3B35 10
C3 1µf 35V
3A32AC
NISQ
BFF 3A14LN
LNISQ 3A3 13
BFF 3A13LN
LOINC 3A3 15
[T11ST]
3B27AC
3B27AC
3B27AC
A SEE SHEET 2
RPTR 3B2 17
BFF 3A16LN
LRPTR 3B2 13
3B19AC
3B19AC
MIIP 3B2 11
IR 3A18GE
R 3B18J6
SIIP 3A2 15
C6 1µf 35V
3A9AC
IIP
BFF 3A15LN
LIIP 3A3 19
(MOSCAL) MCTROR 3B1 19
IR 3A18GE
R 3B18J6
3B19AC
BLK2
3B22AC
AL4 SEE SHEET 2
SCTROR 3A2 16
BLK2
3A19AC
C7 1µf 35V
CTROR
BFF 3A15LN
LCTROR 3B2 9
3A25AC
3A11LN
INKL 3A1 14
INKL
MINKL 3A1 2
IR 3A5GE
R 3A4J6
SINKL 3A1 12
C9 1µf 35V
3A7AC
BFF 3A16LN
LINKL 3B2 10
3B15LN
LINHL 3A3 3
MINHL 3A2 4
IR 3A20GE
R 3A21J6
8 7 6 5 4 3 2 1
H G F E D C B A

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
J6	RESISTOR	1020130
GE	INTERFACE RECIEVER	1014231
LN	BUFFERED FLIP-FLOP	2014001
AC	NOR	1014036
MK	DRIVER	1014123
KH	GATED FLIP-FLOP	1014072

REV STATUS OF WIREWRAP
WIREWRAP CARD
—

NOTES
1. PIN 5 ON ALL INTERFACE RECEIVERS MUST BE WIREWRAPPED TO GROUND
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE:
1. ASSEMBLY DWG 2014336

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 16 APR 66
CHECKED 22 APR 66
APPROVAL 4/20/66
APPROVAL 4/25/66
APPROVAL 4/26/66
NASA APPROVAL
M&T APPROVAL
MIT APPROVAL 4/26/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
PLATE 3
PROGRAM & MONITOR
COMPUTER TEST SET

SIZE J
COD. IDENT NO. 49956
NASA DRAWING NO. 2016390
SCALE NONE
WT
SHEET 1 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

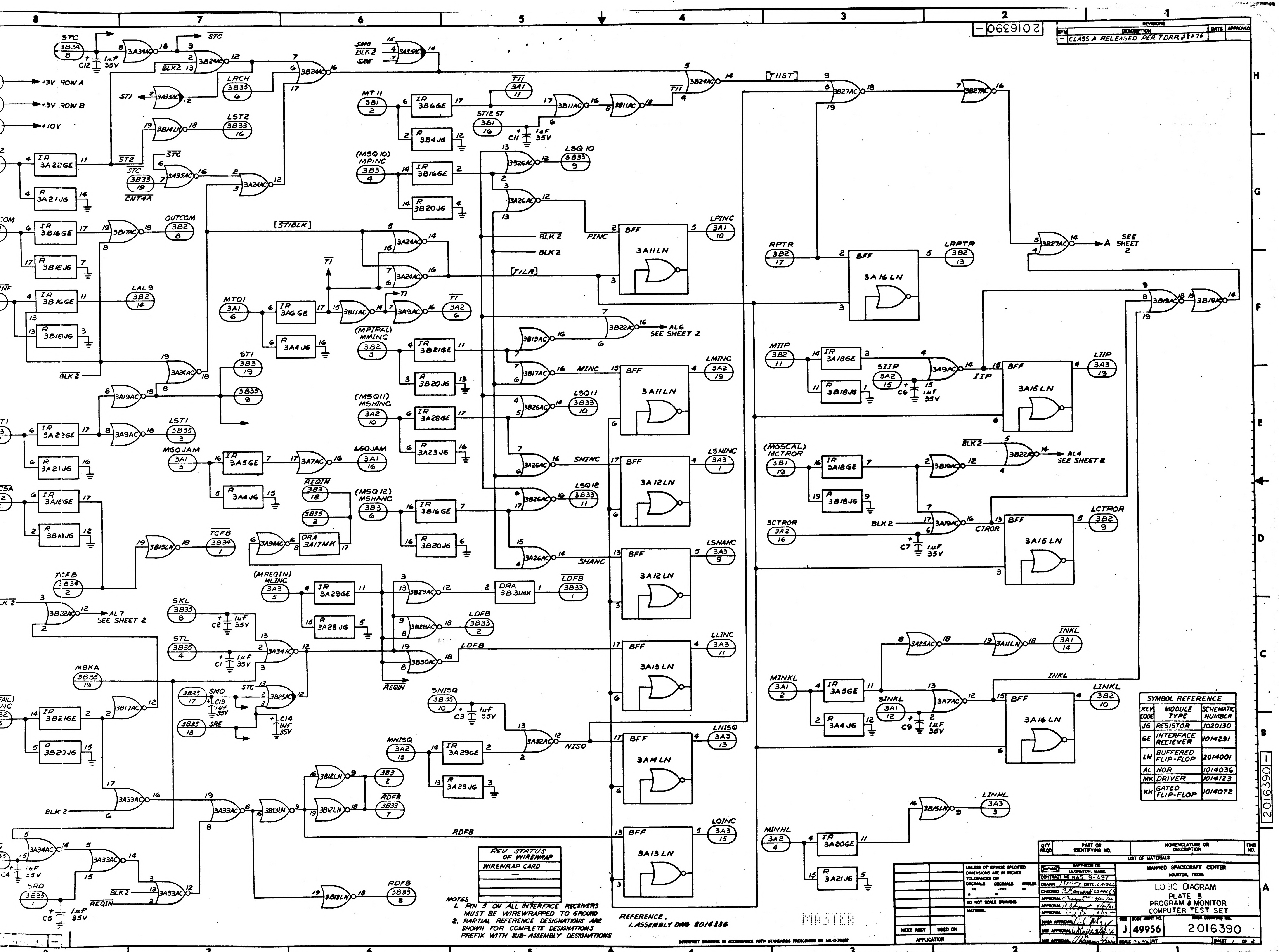
2016390 —

2016390 —

F-2

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28276		

2016390 —



STC
3B34 8
C12 1μF 35V
3A34AC
STC
3B24AC
BLK2
3B24AC
SMO
BLK2
SRE
3A35AC
3B24AC
[T11ST]
3B27AC
3B27AC
+3V ROW A
+3V ROW B
+10V
LRCH 3B35 6
ST1
3A35AC
LST2 3B33 16
3B14LN
ST2
3A22GE
3A21J6
STC
3B33 19
CNT4A
3A35AC
3A24AC
OUTCOM 3B2 7
3B16GE
3B16J6
3B17AC
[ST1BLK]
3A24AC
3A24AC
T1
[T1LR]
LAL9 3B2 14
3B16GE
3B16J6
MT11 3B1 2
3B6GE
3B4J6
T11
3A1 11
3B11AC
3B11AC
ST12 ST 3B1 16
C11 1μF 35V
(MSQ 10) MPINC 3B3 4
3B16GE
3B20J6
3B26AC
3B26AC
LSQ10 3B33 9
BLK2
PINC
BFF
3A11LN
LPINC 3A1 10
RPTR 3B2 17
3A16LN
LRPTR 3B2 13
3B27AC
A SEE SHEET 2
MTO1 3A1 6
3A6GE
3A4J6
3B11AC
3A9AC
T1 3A2 6
3B22AC
AL6 SEE SHEET 2
3B19AC
(MPIPAL) MMINC 3B2 3
3B21GE
3B20J6
3B17AC
MINC
LMINC 3A2 19
BLK2
3A24AC
3A19AC
ST1 3B3 19
3B35 9
LST1 3B35 3
3A22GE
3A21J6
3A9AC
(MSQ11) MSHINC 3A2 10
3A28GE
3A23J6
3B26AC
LSQ11 3B33 10
3A11LN
MIIP 3B2 11
3A18GE
3B18J6
SIIP 3A2 15
C6 1μF 35V
3A9AC
IIP
3A15LN
LIIP 3A3 19
3B19AC
3B19AC
MGOJAM 3A1 5
3A5GE
3A4J6
3A7AC
LGOJAM 3A1 16
REQIN 3B3 18
3B35 2
DRA 3A17MK
3A34AC
3A26AC
SHINC
3A12LN
LSHINC 3A3 1
(MOSCAL) MCTROR 3B1 19
3A18GE
3B18J6
3B19AC
BLK2
3B22AC
AL4 SEE SHEET 2
(MSQ 12) MSHANC 3B3 6
3B16GE
3B20J6
3B26AC
LSQ12 3B33 11
SCTROR 3A2 16
C7 1μF 35V
3A19AC
CTROR
3A15LN
LCTROR 3B2 9
3A1EGE
3B11J6
3B15LN
TCFB 3B34 1
3A26AC
SHANC
3A12LN
LSHANC 3A3 9
TCFB 3B34 2
(MREQIN) MLINC 3A3 5
3A29GE
3A23J6
3B29AC
DRA 3B31MK
LDFB 3B33 1
3B22AC
AL7 SEE SHEET 2
SKL 3B35 8
C2 1μF 35V
3B28AC
LDFB 3B33 2
STL 3B35 4
C1 1μF 35V
3A34AC
3B30AC
LDFB
REQIN
3A13LN
LLINC 3A3 11
3A25AC
3A11LN
INKL 3A1 14
MBKA 3B35 19
3B35 17
SMO
C19 1μF 35V
STC
3B25AC
3B35 18
SRE
C14 1μF 35V
SNISQ 3B35 10
C3 1μF 35V
3A32AC
NISQ
3A14LN
LNISQ 3A3 13
MINKL 3A1 2
3A5GE
3A4J6
SINKL 3A1 12
C9 1μF 35V
3A7AC
INKL
3A16LN
LINKL 3B2 10
3B21GE
3B20J6
3B17AC
MNISQ 3A2 13
3A29GE
3A23J6
3B12LN
3B3 2
3B12LN
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3A33AC
BLK2
3A33AC
3B13LN
3B15LN
LINHL 3A3 3
RDFB
3A13LN
LOINC 3A3 15
MINHL 3A2 4
3A20GE
3A21J6
3A34AC
C4 1μF 35V
3A33AC
BLK2
3A33AC
REQIN
SRD 3B35
C5 1μF 35V
3B13LN
RDFB 3B33 8
MASTER

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
J6	RESISTOR	1020130
GE	INTERFACE RECIEVER	1014231
LN	BUFFERED FLIP-FLOP	2014001
AC	NOR	1014036
MK	DRIVER	1014123
KH	GATED FLIP-FLOP	1014072

REV STATUS OF WIREWRAP
WIREWRAP CARD
—

NOTES
1. PIN 5 ON ALL INTERFACE RECEIVERS MUST BE WIREWRAPPED TO GROUND
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE.
1. ASSEMBLY DWG 2014336

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

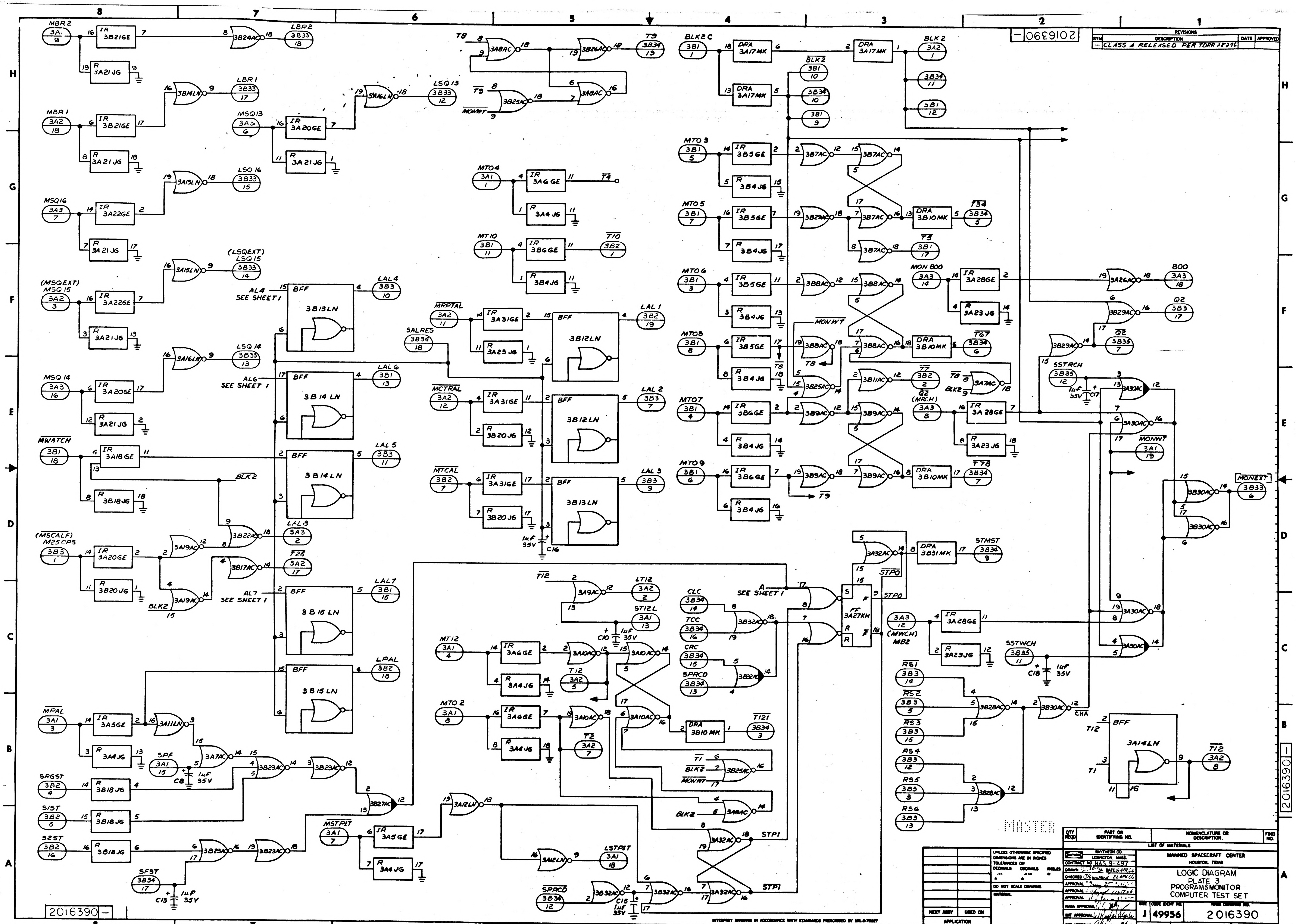
RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 16 APR 66
CHECKED 22 APR 66
APPROVAL 4/25/66
APPROVAL 4/25/66
APPROVAL 4/26/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
PLATE 3
PROGRAM & MONITOR
COMPUTER TEST SET

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016390
SCALE NONE
WT
SHEET 1 OF 2

2016390 —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3B21GE
3B24AC
LBR2
3A21JG
LBR1
3B14LN
MBR1
MSQ13
3A20GE
3A16LN
LSQ13
LSQ16
3A15LN
MSQ16
3A22GE
(LSQEXT)
LSQ15
(MSQEXT)
MSQ15
3A22GE
LSQ14
3A16LN
MSQ14
3A20GE
MWATCH
3A18GE
3B18JG
BLK2
3B22AC
LAL8
(MSCALF)
M25CPS
3A19AC
3B17AC
T25
3B20JG
AL4 SEE SHEET 1
AL6 SEE SHEET 1
AL7 SEE SHEET 1
BFF
3B13LN
3B14LN
3B15LN
LAL4
LAL6
LAL5
LAL7
LPAL
MPAL
3A5GE
3A11LN
3A7AC
SPF
3B23AC
SRGST
S1ST
S2ST
SFST
3B27AC
T8
3A8AC
3B26AC
T9
3B25AC
MONWT
MTO4
3A6GE
3A4JG
T4
MT10
3B6GE
3B4JG
T10
MRPTAL
3A31GE
3A23JG
SALRES
3B12LN
LAL1
MCTRAL
3B20JG
LAL2
MTCAL
LAL3
C16
35V
T12
3A9AC
LT12
ST12L
MT12
3A10AC
T12
MTO2
3B10MK
T121
T2
T1
BLK2
MONWT
3B25AC
3A8AC
3A12LN
MSTPIT
LSTPIT
SPRCD
3B32AC
3A32AC
STP1
CLC
TCC
CRC
SPRCD
A SEE SHEET 1
FF 3A27KH
STPQ
3A32AC
3B31MK
STMST
BLK2C
DRA 3A17MK
BLK2
MTO3
3B56GE
3B7AC
MTO5
3B29AC
3B10MK
T34
T3
MTO6
3B8AC
MTO8
3B5GE
T67
T8
3B25AC
MTO7
3B11AC
T7
3B9AC
MTO9
T9
T78
MON800
3A28GE
3A26AC
800
Q2
3B29AC
SSTRCH
C17
3A30AC
(MRCH)
MONWT
MONEXT
3B30AC
(MWCH) MB2
SSTWCH
C18
RS1
RS2
RS3
RS4
RS5
RS6
3B28AC
3B30AC
CHA
3A14LN
T12
MASTER
2016390

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TORR 38296		

REVISIONS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION.	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

NEXT ASSY | USED ON
APPLICATION

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 16 APR 66
CHECKED Hayward 22 APR 66
APPROVAL
APPROVAL 4/25/66
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
PLATE 3
PROGRAM & MONITOR
COMPUTER TEST SET

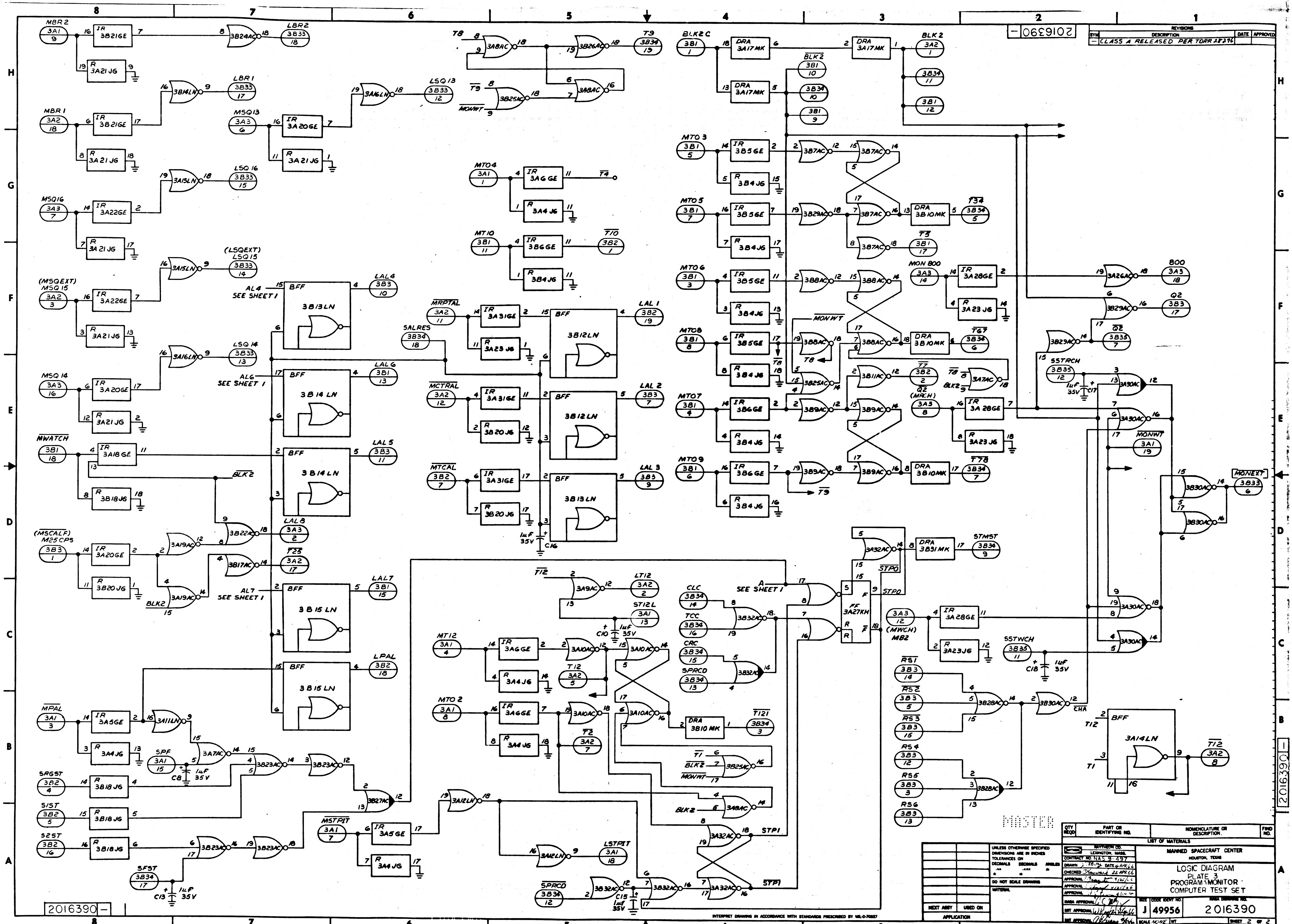
SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016390
SCALE NONE | WT | SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016390 –

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28296		

2016390 –



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MBR1
MSQ13
MSQ16
(MSQEXT) MSQ15
MSQ 14
MWATCH
(MSCALF) M25CPS
MPAL
SPF
SRGST
SIST
S2ST
SFST
LBR2
LBR1
LSQ13
LSQ16
(LSQEXT) LSQ15
LSQ14
LAL4
AL4 SEE SHEET 1
AL6 SEE SHEET 1
AL7 SEE SHEET 1
LAL6
LAL5
LAL8
T25
LAL7
LPAL
BLK2
T8
T9
MONWT
MTO4
MT10
T4
T10
MRPTAL
MCTRAL
MTCAL
SALRES
LAL1
LAL2
LAL3
C16
1µF 35V
T12
LT12
ST12L
MT12
MTO2
T2
MSTPIT
LSTPIT
SPRCD
C8
C10
C13
C15
BLK2C
BLK2
MTO3
MTO5
MTO6
MTO8
MTO7
MTO9
T34
T3
MON 800
T67
T7
Q2 (MRCH)
T78
800
Q2
SSTRCH
C17
MONEXT
STMST
STPO
A SEE SHEET 1
CLC
TCC
CRC
FF 3A27KH
(MWCH) MB2
SSTWCH
C18
RS1
RS2
RS3
RS4
RS5
RS6
CHA
T121
T1
BLKZ
STP1
BFF
IR
R
DRA
MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

NEXT ASSY | USED ON

APPLICATION

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN D. Moy DATE 16 APR 66
CHECKED Hayward 22 APR 66
APPROVAL 4/25/66
APPROVAL 4/25/66
APPROVAL 4/26/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

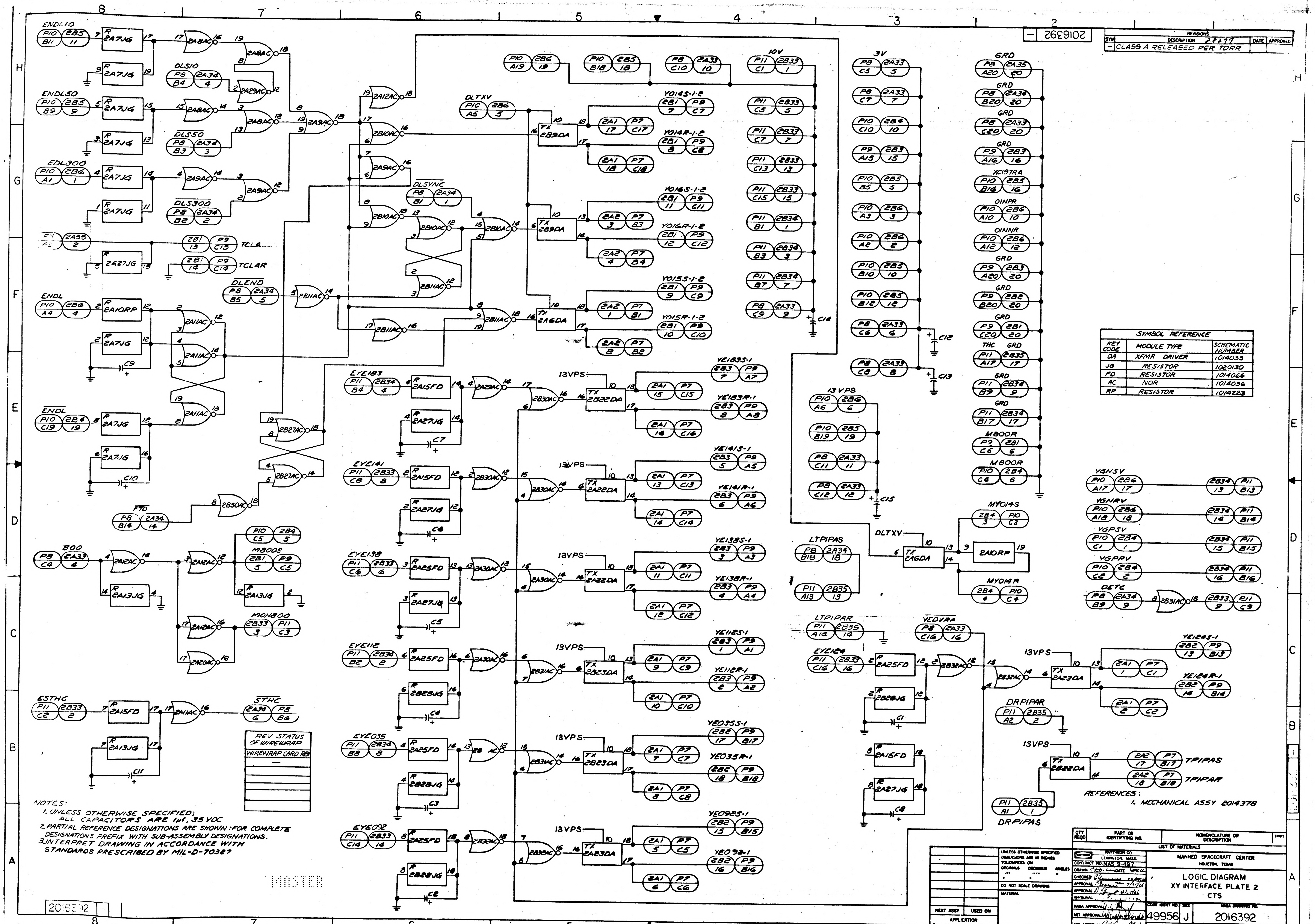
LOGIC DIAGRAM
PLATE 3
PROGRAM & MONITOR
COMPUTER TEST SET

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016390

SCALE NONE | WT | SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016390 –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ENDL50
EDL300
DLS10
DLS50
DLS300
TCLA
TCLAR
ENDL
DLEND
DLTXV
DLSYNC
FTD
800
M800S
MON800
ESTHC
STHC
EYE183
EYE141
EYE138
EYE112
EYE035
EYE092
13VPS
YE183S-1
YE183R-1
YE141S-1
YE141R-1
YE138S-1
YE138R-1
YE112S-1
YE112R-1
YE035S-1
YE035R-1
YE092S-1
YE092R-1
YO14S-1-2
YO14R-1-2
YO16S-1-2
YO16R-1-2
YO15S-1-2
YO15R-1-2
10V
3V
GRD
XC197RA
OINPR
OINNR
THC
M800R
MYO14S
MYO14R
LTPIPAS
LTPIPAR
YEDVPA
EYE124
YE124S-1
YE124R-1
DRPIPAR
DRPIPAS
TPIPAS
TPIPAR
YGNSV
YGNRV
YGPSV
YGPRV
DETC
2A10RP
REV STATUS OF WIREWRAP
WIREWRAP CARD REV
—
MASTER
2016392
—

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
DA	XFMR DRIVER	1014033
JG	RESISTOR	1020130
FD	RESISTOR	1014066
AC	NOR	1014036
RP	RESISTOR	1014223

NOTES:
1. UNLESS OTHERWISE SPECIFIED;
ALL CAPACITORS ARE 1μf, 35 VDC
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS.
3. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REFERENCES:
1. MECHANICAL ASSY 2014378

REVISIONS			
SYM	DESCRIPTION 26277	DATE	APPROVED
—	CLASS A RELEASED PER TORR		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

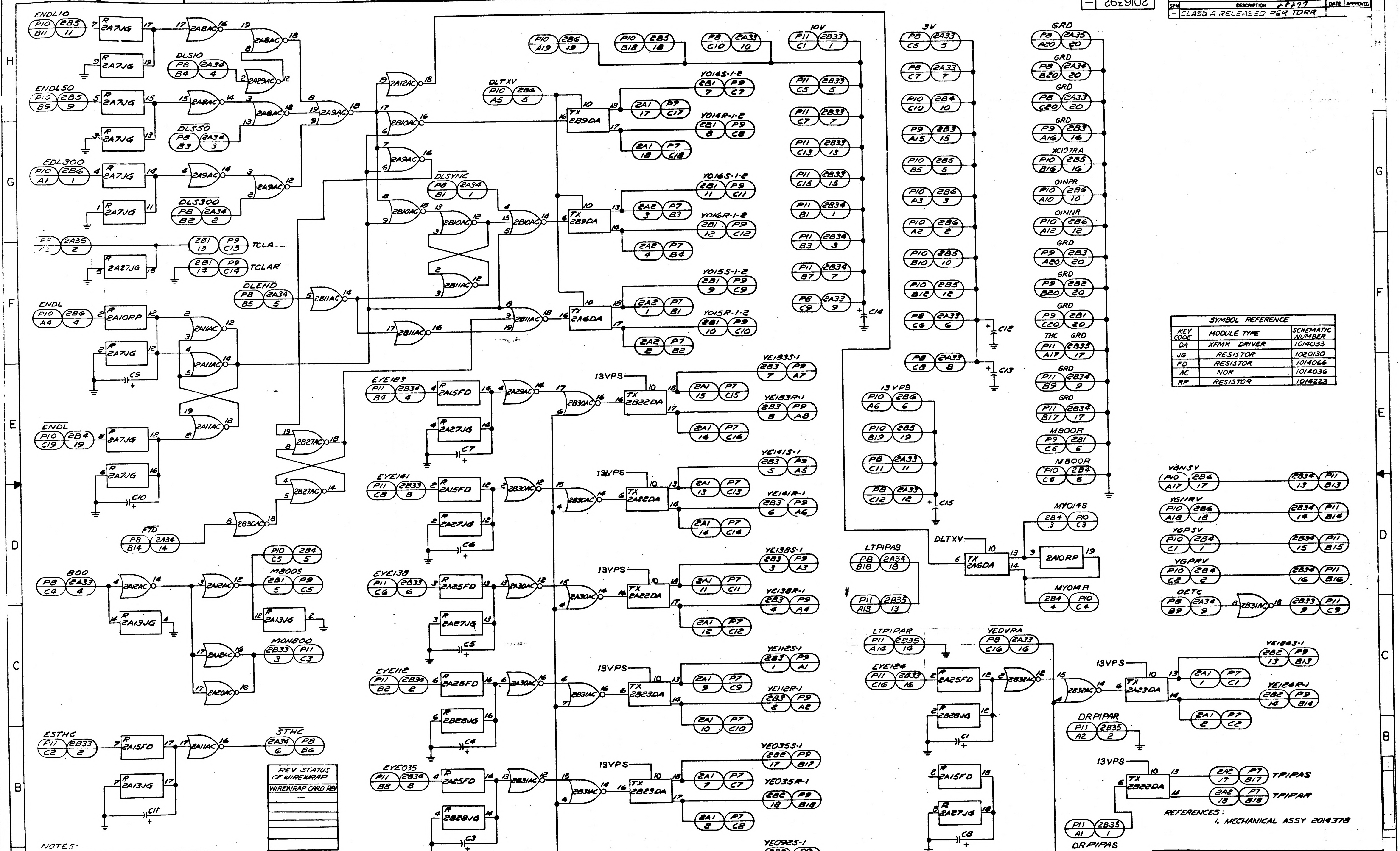
RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 3 APR 66
CHECKED 29 APR 66
APPROVAL 9/21/66
APPROVAL 4/25/66
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
XY INTERFACE PLATE 2
CTS

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016392
SCALE NONE
WT
SHEET 1 OF 2

SYM	DESCRIPTION 28277	DATE	APPROVED
—	CLASS A RELEASED PER TDRR		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ENDL50
EDL300
DLS10
DLS50
DLS300
TCLA
TCLAR
DLEND
ENDL
FTD
800
M800S
MON800
ESTHC
STHC
DLTXV
DLSYNC
10V
3V
GRD
XC197RA
OINPR
OINNR
THC
M800R
Y014S-1-2
Y014R-1-2
Y016S-1-2
Y016R-1-2
Y015S-1-2
Y015R-1-2
13VPS
EYE183
EYE141
EYE138
EYE112
EYE035
EYE092
YE183S-1
YE183R-1
YE141S-1
YE141R-1
YE138S-1
YE138R-1
YE112S-1
YE112R-1
YE035S-1
YE035R-1
YE092S-1
YE092-1
LTPIPAS
LTPIPAR
YEDVPA
EYE124
YE124S-1
YE124R-1
DRPIPAR
DRPIPAS
TPIPAS
TPIPAR
MY014S
MY014R
YGNSV
YGNRV
YGPSV
YGPRV
DETC
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
REV STATUS OF WIREWRAP
WIREWRAP CARD REV
—

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
DA	XFMR DRIVER	1014033
JG	RESISTOR	1020130
FD	RESISTOR	1014066
AC	NOR	1014036
RP	RESISTOR	1014223

REFERENCES:
1. MECHANICAL ASSY 2014378

NOTES:
1. UNLESS OTHERWISE SPECIFIED;
ALL CAPACITORS ARE 1µf, 35 VDC
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS.
3. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 3APR66
CHECKED 23APR66
APPROVAL 4/25/66
APPROVAL 4/25/66
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 4/25/66

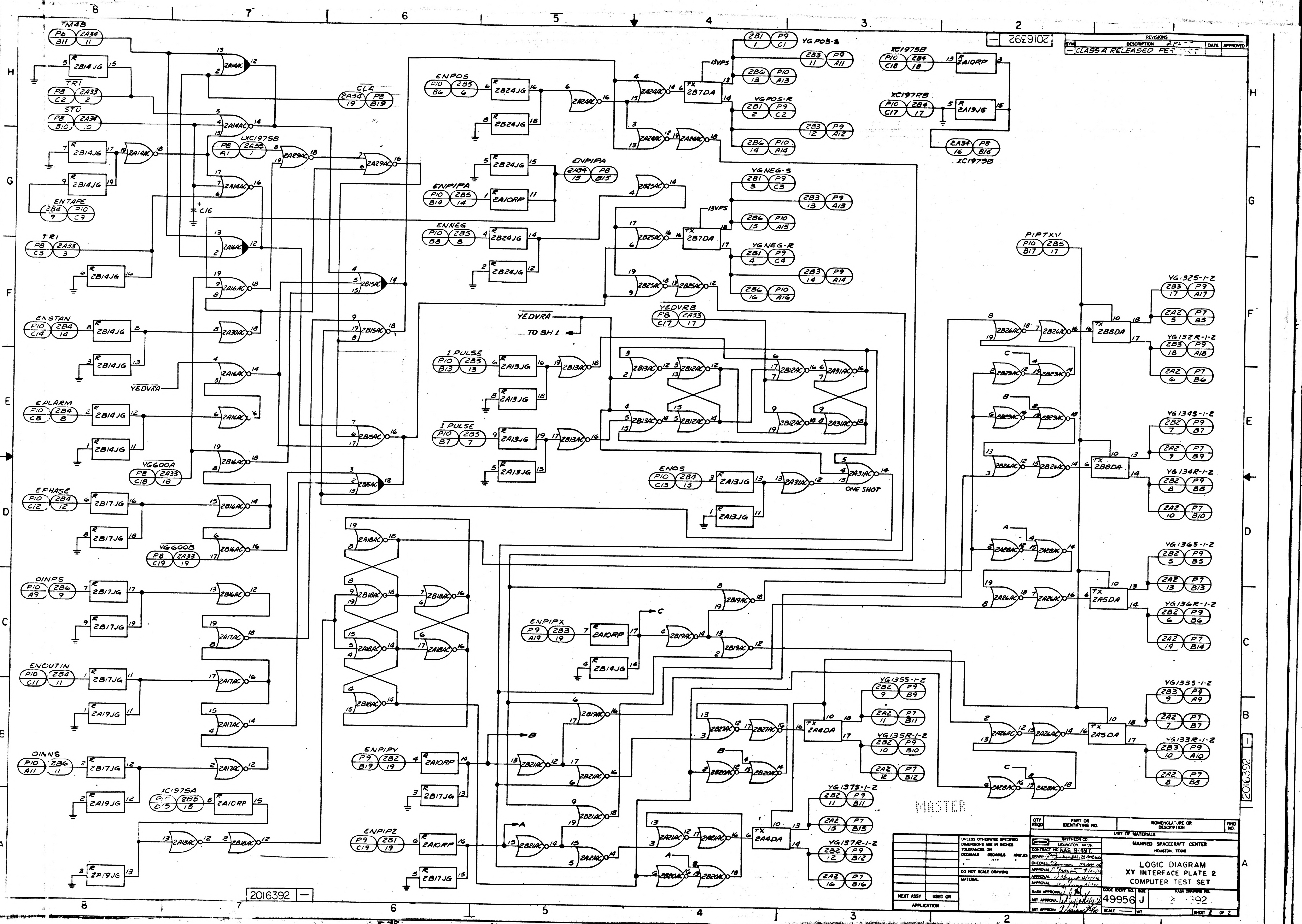
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
XY INTERFACE PLATE 2
CTS

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016392
SCALE NONE
WT
SHEET 1 OF 2

2016392 —

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER		


TM4B
TRI
STU
CLA
ENTAPE
LXC1975B
C16
EASTAN
EPLARM
YEDVRA
YG600A
EPHASE
YG600B
OINPS
ENOUTIN
OINNS
XC1975A
ENPOS
ENPIPA
ENNEG
YGPOS-S
YGPOS-R
13VPS
YGNEG-S
YGNEG-R
XC1975B
XC197RB
YEDVRA
TO SH 1
YEDVRB
1 PULSE
ENOS
ONE SHOT
PIPTXV
YG132S-1-Z
YG132R-1-Z
YG134S-1-Z
YG134R-1-Z
YG136S-1-Z
YG136R-1-Z
ENPIPX
YG135S-1-Z
YG135R-1-Z
YG133S-1-Z
YG133R-1-Z
ENPIPY
ENPIPZ
YG137S-1-Z
YG137R-1-Z
MASTER
2016392 —

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

NEXT ASSY	USED ON
APPLICATION	

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DAT. 25 APR 66
CHECKED 23 APR 66
APPROVAL P. Frazier 4/25/66
APPROVAL 4/25/66
APPROVAL 4/5/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

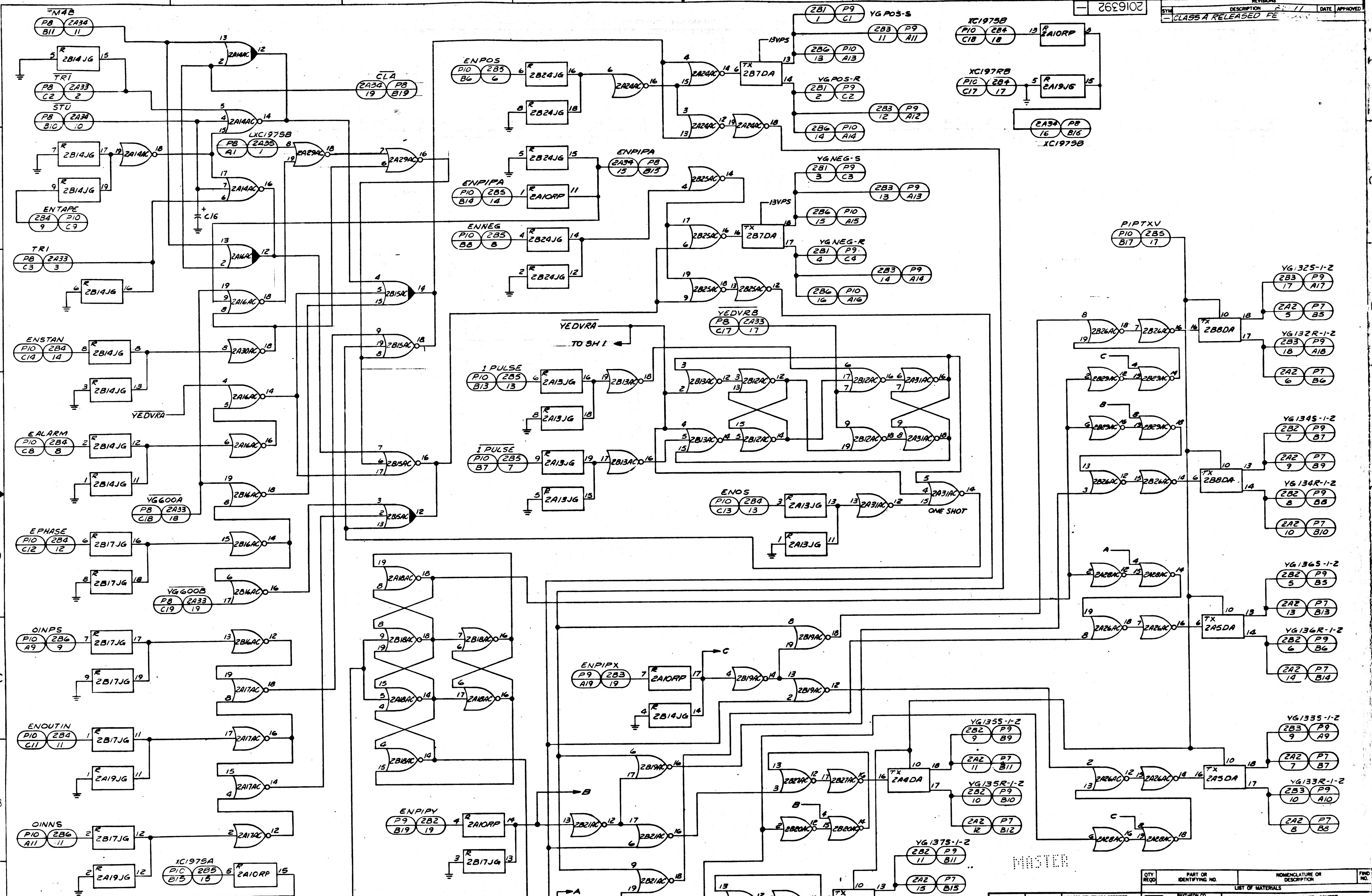
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
XY INTERFACE PLATE 2
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2 392
SCALE —
WT
SHEET 2 OF 2

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PE		

— 2016392



M4B
TRI
STU
ENTAPE
LXC1975B
CLA
ENSTAN
YEDVRA
EALARM
VG600A
EPHASE
VG600B
OINPS
ENOUTIN
OINNS
XC197SA
C16
ENPOS
ENPIPA
ENNEG
13VPS
YG POS-S
YG POS-R
YG NEG-S
YG NEG-R
XC1975B
XC197RB
YEDVRB
TO SH I
1 PULSE
ENOS
ONE SHOT
ENPIPX
ENPIPY
ENPIPZ
PIPTXV
YG132S-1-2
YG132R-1-2
YG134S-1-2
YG134R-1-2
YG136S-1-2
YG136R-1-2
YG133S-1-2
YG133R-1-2
YG135S-1-2
YG135R-1-2
YG137S-1-2
YG137R-1-2
A
B
C

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.

CONTRACT NO. NAS 9-497
DRAWN DATE 23 APR 66
CHECKED 23 APR 66
APPROVAL 4-25-66
APPROVAL 4-25-66
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
XY INTERFACE PLATE 2
COMPUTER TEST SET

CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	J	-2

SCALE — WT SHEET 2 OF 2

2016392 —

2016393 —

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28105		

SIGNAL	FROM	TO	FROM	TO	FROM	TO
ACSP1	A1-34-12	A3-26-12				
ACSP2	A1-34-02	A3-27-02				
BLK2	A1-28-05	A2-18-03	A2-18-03	A2-18-17	A2-18-17	A3-02-07
BLK2B	A3-12-16	A3-25-12				
BLK2C	A2-18-09	A3-15-07				
B2	A2-07-04	A2-20-04				
CLB	A2-06-06	A2-33-04	A2-06-06	A1-19-13		
CNTRL1	A3-20-02	A3-29-17				
CNTRL2	A3-21-12	A3-28-06				
$\overline{\text{CNTOA}}$	A2-11-05	A2-27-12				
CNTOA	A2-07-15	A2-31-13				
$\overline{\text{CNT1A}}$	A1-13-03	A2-05-03	A2-05-03	A2-29-12		
$\overline{\text{CNT2A}}$	A1-27-17	A2-06-02				
$\overline{\text{CNT3A}}$	A1-26-17	A2-07-06				
$\overline{\text{CNT4A}}$	A1-32-03	A2-04-03	A2-04-03	A2-32-17		
$\overline{\text{CNT5A}}$	A1-14-17	A2-06-05				
$\overline{\text{CNT6A}}$	A1-14-13	A1-15-07	A1-15-07	A2-04-13		
$\overline{\text{CNT7A}}$	A1-27-08	A2-05-05				
$\overline{\text{CNT8A}}$	A1-25-17	A2-07-19	A2-07-19	A2-36-09		
DAB	A1-43-12	A3-07-19	A3-07-19	A3-27-11		
DAG	A1-44-12	A3-15-01	A3-15-01	A3-26-01		
DALP(DAL)	A1-43-02	A3-10-09	A3-10-09	A3-25-11		
DAQ	A1-42-14	A3-14-01	A3-14-01	A3-26-11		
DAX	A2-12-14	A3-10-19	A3-10-19	A3-25-01		
DAY	A2-03-16	A3-15-11	A3-15-11	A3-27-01		
DRTEST	A3-02-04	A3-16-11				
$\overline{\text{EBK10}}$	A1-28-09	A2-10-07				
EBK10	A1-30-16	A2-10-19	A2-10-19	A2-29-03		
$\overline{\text{EBK11}}$	A1-28-03	A2-12-19				
EBK11	A1-29-14	A2-10-09	A2-10-09	A2-29-17		
$\overline{\text{EBK9}}$	A1-30-08	A2-11-19				
EBK9	A1-27-04	A2-09-01	A2-09-01	A2-30-17		
FBK11	A1-11-06	A1-38-16	A1-38-16	A2-29-07	A2-29-07	A2-39-14
$\overline{\text{FBK11}}$	A1-12-16	A1-38-06				
$\overline{\text{FBK12}}$	A1-07-03	A1-39-06				
FBK12	A1-07-13	A1-39-16	A1-39-16	A2-28-03	A2-28-03	A2-39-04
$\overline{\text{FBK13}}$	A1-11-02	A1-37-05				
FBK13	A1-13-06	A1-37-15	A1-37-15	A2-30-14	A2-30-14	A2-37-13
$\overline{\text{FBK14}}$	A1-10-12	A1-38-05				
FBK14	A1-10-13	A1-38-15	A1-38-15	A2-28-18	A2-28-18	A2-37-03
FBK16	A1-07-12	A1-41-14	A1-41-14	A2-26-12	A2-26-12	A2-38-13
$\overline{\text{FBK16}}$	A1-11-08	A1-35-05				
$\overline{\text{FEXT5}}$	A2-07-11	A2-23-01				
FEXT5	A2-08-13	A2-25-11				
$\overline{\text{FEXT6}}$	A2-07-03	A2-23-11				
FEXT6	A2-11-17	A2-25-19				
$\overline{\text{FEXT7}}$	A2-12-08	A2-26-02				
FEXT7	A2-10-17	A2-27-07				
GRD	A1-01-10	A1-01-20	A1-01-20	A1-02-10	A1-02-10	A1-02-20
	A1-02-20	A1-03-10	A1-03-10	A1-03-20	A1-03-20	A1-04-10
	A1-04-10	A1-04-20	A1-04-20	A1-05-10	A1-05-10	A1-05-20
	A1-05-20	A1-06-10	A1-06-10	A1-06-20	A1-06-20	A1-07-10
	A1-07-10	A1-07-20	A1-07-20	A1-08-10	A1-08-10	A1-08-20
	A1-08-20	A1-09-10	A1-09-10	A1-09-20	A1-09-20	A1-10-10
	A1-10-10	A1-10-20	A1-10-20	A1-11-10	A1-11-10	A1-11-20
	A1-11-20	A1-12-10	A1-12-10	A1-12-20	A1-12-20	A1-13-20
	A1-13-20	A1-18-10	A1-18-10	A1-19-04	A1-19-04	A1-19-05
	A1-19-05	A1-19-06	A1-19-06	A1-19-09	A1-19-09	A1-19-10
	A1-19-10	A1-19-19	A1-19-19	A1-19-20	A1-19-20	A1-20-03
	A1-20-03	A1-20-05	A1-20-05	A1-20-09	A1-20-09	A1-20-10
	A1-20-10	A1-20-15	A1-20-15	A1-20-19	A1-20-19	A1-20-20
	A1-20-20	A1-21-04	A1-21-04	A1-21-05	A1-21-05	A1-21-06
	A1-21-06	A1-21-08	A1-21-08	A1-21-10	A1-21-10	A1-21-13
	A1-21-13	A1-21-15	A1-21-15	A1-21-16	A1-21-16	A1-21-20
	A1-21-20	A1-25-20	A1-25-20	A1-26-10	A1-26-10	A1-27-10
	A1-27-10	A1-27-20	A1-27-20	A1-28-10	A1-28-10	A1-28-20
	A1-28-20	A1-29-10	A1-29-10	A1-29-20	A1-29-20	A1-34-10
	A1-34-10	A1-34-20	A1-34-20	A1-35-10	A1-35-10	A1-35-20
	A1-35-20	A1-36-10	A1-36-10	A1-36-20	A1-36-20	A1-39-03
	A1-39-03	A1-39-15	A1-39-15	A1-43-10	A1-43-10	A1-43-20
	A1-43-20	A1-44-10	A1-44-10	A1-44-20	A1-44-20	A1-45-10
	A1-45-10	A1-45-20	A1-45-20	A2-01-20	A2-01-20	A2-05-10
	A2-05-10	A2-06-10	A2-06-10	A2-06-20	A2-06-20	A2-07-10
	A2-07-10	A2-07-20	A2-07-20	A2-08-10	A2-08-10	A2-08-20
	A2-08-20	A2-13-04	A2-13-04	A2-13-05	A2-13-05	A2-13-06
	A2-13-06	A2-13-07	A2-13-07	A2-13-10	A2-13-10	A2-13-19
	A2-13-19	A2-13-20	A2-13-20	A2-14-03	A2-14-03	A2-14-05
	A2-14-05	A2-14-09	A2-14-09	A2-14-10	A2-14-10	A2-14-20
	A2-14-20	A2-15-01	A2-15-01	A2-15-04	A2-15-04	A2-15-05
	A2-15-05	A2-15-06	A2-15-06	A2-15-08	A2-15-08	A2-15-10
	A2-15-10	A2-15-13	A2-15-13	A2-15-15	A2-15-15	A2-15-16
	A2-15-16	A2-15-20	A2-15-20	A2-16-10	A2-16-10	A2-16-20
	A2-16-20	A2-17-10	A2-17-10	A2-17-20	A2-17-20	A2-18-10
	A2-18-10	A2-18-20	A2-18-20	A2-19-10	A2-19-10	A2-19-20
	A2-19-20	A2-20-10	A2-20-10	A2-20-20	A2-20-20	A2-21-10
GRD	A2-21-10	A2-21-20	A2-21-20	A2-22-10	A2-22-10	A2-22-20

SIGNAL	FROM	TO	FROM	TO	FROM	TO
GRD	A2-22-20	A2-23-10	A2-23-10	A2-23-20	A2-23-20	A2-24-10
	A2-24-10	A2-24-20	A2-24-20	A2-25-10	A2-25-10	A2-25-20
	A2-25-20	A2-26-10	A2-26-10	A2-26-20	A2-26-20	A2-27-10
	A2-27-10	A2-27-20	A2-27-20	A2-28-10	A2-28-10	A2-28-20
	A2-28-20	A2-29-10	A2-29-10	A2-29-20	A2-29-20	A2-30-10
	A2-30-10	A2-30-20	A2-30-20	A2-31-10	A2-31-10	A2-31-20
	A2-31-20	A2-32-10	A2-32-10	A2-32-20	A2-32-20	A2-33-10
	A2-33-10	A2-33-20	A2-33-20	A2-34-10	A2-34-10	A2-34-20
	A2-34-20	A2-35-10	A2-35-10	A2-35-20	A2-35-20	A2-36-10
	A2-36-10	A2-36-20	A2-36-20	A2-37-10	A2-37-10	A2-37-20
	A2-37-20	A2-38-20	A2-38-20	A2-39-10	A2-39-10	A2-39-20
	A2-39-20	A2-40-10	A2-40-10	A2-40-20	A2-40-20	A2-41-10
	A2-41-10	A2-41-20	A2-41-20	A2-42-10	A2-42-10	A2-42-20
	A2-42-20	A2-43-10	A2-43-10	A2-43-20	A2-43-20	A2-44-10
	A2-44-10	A2-44-20	A2-44-20	A2-45-10	A2-45-10	A2-45-20
	A2-45-20	A3-01-10	A3-01-10	A3-01-20	A3-01-20	A3-02-10
	A3-02-10	A3-02-20	A3-02-20	A3-03-10	A3-03-10	A3-03-20
	A3-03-20	A3-04-10	A3-04-10	A3-04-20	A3-04-20	A3-05-10
	A3-05-10	A3-05-20	A3-05-20	A3-06-10	A3-06-10	A3-06-20
	A3-06-20	A3-07-10	A3-07-10	A3-07-20	A3-07-20	A3-08-10
	A3-08-10	A3-08-20	A3-08-20	A3-09-10	A3-09-10	A3-09-20
	A3-09-20	A3-10-10	A3-10-10	A3-10-20	A3-10-20	A3-11-10
	A3-11-10	A3-11-20	A3-11-20	A3-12-10	A3-12-10	A3-12-20
	A3-12-20	A3-13-10	A3-13-10	A3-13-20	A3-13-20	A3-14-10
	A3-14-10	A3-14-20	A3-14-20	A3-15-10	A3-15-10	A3-15-20
	A3-15-20	A3-16-10	A3-16-10	A3-16-20	A3-16-20	A3-17-10
	A3-17-10	A3-17-20	A3-17-20	A3-18-10	A3-18-10	A3-18-20
	A3-18-20	A3-19-10	A3-19-10	A3-19-20	A3-19-20	A3-20-10
	A3-20-10	A3-20-20	A3-20-20	A3-21-10	A3-21-10	A3-21-20
	A3-21-20	A3-22-10	A3-22-10	A3-22-20	A3-22-20	A3-23-10
	A3-23-10	A3-23-20	A3-23-20	A3-24-10	A3-24-10	A3-24-20
	A3-24-20	A3-25-10	A3-25-10	A3-25-20	A3-25-20	A3-26-10
	A3-26-10	A3-26-16	A3-26-16	A3-26-20	A3-26-20	A3-27-10
	A3-27-10	A3-27-20	A3-27-20	A3-28-07	A3-28-07	A3-28-08
	A3-28-08	A3-28-10	A3-28-10	A3-28-17	A3-28-17	A3-28-18
	A3-28-18	A3-28-20	A3-28-20	A3-29-08	A3-29-08	A3-29-18
	A3-29-18	A3-30-09	A3-30-09	A3-30-10	A3-30-10	A3-30-18
	A3-30-18	A3-30-19	A3-30-19	A3-33-10	A3-33-10	A3-34-10
	A3-34-10	A3-34-20	A3-34-20	A3-35-10	A3-35-10	A3-35-20
GRD	A3-35-20	A3-36-10	A3-36-10	A3-36-20	A3-36-20	A1-13-10
$\overline{\text{INKL}}$	A1-32-14	A2-20-17				
KBBS1	A1-16-14	A2-25-12				
KBBS2	A1-18-03	A2-27-03				
KBCLR	A1-13-16	A1-15-13	A1-15-13	A1-25-09	A1-25-09	A1-33-14
KBCLR	A1-33-14	A2-05-02	A2-05-02	A2-30-02		
$\overline{\text{KBCLR}}$	A2-30-01					
$\overline{\text{KBERR}}$	A1-13-12	A2-23-05				
[$\overline{\text{KBINFO}}$]	A1-15-03	A2-24-14				
[$\overline{\text{KBRET}}$]	A2-04-18	A2-25-09				
[$\overline{\text{KBSIG}}$]	A2-04-08	A2-22-03				
KBSTP	A1-26-19	A2-24-15				
[$\overline{\text{K1}}$]	A1-14-12	A2-10-15	A2-10-15	A2-22-13		
[$\overline{\text{K2}}$]	A1-14-02	A2-10-05	A2-10-05	A2-24-04		
[K3]	A1-15-12	A2-11-15	A2-11-15	A2-23-04		
LAAGRE	A1-34-13	A2-08-11				
LAL1	A1-08-14	A2-18-19				
LAL10	A1-07-06	A2-29-15				
LAL11	A1-09-15	A2-29-05				
LAL12	A1-08-16	A2-28-16				
LAL13	A1-08-06	A2-28-06				
LAL14	A1-09-18	A2-30-03				
LAL15	A1-07-17	A2-29-13				
LAL16	A1-08-17	A2-29-14				
LAL17	A1-07-05	A2-29-04				
LAL18	A1-08-15	A2-28-01				
LAL2	A1-08-04	A2-19-05				
LAL3	A1-07-15	A2-20-15				
LAL4	A1-09-05	A2-20-05				
LAL5	A1-07-14	A2-21-15				
LAL6	A1-07-04	A2-18-07				
LAL7	A1-09-07	A2-16-06				
LAL8	A1-07-16	A2-16-05				
LAL9	A1-08-05	A2-19-11				
LBAGRE	A1-34-03	A2-07-13				
LCL	A1-19-07	A2-02-17				
$\overline{\text{LCL}}$	A1-19-08	A2-02-07	A2-02-07	A3-01-07		
LCTROR	A1-35-06	A2-19-02				
LEBK10	A1-26-13	A2-37-04				
LEBK11	A1-29-16	A2-38-14				
LEBK9	A1-26-03	A2-37-14				
LGAGRE	A1-35-13	A2-12-15				
LGOJAM	A1-36-15	A2-21-17				
LIIP	A1-36-16	A2-18-13				
LINHL	A1-36-17	A2-23-19				
LINKL	A1-35-16	A2-20-12				
LLDFB	A1-36-05	A2-17-04				
LMINC	A1-35-04	A2-19-09				
LNISQ	A1-34-15	A2-18-04				
LPAL	A1-34-06	A2-17-09				
LPFG	A1-35-12	A2-33-01				

SIGNAL	FROM	TO	FROM	TO	FROM	TO
LPINC	A1-36-14	A2-21-08				
LPTG	A1-35-03	A2-34-19				
$\overline{\text{LRCH}}$	A1-04-11	A2-34-05	A2-34-05	A3-03-04		
LRDFB	A1-34-14	A2-16-03				
LRPTR	A1-36-06	A2-21-02				
LSHANC	A1-34-04	A2-16-04				
LSHINC	A1-35-14	A2-16-15				
LSTPIT	A1-35-15	A2-21-07				
LST3	A1-27-05	A2-23-02				
LTVF	A2-04-09	A2-24-02				
LT12	A1-34-05	A2-16-12				
MAL10	A2-29-11	A3-24-09				
MAL11	A2-28-14	A3-19-06				
MAL13	A2-30-05	A3-20-16				
MAL14	A2-30-15	A3-19-11				
MAL15	A2-30-12	A3-21-02				
MAL16	A2-28-05	A3-20-12				
MAL17	A2-28-15	A3-27-08				
MAL18	A2-30-06	A3-21-09				
[MBKA]	A2-05-07	A2-26-18	A2-26-18	A2-34-11		
MBR1	A2-19-19	A3-24-14				
MBR2	A2-21-18	A3-22-03				
MB2(MWCH)	A2-18-14	A3-26-19				
$\overline{\text{MCTRAL}}$	A2-24-19	A3-24-18				
MCTROR($\overline{\text{MOSCAL}}$)	A2-18-06	A3-24-12				
MDT01	A2-36-17	A3-09-06	A3-09-06	A3-19-17		
MDT02	A2-36-07	A3-13-19	A3-13-19	A3-19-07		
MDT03	A2-34-16	A3-13-09	A3-13-09	A3-20-17		
MDT04	A2-31-16	A3-14-19	A3-14-19	A3-20-07		
MDT05	A2-31-06	A3-14-09	A3-14-09	A3-21-17		
MDT06	A2-32-16	A3-15-19	A3-15-19	A3-21-07		
MDT07	A2-32-06	A3-15-09	A3-15-09	A3-19-16		
MDT08	A2-33-16	A3-13-18	A3-13-18	A3-20-06		
MDT09	A2-33-06	A3-13-08	A3-13-08	A3-21-16		
MDT10	A2-31-15	A3-14-18	A3-14-18	A3-21-06		
MDT11	A2-32-14	A3-14-08	A3-14-08	A3-19-15		
MDT12	A2-32-04	A3-15-18	A3-15-18	A3-19-05		
MDT13	A2-33-14	A3-15-08	A3-15-08	A3-20-15		
MDT14	A2-31-03	A3-13-17	A3-13-17	A3-20-05		
MDT15	A3-23-12					
MDT16	A2-32-13	A3-13-07	A3-13-07	A3-19-14		
[MGATX]	A1-09-14	A1-15-06	A1-15-06	A1-15-16	A1-15-16	A2-24-01
MGOJAM	A2-19-18	A3-20-09				
MIIP	A2-20-02	A3-23-04				
MINHL	A2-17-12	A3-21-19				
MINKL	A2-20-09	A3-19-08				
MLDCH	A2-35-16	A3-15-14	A3-15-14	A3-24-04		
MLINC(MREQIN)	A2-17-05	A3-24-07				
MLOAD	A2-35-06	A3-13-04	A3-13-04	A3-19-04		
MMINC($\overline{\text{MPIPAL}}$)	A2-19-03	A3-22-16				
MNHNC	A2-24-03	A3-15-17	A3-15-17	A3-21-13		
MNHRPT	A2-22-12	A3-14-07	A3-14-07	A3-20-03		
MNISQ	A2-17-11	A3-24-17				
MQINC($\overline{\text{MVFAIL}}$)	A2-19-01	A3-23-06				
$\overline{\text{MONBB}}$	A1-10-18	A1-25-05	A1-25-05	A2-28-02		
$\overline{\text{MONWT}}$	A1-09-13	A1-33-05	A1-33-05	A2-19-16		
MONWBK	A2-32-03	A3-15-04	A3-15-04	A3-24-01		
MON800	A2-16-13	A3-23-09				
MOUTCOM	A2-21-13	A3-24-15				
$\overline{\text{MPAL}}$	A2-21-19	A3-19-09				
MPARBUS(MSP)	A2-31-01	A3-26-03				
MPGT($\overline{\text{MGP}}$)	A2-32-01	A3-27-13				
MPINC(MSQ10)	A2-21-16	A3-24-16				
MQ1(MONWT)	A1-30-07	A3-25-19				
MQ2(MRCH)	A2-16-14	A3-25-09				
MRDCH	A2-33-02	A3-14-04	A3-14-04	A3-22-12		
MREAD	A2-31-11	A3-14-14	A3-14-14	A3-20-14		
MRGG	A1-26-05	A3-23-18				
$\overline{\text{MRPTAL}}$	A2-16-01	A3-23-08				
MRPTR(MWEBG)	A1-25-02	A3-23-03				
MRSC	A3-07-04	A3-23-11				
MSBSTP	A2-32-02	A3-13-13	A3-13-13	A3-20-04		
MSCDBL	A2-28-04	A3-21-05				
MSHANC(MSQ12)	A2-19-15	A3-24-06				
MSHINC(MSQ11)	A2-16-11	A3-22-15				
MSQ13	A2-18-15	A3-22-05				
MSQ14	A2-17-13	A3-23-15				
MSQ15(MSQEXT)	A2-16-02	A3-23-05				
MSQ16	A2-18-05	A3-22-14				
MSTP	A2-23-12	A3-14-17	A3-14-17	A3-19-03		
$\overline{\text{MSTPIT}}$	A2-20-18	A3-20-19				
MSTRT	A2-32-12	A3-13-03	A3-13-03	A3-21-14		
MST1	A2-17-14	A3-22-04				
MST2	A2-17-15	A3-23-14				
$\overline{\text{MTCAL}}$	A2-21-03	A3-22-17				
$\overline{\text{MTCSA}}$	A2-21-12	A3-23-13				
MTCSAI	A2-22-02	A3-13-16	A3-13-16	A3-20-13		
MT01	A2-19-08	A3-13-06	A3-13-06	A3-26-09		
MT02	A2-20-08	A3-14-16	A3-14-16	A3-27-19		
MT03	A2-17-08	A3-14-06	A3-14-06	A3-25-18		

SIGNAL	FROM	TO	FROM	TO	FROM	TO
MT04	A2-20-19	A3-15-16	A3-15-16	A3-25-08		
MT05	A2-18-08	A3-15-06	A3-15-06	A3-26-18		
MT06	A2-16-08	A3-13-15	A3-13-15	A3-26-08		
MT07	A2-17-18	A3-19-05	A3-19-05	A3-27-18		
MT08	A2-16-17	A3-14-15	A3-14-15	A3-25-17		
MT09	A2-18-18	A3-14-05	A3-14-05	A3-25-13		
MT10	A2-17-07	A3-15-15	A3-15-15	A3-26-17		
MT11	A2-16-18	A3-15-05	A3-15-05	A3-26-07		
MT12	A2-21-09	A3-13-14	A3-13-14	A3-27-17		
[N'VCNTL]	A2-02-03	A2-30-13				
MWAG	A1-29-17	A3-26-02				
MWALPG(MRAG)	A1-29-08	A3-27-12				
$\overline{\text{MWARNF}}$	A2-16-16	A3-21-08				
$\overline{\text{MWATCH}}$	A2-18-16	A3-19-19				
MWBBG	A1-25-12	A3-24-13				
MWBG	A1-28-07	A3-24-19				
MWFBG(MWBKG)	A1-33-02	A3-23-02				
MWG4(MWG)	A1-26-02	A3-22-07				
MWG5(MRLG)	A1-28-15	A3-23-17				
MWG6(MST3)	A1-25-03	A3-23-07				
MWLPG(MWLG)	A1-28-06	A3-19-18				
MWL01	A1-11-16	A3-27-07				
MWL02	A1-12-19	A3-25-16				
MWL03	A1-12-09	A3-26-06				
MWL04	A1-11-18	A3-27-16				
MWL05	A1-12-18	A3-27-06				
MWL06	A1-12-08	A3-25-15				
MWL07	A1-10-17	A3-25-05				
MWL08	A1-10-07	A3-26-15				
MWL09	A1-11-17	A3-26-05				
MWL10	A1-11-07	A3-25-14				
MWL11	A1-12-17	A3-25-04				
MWL12	A1-12-07	A3-26-14				
MWL13	A1-07-11	A3-26-04				
MWL14	A1-10-09	A3-27-14				
MWL15	A1-11-19	A3-25-03				
MWL16	A1-10-19	A3-26-13				
MWQG	A1-28-17	A3-22-18				
MWSG	A1-30-18	A3-22-08				
MWXG(MRULOG)	A1-29-07	A3-22-09				
MWYG	A1-27-12	A3-23-19				
MWZG	A1-26-12	A3-22-19				
M25CPS(MSCALF)	A2-19-06	A3-20-18				
OUTCOM	A1-09-16	A2-19-12				
PACT	A3-08-04	A3-22-13	A3-22-13	A3-24-02		
PMIO	A1-19-11					
PWR1	A3-20-08	A3-29-16				
PWR2	A3-21-18	A3-28-16				
Q2	A1-04-09	A2-21-14				
RA1	A1-13-15	A1-45-12	A1-45-12	A2-29-16	A2-29-16	A2-44-15
$\overline{\text{RX9}}$	A2-9-9	A2-36-13				
$\overline{\text{RX10}}$	A2-9-19	A2-36-3				
BLK2	A1-28-19	A1-32-12	A1-32-12	A2-01-13	A2-01-13	A2-08-17
$\overline{\text{BLK2}}$	A2-08-17	A2-15-19	A2-15-19	A2-16-07	A2-16-07	A2-17-17
$\overline{\text{BLK2}}$	A2-17-17	A3-03-09				

NOTES

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

	REV STATUS OF WIREWRAP							
	PLATE				WIREWRAP CARD			
	A1	A2	A3	HW	A1	A2	A3	HW
REV	—	—	—	—	—	—	B	—

REFERENCES:

1. ASSY DWG'S 2014046 & 2014275

MASTER

2016393 —

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN E. Esperia DATE 9 Apr 66
CHECKED 9 APR 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION
PLATE A1-A2-A3-A4
WIRE WRAP LIST A18
CTS

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016393
SCALE NONE | WT | SHEET 1 OF 3

2016393 –

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28105		

SIGNAL	FROM	TO	FROM	TO	FROM	TO
RA10	A1-12-12	A1-45-02	A1-45-02	A2-31-08	A2-31-08	A2-42-02
RA11	A1-14-18	A1-43-11	A1-43-11	A2-30-07	A2-30-07	A2-41-13
RA12	A1-15-18	A2-01-19	A2-01-19	A2-29-06	A2-29-06	A2-42-05
RA13	A1-32-01	A2-01-09	A2-01-09	A2-30-04		
RA14	A1-33-04	A2-03-19	A2-03-19	A2-28-19		
RA15	A1-10-16	A2-30-09				
RA16	A1-08-13	A2-01-08	A2-01-08	A2-25-14		
RA2	A1-13-05	A2-02-18	A2-02-18	A2-28-13	A2-28-13	A2-43-11
RA3	A1-14-05	A2-02-08	A2-02-08	A2-30-16	A2-30-16	A2-45-13
RA4	A1-11-12	A2-03-18	A2-03-18	A2-34-06	A2-34-06	A2-44-14
RA5	A1-10-15	A2-03-08	A2-03-08	A2-32-19	A2-32-19	A2-42-11
RA6	A1-12-15	A1-44-05	A1-44-05	A2-32-09	A2-32-09	A2-44-06
RA7	A1-12-05	A2-02-12	A2-02-12	A2-33-19	A2-33-19	A2-43-17
RA8	A1-11-14	A2-04-19	A2-04-19	A2-33-09	A2-33-09	A2-45-19
RA9	A1-12-14	A1-45-05	A1-45-05	A2-31-18	A2-31-18	A2-40-15
RB1	A1-12-04	A2-44-05				
RB10	A1-10-03	A2-40-11				
RB11	A1-11-13	A2-41-03				
RB12	A1-11-03	A2-40-14				
RB13	A1-14-07	A2-27-04				
RB14	A1-13-07	A2-29-18				
RB15	A1-10-02	A2-25-15				
RB16	A1-13-18	A2-03-09	A2-03-09	A2-27-05		
RB2	A1-07-02	A2-43-01				
RB3	A1-08-12	A2-45-03				
RB4	A1-08-02	A2-44-04				
RB5	A1-26-08	A2-42-01				
RB6	A1-09-12	A2-45-16				
RB7	A1-15-02	A2-43-07				
RB8	A1-13-11	A2-45-09				
RB9	A1-09-02	A2-40-05				
$\overline{\text{RDFB}}$	A1-29-12	A2-20-16	A2-20-16	A2-03-07		
$\overline{\text{RDINH}}$	A2-05-18	A2-28-12				
$\overline{\text{REQIN}}$	A1-28-18	A2-21-11	A2-21-11	A2-24-11		
RETEST	A3-09-14	A3-18-02				
$\overline{\text{RGG}}$	A1-31-07	A2-33-12				
RG1	A1-32-04	A1-37-12	A1-37-12	A2-38-12		
$\overline{\text{RG1}}$	A1-33-13	A1-37-02	A1-37-02	A1-43-04		
RG10	A1-31-03	A1-42-08	A1-42-08	A2-39-11		
$\overline{\text{RG10}}$	A1-33-03	A1-40-17	A1-40-17	A1-44-03		
$\overline{\text{RG11}}$	A1-31-12	A1-41-17	A1-41-17	A1-45-03		
RG11	A1-32-13	A1-40-07	A1-40-07	A2-39-01		
RG12	A1-31-02	A1-41-07	A1-41-07	A2-40-19		
$\overline{\text{RG12}}$	A1-32-02	A1-42-17	A1-42-17	A1-45-19		
$\overline{\text{RG13}}$	A1-11-05	A1-40-16	A1-40-16	A1-45-09		
RG13	A1-15-15	A1-42-07	A1-42-07	A2-40-09		
RG14	A1-09-03	A1-40-06	A1-40-06	A2-41-19		
$\overline{\text{RG14}}$	A1-15-05	A1-41-16	A1-41-16	A1-43-18		
RG15	A1-08-03	A1-41-06	A1-41-06	A2-41-09		
$\overline{\text{RG15}}$	A1-13-14	A1-42-16				
RG16	A1-09-04	A1-42-06	A1-42-06	A2-01-15	A2-01-15	A2-42-19
$\overline{\text{RG16}}$	A1-10-08	A1-40-15	A1-40-15	A1-43-08		
RG2	A1-33-12	A1-38-12	A1-38-12	A2-38-02		
$\overline{\text{RG2}}$	A1-31-11	A1-38-02	A1-38-02	A1-44-18		
RG3	A1-31-01	A1-39-12	A1-39-12	A2-39-15		
$\overline{\text{RG3}}$	A1-32-11	A1-39-02	A1-39-02	A1-44-08		
RG4	A1-32-07	A1-37-11	A1-37-11	A2-39-12		
$\overline{\text{RG4}}$	A1-33-07	A1-40-19	A1-40-19	A1-45-18		
RG5	A1-15-14	A1-40-09	A1-40-09	A2-39-02		
$\overline{\text{RG5}}$	A1-14-04	A1-41-19	A1-41-19	A1-45-08		
RG6	A1-14-14	A1-41-09	A1-41-09	A2-37-11		
$\overline{\text{RG6}}$	A1-13-04	A1-42-19	A1-42-19	A1-43-17		
RG7	A1-33-16	A1-42-09	A1-42-09	A2-37-01		
$\overline{\text{RG7}}$	A1-25-16	A1-40-18	A1-40-18	A2-03-14		
RG8	A1-33-06	A1-40-08	A1-40-08	A2-38-11		
$\overline{\text{RG8}}$	A1-31-15	A1-41-18	A1-41-18	A1-44-17		
RG9	A1-31-05	A1-41-08	A1-41-08	A2-38-01		
$\overline{\text{RG9}}$	A1-32-15	A1-42-18	A1-42-18	A1-45-17		
RLP1	A1-32-05	A2-44-13				
RLP10	A1-33-15	A2-42-12				
RLP11	A1-31-04	A2-41-12				
RLP12	A1-29-11	A2-40-03				
RLP13	A1-14-16	A2-25-04				
RLP14	A1-13-08	A2-28-09				
RLP15	A1-14-06	A2-30-08				
RLP16	A1-12-03	A1-45-13	A1-45-13	A2-25-05		
RLP2	A1-29-01	A2-45-02				
RLP3	A1-30-01	A2-45-12				
RLP4	A1-31-09	A2-44-03				
RLP5	A1-27-18	A2-44-08				
RLP6	A1-33-09	A2-44-16				
RLP7	A1-31-08	A2-43-16				
RLP8	A1-32-18	A2-45-08				
RLP9	A1-33-18	A2-42-04				
RPTR	A1-30-15	A2-17-19				
RQ1	A1-33-08	A2-45-15				
RQ10	A1-28-14	A2-40-01				
RQ11	A1-28-04	A2-42-13				
RQ12	A1-29-04	A2-40-04				
RQ13	A1-11-04	A2-27-14				

SIGNAL	FROM	TO	FROM	TO	FROM	TO
RQ14	A1-14-15	A2-30-19				
RQ15	A1-10-05	A2-27-06				
RQ16	A1-11-15	A2-12-12	A2-12-12	A2-27-15		
RQ2	A1-30-14	A2-44-11				
RQ3	A1-30-04	A2-43-12				
RQ4	A1-28-13	A2-45-14				
RQ5	A1-15-04	A2-43-19				
RQ6	A1-29-13	A2-45-06				
RQ7	A1-14-03	A2-44-17				
RQ8	A1-30-13	A2-43-18				
RQ9	A1-30-03	A2-41-15				
RS1	A1-28-12	A1-35-02	A1-35-02	A2-43-04		
$\overline{\text{RS1}}$	A1-28-02	A1-36-12	A1-36-12	A2-19-04		
RS10	A1-29-02	A1-38-17	A1-38-17	A2-41-02		
$\overline{\text{RS10}}$	A1-30-12	A1-38-07				
$\overline{\text{RS11}}$	A1-28-11	A1-39-07				
RS11	A1-30-02	A1-39-17	A1-39-17	A2-40-02		
$\overline{\text{RS12}}$	A1-28-16	A1-37-06				
RS12	A1-30-17	A1-37-16	A1-37-16	A2-40-13		
RS2	A1-29-15	A1-36-02	A1-36-02	A2-45-01		
$\overline{\text{RS2}}$	A1-29-05	A1-34-11	A1-34-11	A2-21-06		
RS3	A1-29-06	A1-37-19	A1-37-19	A2-44-02		
$\overline{\text{RS3}}$	A1-27-02	A1-37-09	A1-37-09	A2-20-14		
RS4	A1-28-08	A1-38-19	A1-38-19	A2-21-05	A2-21-05	A2-43-03
$\overline{\text{RS4}}$	A1-29-18	A1-38-09				
RS5	A1-25-11	A1-39-19	A1-39-19	A2-20-06	A2-20-06	A2-44-09
$\overline{\text{RS5}}$	A1-29-09	A1-39-09				
RS6	A1-30-09	A1-37-18	A1-37-18	A2-19-14	A2-19-14	A2-43-06
$\overline{\text{RS6}}$	A1-25-15	A1-37-08				
RS7	A1-26-15	A1-38-18	A1-38-18	A2-45-07		
$\overline{\text{RS7}}$	A1-27-15	A1-38-08				
RS8	A1-25-04	A1-39-18	A1-39-18	A2-45-18		
$\overline{\text{RS8}}$	A1-27-14	A1-39-08				
RS9	A1-05-02	A1-37-17	A1-37-17	A2-42-14		
$\overline{\text{RS9}}$	A1-05-12	A1-37-07				
RX1	A1-04-02	A2-45-05				
$\overline{\text{RX1}}$	A2-09-02	A2-36-18				
RX10	A1-04-12	A2-41-11				
RX11	A1-06-03	A2-42-03				
$\overline{\text{RX11}}$	A2-10-08	A2-32-15				
RX12	A1-06-13	A2-41-14				
$\overline{\text{RX12}}$	A2-12-18	A2-33-15				
RX13	A1-10-04	A2-26-04				
$\overline{\text{RX13}}$	A2-08-04	A2-33-05				
RX14	A1-15-08	A2-29-09				
$\overline{\text{RX14}}$	A2-06-03	A2-31-14				
RX15	A1-12-06	A2-28-07				
$\overline{\text{RX15}}$	A1-04-19	A2-31-04				
RX16	A1-13-17	A1-42-12	A1-42-12	A2-26-05		
RX2	A1-05-03	A2-44-01				
$\overline{\text{RX2}}$	A2-09-15	A2-34-17				
RX3	A1-05-13	A2-43-02				
$\overline{\text{RX3}}$	A2-09-18	A2-35-17				
RX4	A1-04-03	A2-45-04				
RX5	A1-27-07	A2-43-09				
RX6	A1-26-07	A2-43-15				
RX7	A1-13-13	A2-44-07				
RX8	A1-25-07	A2-43-08				
RX9	A1-04-13	A2-41-05				
RY1	A1-06-04	A2-43-14				
RY10	A1-06-14	A2-41-01				
RY11	A1-05-04	A2-40-12				
RY12	A1-05-14	A2-41-04				
RY13	A1-12-13	A2-26-14				
RY14	A1-14-08	A2-29-19				
RY15	A1-10-14	A2-28-17				
RY16	A1-04-04	A1-44-15	A1-44-15	A2-26-15		
RY2	A1-04-14	A2-45-11				
RY3	A1-06-05	A2-44-12				
RY4	A1-06-15	A2-43-13				
RY5	A1-05-05	A2-44-19				
RY6	A1-05-15	A2-43-05				
RY7	A1-25-19	A2-45-17				
RY8	A1-04-05	A2-44-18				
RY9	A1-04-15	A2-42-15				
RZ1	A1-06-06	A2-26-07	A2-26-07	A2-40-08		
$\overline{\text{RZ1}}$	A1-06-16	A2-27-17				
RZ10	A1-05-06	A2-30-18	A2-30-18	A2-42-17		
$\overline{\text{RZ10}}$	A1-05-16	A2-33-07				
RZ11	A1-04-06	A2-29-08	A2-29-08	A2-42-07		
$\overline{\text{RZ11}}$	A1-04-16	A2-31-05				
RZ12	A1-06-07	A2-27-01	A2-27-01	A2-40-16		
$\overline{\text{RZ12}}$	A1-06-17	A2-32-05				
RZ13	A1-13-19	A2-40-06				
$\overline{\text{RZ13}}$	A1-13-09	A2-36-08				
RZ14	A1-12-02	A2-41-16				
$\overline{\text{RZ14}}$	A1-10-11	A2-34-07				
RZ15	A1-15-19	A2-41-06				
$\overline{\text{RZ15}}$	A1-14-09	A2-35-07				
RZ16	A1-15-17	A2-42-16				

SIGNAL	FROM	TO	FROM	TO	FROM	TO
$\overline{\text{RZ16}}$	A1-15-09					
RZ2	A1-05-07	A2-26-17	A2-26-17	A2-41-18		
$\overline{\text{RZ2}}$	A1-05-17	A2-26-11				
RZ3	A1-07-18	A2-25-08	A2-25-08	A2-41-08		
$\overline{\text{RZ3}}$	A1-09-19	A2-27-09				
RZ4	A1-08-19	A2-25-18	A2-25-18	A2-42-18		
$\overline{\text{RZ4}}$	A1-07-19	A2-32-18				
RZ5	A1-08-07	A2-28-08	A2-28-08	A2-42-08		
$\overline{\text{RZ5}}$	A1-07-07	A2-32-08				
RZ6	A1-13-02	A2-26-01	A2-26-01	A2-40-17		
$\overline{\text{RZ6}}$	A1-27-19	A2-33-18				
RZ7	A1-09-08	A2-27-19	A2-27-19	A2-40-07		
$\overline{\text{RZ7}}$	A1-27-09	A2-33-08				
RZ8	A1-26-18	A2-26-09	A2-26-09	A2-41-17		
$\overline{\text{RZ8}}$	A1-25-08	A2-32-07				
RZ9	A1-07-08	A2-29-02	A2-29-02	A2-41-07		
$\overline{\text{RZ9}}$	A1-09-09	A2-33-17				
R5A	A1-06-19	A3-11-16	A3-11-16	A4R5A		
R5B	A3-28-11	A4R5B				
R6A	A1-39-05	A2-24-12	A2-24-12	A4R6A		
R6B	A3-28-12	A4R6B				
R7A	A2-25-03	A2-26-13	A2-26-13	A4R7A		
R7B	A3-29-13	A4R7B				
R8B	A3-28-03	A4R8B				
SCTROR	A1-34-08	A2-18-01				
SDAB1	A1-01-19	A1-45-15				
SDAB2	A1-01-09	A1-43-03				
SDAB3	A1-02-19	A1-44-13				
SDAB4	A1-02-09	A2-02-15				
SDAB5	A1-03-19	A2-02-09				
SDAB6	A1-03-09	A2-03-17				
SDAG1	A1-01-18	A2-01-18				
SDAG2	A1-01-08	A1-44-04				
SDAG3	A1-02-18	A2-02-19				
SDAG4	A1-02-08	A2-01-14				
SDAG5	A1-03-18	A2-01-07				
SDAG6	A1-03-08	A1-44-14				
SDALP1	A1-01-14	A1-41-02				
SDALP2	A1-01-04	A2-11-04				
SDALP3	A1-02-14	A2-11-11				
SDALP4	A1-02-04	A1-40-02				
SDALP5	A1-03-14	A1-40-13				
SDALP6	A1-03-04	A1-44-07				
SDAQ1	A1-01-17	A2-11-13				
SDAQ2	A1-01-07	A1-43-16				
SDAQ3	A1-02-17	A2-10-11				
SDAQ4	A1-02-07	A2-12-02				
SDAQ5	A1-03-17	A2-11-12				
SDAQ6	A1-03-07	A2-10-03				
SDAX1	A1-01-16	A2-11-02				
SDAX2	A1-01-06	A2-10-12				
SDAX3	A1-02-16	A2-10-02				
SDAX4	A1-02-06	A2-12-13				
SDAX5	A1-03-16	A2-10-13				
SDAX6	A1-03-06	A2-12-04				
SDAY1	A1-01-15	A1-45-14				
SDAY2	A1-01-05	A1-45-04				
SDAY3	A1-02-15	A1-43-13				
SDAY4	A1-02-05	A1-45-06				
SDAY5	A1-03-15	A1-43-15				
SDAY6	A1-03-05	A1-43-05				
$\overline{\text{SDBLTST}}$	A3-03-03	A3-12-17				
[SEXI]	A2-04-07	A2-31-07	A2-31-07	A3-01-15		
[$\overline{\text{SEXI}}$]	A2-05-17	A2-31-17	A2-31-17	A3-06-11		
SIIP	A1-34-18	A2-18-11				
SINKL	A1-35-18	A2-19-17				
$\overline{\text{SKL}}$	A2-09-06	A2-34-02				
SLT	A1-09-06	A1-21-09	A1-21-09	A1-21-11	A1-21-11	A1-21-19
SLT	A1-21-19	A1-36-04	A1-36-04	A2-15-09	A2-15-09	A2-15-11
SLT	A2-15-11			A2-37-12	A2-37-12	A2-38-04
SLT	A2-38-04	A2-39-13	A2-39-13	A2-42-06	A2-42-06	A2-42-09
SLT	A2-42-09	A3-12-01	A3-12-01	A3-13-01	A3-13-01	A3-13-11
SLT	A3-13-11	A3-14-11				
SMAX	A1-25-18	A2-26-19				
SMIN	A1-08-09	A2-25-07				
SMO	A2-26-03	A3-03-16				
$\overline{\text{SMO}}$	A1-30-11	A2-27-13				
SNHNC	A1-36-03	A2-33-03				
SNHRPT	A1-36-13	A2-33-13				
SNISQ	A1-36-19	A2-23-14				
SPF	A1-35-08	A2-20-07				
SPWA0	A1-01-13	A2-12-07				
SPWA1	A1-01-03	A2-10-06				
SPWA2	A1-02-13	A2-11-16				
SPWB0	A1-02-03	A2-11-06				
SPWB1	A1-03-13	A2-12-16				
SPWB2	A1-03-03	A2-07-01				
SRE	A1-30-06	A1-45-07	A1-45-07	A2-27-18	A2-27-18	A3-02-14
$\overline{\text{SRE}}$	A2-06-18	A2-27-08				

SIGNAL	FROM	TO	FROM	TO	FROM	TO
SRGST	A1-34-09	A2-20-13				
$\overline{\text{SRM}}$	A1-03-12	A1-43-06				
SRPTR	A1-29-19	A1-36-09				
SRTC	A1-02-02	A1-44-16				
SRT01	A1-01-12	A2-11-09				
SRT1	A1-01-02	A2-11-08				
SRT5	A1-02-12	A2-10-16				
SSTPGT	A2-33-11	A3-07-14				
SSTRCH	A2-22-14	A3-09-05				
SSTRGG	A1-27-03	A3-07-06				
SSTRPTR(SSTWEBK)	A1-30-05	A3-07-05				
SSTWYG	A1-33-17	A3-07-07				
SSTWXG	A1-30-19	A3-07-17				
SSTWSG	A1-32-17	A3-08-06				
SSTWZG	A1-32-09	A3-10-15				
SSTWAG	A1-29-03	A3-12-06				
SSTWALPG	A1-31-18	A3-08-16				
SSTIVCH	A2-22-04	A3-09-15				
SSTWG4	A1-26-14	A3-08-07				
SSTWG5	A1-27-13	A3-09-17				
SSTWLPG	A1-25-13	A3-08-17				
SSTWQG	A1-27-06	A3-11-15				
STD	A2-06-08	A2-26-16				
$\overline{\text{STD}}$	A2-01-02	A2-26-06				
STINKL	A3-01-19	A3-16-02				
$\overline{\text{ST1}}$	A1-34-19	A2-31-12				
STL	A1-44-02	A2-26-08				
STLDCH	A3-01-16	A3-18-01				
STLINC	A3-03-19	A3-18-14				
STLOAD	A3-03-06	A3-17-02				
$\overline{\text{STL}}$	A2-07-09	A2-30-11				
STMONWT	A3-04-12	A3-16-19				
STM800	A1-20-18	A3-18-06				
STOINC(STVFAIL)	A3-01-06	A3-18-04				
STP	A1-45-16	A2-25-17				
STPARBS	A3-02-16	A3-17-07				
$\overline{\text{STP}}$	A1-07-09	A2-04-16	A2-04-16	A2-25-06		
STRDCH	A3-03-07	A3-18-11				
STREAD	A3-03-14	A3-18-12				
STRFR	A2-03-05	A2-24-13				
STRLIGA	A3-02-08	A3-17-12				
STRSS	A2-06-17	A2-23-03				
STSTP	A3-01-14	A3-16-01				
$\overline{\text{STSTPIT}}$	A3-05-12	A3-17-03				
STST1	A3-12-07	A3-16-03				
$\overline{\text{STTCSA}}$	A3-02-18	A3-16-13				
STTCSAI	A3-02-05	A3-17-11				
STT01	A3-01-08	A3-17-09				
STT02	A3-03-18	A3-18-19				
STT03	A3-06-12	A3-18-09				
STT04	A3-04-13	A3-16-18				
STT05	A3-05-13	A3-16-08				
STT06	A3-03-05	A3-17-18				
STT07	A3-05-02	A3-17-08				
STT08	A3-06-04	A3-18-18				
STT09	A3-03-08	A3-18-08				
STT10	A3-01-18	A3-16-17				
STT11	A3-03-15	A3-16-07				
STT12	A3-02-15	A3-17-17				
STT25(STSCAFAL)	A3-02-06	A3-16-12				

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN C. Aspia DATE 9 Apr 66
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION
PLATE A1-A2-A3-A4
WIRE WRAP LIST A18
CTS

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO 20163
SCALE NONE
WT
SHEET 2 OF 3

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016393 –

—	2016393

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28105		

SIGNAL	FROM	TO	FROM	TO	FROM	TO
STU	A2-04-06	A2-27-16				
$\overline{\text{STU}}$	A1-19-02	A2-27-11				
STV	A2-03-15	A2-29-01				
$\overline{\text{STV}}$	A2-01-03	A2-28-11	A2-28-11	A2-34-15		
SSTWBBG	A1-27-16	A3-08-15				
SSTWBG	A1-26-04	A3-10-05				
STWEBG	A3-04-03	A3-18-03				
SSTWFBKG	A1-11-09	A3-07-15				
SSTWG6	A1-25-14	A3-09-07				
STWL15	A3-03-17	A3-18-17				
STWP1	A3-04-02	A3-16-06	A3-16-06	A3-17-04		
STWP2	A3-01-09	A3-17-06				
STWP3	A3-02-19	A3-17-16				
STWP4	A3-05-01	A3-16-04	A3-16-04	A3-17-14		
STWP5	A3-06-01	A3-17-19				
ST1	A1-33-19	A2-01-06	A2-01-06	A2-20-01		
ST12ST	A1-35-19	A2-17-16				
ST12L	A1-35-09	A2-19-07				
SVR	A1-43-14	A2-22-11				
$\overline{\text{S1MO}}$	A1-32-16	A1-35-07				
S1SA	A1-31-16	A1-34-07				
S1ST	A1-35-17	A2-20-03	A1-35-17	A1-09-17		
$\overline{\text{S2MO}}$	A1-34-17	A1-32-06				
S2SA	A1-31-06	A1-36-18				
S2ST	A1-36-08	A2-20-11	A1-36-08	A1-08-18		
TCLA	A1-20-06	A2-02-13	A2-02-13	A3-01-05		
$\overline{\text{TMOA}}$	A2-12-09	A2-35-09				
TMOB	A2-06-07					
$\overline{\text{TM1A}}$	A2-03-03	A2-35-19				
$\overline{\text{TM2A}}$	A2-05-08	A2-36-19				
$\overline{\text{TM3A}}$	A2-02-05	A2-34-09				
$\overline{\text{TM3B}}$	A2-01-12					
$\overline{\text{TM4B}}$	A1-19-03	A2-01-05				
TPA	A1-16-06	A1-42-04				
TP1	A1-18-15	A1-40-03				
TP2	A1-16-13	A1-41-13				
TP3	A1-17-03	A2-03-02				
TP4	A1-18-13	A1-41-03				
TP5	A1-16-02	A1-42-13				
TP6	A1-16-17	A1-42-03				
TP7	A1-17-06	A1-40-12				
TP8	A1-18-02	A1-41-12				
TRA	A2-02-02	A3-31-06				
TR1	A1-20-17	A1-42-02	A1-42-02	A3-32-13		
$\overline{\text{TR1}}$	A1-20-16	A1-40-11	A1-40-11	A3-32-02		
TR2	A1-43-19	A3-31-12				
$\overline{\text{TR2}}$	A1-43-09	A3-32-16				
TR3	A1-44-19	A3-33-05				
$\overline{\text{TR3}}$	A2-02-04	A3-32-12				
TR4	A3-33-14					
$\overline{\text{TR4}}$	A2-03-06	A3-33-06				
TR5	A3-31-04					
$\overline{\text{TR5}}$	A2-02-16	A3-32-14				
TR6	A2-06-16	A3-31-16				
$\overline{\text{TR6}}$	A1-44-09	A3-31-05				
TR7	A3-32-05					
$\overline{\text{TR7}}$	A2-11-03	A3-31-15				
TR8	A3-31-14					
$\overline{\text{TR8}}$	A2-12-03	A3-33-04				
$\overline{\text{TSK1B}}$	A2-03-12					
$\overline{\text{T1}}$	A2-18-12	A2-36-16	A2-18-12	A1-06-12		
$\overline{\text{T10}}$	A1-31-14	A2-21-04				
$\overline{\text{T11}}$	A2-01-04	A2-22-18	A2-22-18	A2-35-12		
T12	A2-17-02					
$\overline{\text{T12}}$	A2-02-14	A2-23-09	A2-23-09	A2-34-18		
$\overline{\text{T2}}$	A2-18-02	A2-36-06				
T25	A2-09-03	A2-17-01				
$\overline{\text{T25}}$	A2-09-13	A2-24-09				
$\overline{\text{T5}}$	A1-32-08	A2-17-06				
$\overline{\text{T7}}$	A1-31-17	A2-19-13				
$\overline{\text{WL5}}$	A1-04-07	A2-25-01				
$\overline{\text{WL6}}$	A1-04-17	A2-27-02				
$\overline{\text{WL7}}$	A1-06-08	A2-25-16				
10V	A1-05-08	A1-05-18	A1-05-18	A1-06-18	A1-06-18	A1-08-08
↑	A1-08-08	A1-17-05	A1-17-05	A1-17-13	A1-17-13	A1-20-11
	A1-20-11	A1-20-12	A1-20-12	A1-21-07	A1-21-07	A1-21-14
	A1-21-14	A1-21-18	A1-21-18	A1-31-13	A1-31-13	A1-32-19
	A1-32-19	A1-37-04	A1-37-04	A1-37-14	A1-37-14	A2-01-17
	A2-01-17	A2-05-09	A2-05-09	A2-05-19	A2-05-19	A2-07-07
	A2-07-07	A2-10-01	A2-10-01	A2-14-11	A2-14-11	A2-14-12
	A2-14-12	A2-15-03	A2-15-03	A2-15-07	A2-15-07	A2-15-14
	A2-15-14	A2-15-18	A2-15-18	A2-22-09	A2-22-09	A2-25-13
	A2-25-13	A2-34-08	A2-34-08	A2-37-02	A2-37-02	A2-38-03
	A2-38-03	A2-39-03	A2-39-03	A2-39-05	A2-39-05	A2-40-18
	A2-40-18	A3-06-19	A3-06-19	A3-07-16	A3-07-16	A3-08-05
	A3-08-05	A3-09-04	A3-09-04	A3-10-16	A3-10-16	A3-11-05
	A3-11-05	A3-11-18	A3-11-18	A3-19-12	A3-19-12	A3-19-13
	A3-19-13	A3-21-15	A3-21-15	A3-28-04	A3-28-04	A3-28-05
↓	A3-28-05	A3-28-09	A3-28-09	A3-28-14	A3-28-14	A3-28-15
10V	A3-28-15	A3-28-19	A3-28-19	A3-29-04	A3-29-04	A3-29-05

SIGNAL	FROM	TO	FROM	TO	FROM	TO
10V	A3-29-05	A3-29-06	A3-29-06	A3-29-14	A3-29-14	A3-29-15
10V	A3-29-15	A3-30-05	A3-30-05	A3-30-06	A3-30-06	A3-30-15
10V	A3-30-15	A3-30-16	A3-30-16	A3-21-04		
10VWL	A3-10-06	A3-21-03				
13VC1	A1-20-01	A3-30-07				
13VPS	A1-20-02	A1-20-04	A1-20-04	A2-14-02	A2-14-02	A3-29-07
28VC1	A2-14-01	A3-29-19				
28VPS	A1-21-17	A2-14-04	A2-14-04	A2-15-17	A2-15-17	A3-30-08
3V	A1-04-08	A1-04-18	A1-04-18	A1-05-09	A1-05-09	A1-05-19
↑	A1-05-19	A1-06-09	A1-06-09	A1-10-06	A1-10-06	A1-14-19
	A1-14-19	A3-30-11	A3-30-11	A1-21-03	A1-21-03	A1-21-12
	A1-21-12	A1-26-09	A1-26-09	A1-28-01	A1-28-01	A1-31-19
	A1-31-19	A1-43-07	A1-43-07	A2-02-06	A2-02-06	A2-03-04
	A2-03-04	A2-03-13	A2-03-13	A2-06-09	A2-06-09	A2-06-19
	A2-06-19	A2-07-17	A2-07-17	A2-11-01	A2-11-01	A2-11-07
	A2-11-07	A2-12-17	A2-12-17	A2-15-12	A2-15-12	A2-21-01
	A2-21-01	A2-22-01	A2-22-01	A2-22-19	A2-22-19	A2-23-13
	A2-23-13	A2-35-08	A2-35-08	A2-35-18	A2-35-18	A3-06-14
	A3-06-14	A3-07-11	A3-07-11	A3-19-01	A3-19-01	A3-19-02
	A3-19-02	A3-20-01	A3-20-01	A3-20-11	A3-20-11	A3-21-11
	A3-21-11	A3-28-01	A3-28-01	A3-28-02	A3-28-02	A3-28-13
	A3-28-13	A3-29-01	A3-29-01	A3-29-02	A3-29-02	A3-29-03
	A3-29-03	A3-29-11	A3-29-11	A3-29-12	A3-29-12	A3-30-01
↓	A3-30-01	A3-30-02	A3-30-02	A3-30-03	A3-30-03	A3-30-04
3V	A3-30-04	A3-30-12	A3-30-12	A3-30-13	A3-30-13	A3-30-14
3V	A3-30-01	A1-31-19	A3-30-11	A1-28-01	A3-29-01	A1-26-09
3V	A3-29-11	A1-14-19	A3-30-02	A2-12-17	A3-30-12	A2-11-07
3V	A3-07-11	A2-03-04	A3-28-02	A2-23-13		
800	A1-19-01	A2-17-03				
CLA	A2-04-17	A2-32-11	A2-32-11	A3-02-17	A2-04-17	A1-19-12
$\overline{\text{SK}}$	A2-12-06	A2-25-02				
$\overline{\text{TSK2B}}$	A2-01-11					
$\overline{\text{TSK3B}}$	A2-01-16					
MDBLTST	A3-01-04	A3-22-01	A3-22-01	A3-14-03		
MDOSCAL	A2-31-02	A3-22-11	A3-22-11	A3-14-13		
GRD	A1-13-10	A1-14-10	A1-14-10	A1-14-20	A1-14-20	A1-15-10
↑	A1-15-10	A1-15-20	A1-15-20	A1-16-10	A1-16-10	A1-16-20
	A1-16-20	A1-17-10	A1-17-10	A1-17-20	A1-17-20	A1-18-20
	A1-18-20	A1-22-10	A1-22-10	A1-22-20	A1-22-20	A1-23-10
	A1-23-10	A1-23-20	A1-23-20	A1-24-10	A1-24-10	A1-24-20
	A1-24-20	A1-25-10	A1-25-10	A1-26-20	A1-26-20	A1-30-10
	A1-30-10	A1-30-20	A1-30-20	A1-31-10	A1-31-10	A1-31-20
	A1-31-20	A1-32-10	A1-32-10	A1-32-20	A1-32-20	A1-33-10
	A1-33-10	A1-33-20	A1-33-20	A1-37-10	A1-37-10	A1-37-20
	A1-37-20	A1-38-10	A1-38-10	A1-38-20	A1-38-20	A1-39-10
	A1-39-10	A1-39-20	A1-39-20	A1-40-10	A1-40-10	A1-40-20
	A1-40-20	A1-41-10	A1-41-10	A1-41-20	A1-41-20	A1-42-10
	A1-42-10	A1-42-20	A1-42-20	A2-01-10	A2-01-10	A2-02-10
	A2-02-10	A2-02-20	A2-02-20	A2-03-10	A2-03-10	A2-03-20
	A2-03-20	A2-04-10	A2-04-10	A2-04-20	A2-04-20	A2-05-20
	A2-05-20	A2-09-10	A2-09-10	A2-09-20	A2-09-20	A2-10-10
	A2-10-10	A2-10-20	A2-10-20	A2-11-10	A2-11-10	A2-11-20
	A2-11-20	A2-12-10	A2-12-10	A2-12-20	A2-12-20	A2-14-17
	A2-14-17	A2-14-19	A2-14-19	A2-15-02	A2-15-02	A2-38-10
	A2-38-10	A3-45-20	A3-45-20	A3-45-10	A3-45-10	A3-44-20
	A3-44-20	A3-44-10	A3-44-10	A3-43-20	A3-43-20	A3-43-10
	A3-43-10	A3-42-20	A3-42-20	A3-42-10	A3-42-10	A3-41-20
	A3-41-20	A3-41-10	A3-41-10	A3-40-20	A3-40-20	A3-40-10
	A3-40-10	A3-39-20	A3-39-20	A3-39-10	A3-39-10	A3-38-20
	A3-38-20	A3-38-10	A3-38-10	A3-37-20	A3-37-20	A3-37-10
	A3-37-10	A3-33-20	A3-33-20	A3-32-20	A3-32-20	A3-32-10
	A3-32-10	A3-29-09	A3-29-09	A3-29-10	A3-29-10	A3-29-20
↓	A3-29-20	A3-30-20	A3-30-20	A3-31-10	A3-31-10	A3-31-20
GRD	A1-13-10	A1-18-16				
R8A			A3-31-02	A3-31-13	A3-31-13	A3-31-17
R8A	A3-31-17	A3-32-03	A3-32-03	A3-32-06	A3-32-06	A3-33-02
R8A	A3-33-02	A3-33-13	A3-33-13	A3-33-15	A3-33-15	A4R8A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN B. Hapua DATE 9 Apr 66
CHECKED C. Jorgensen 3 APR 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 4-18-66
MIT APPROVAL 4/19/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION
PLATE A1-A2-A3-A4
WIRE WRAP LIST A18
CTS

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016393
SCALE NONE
WT
SHEET 3 OF 3

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

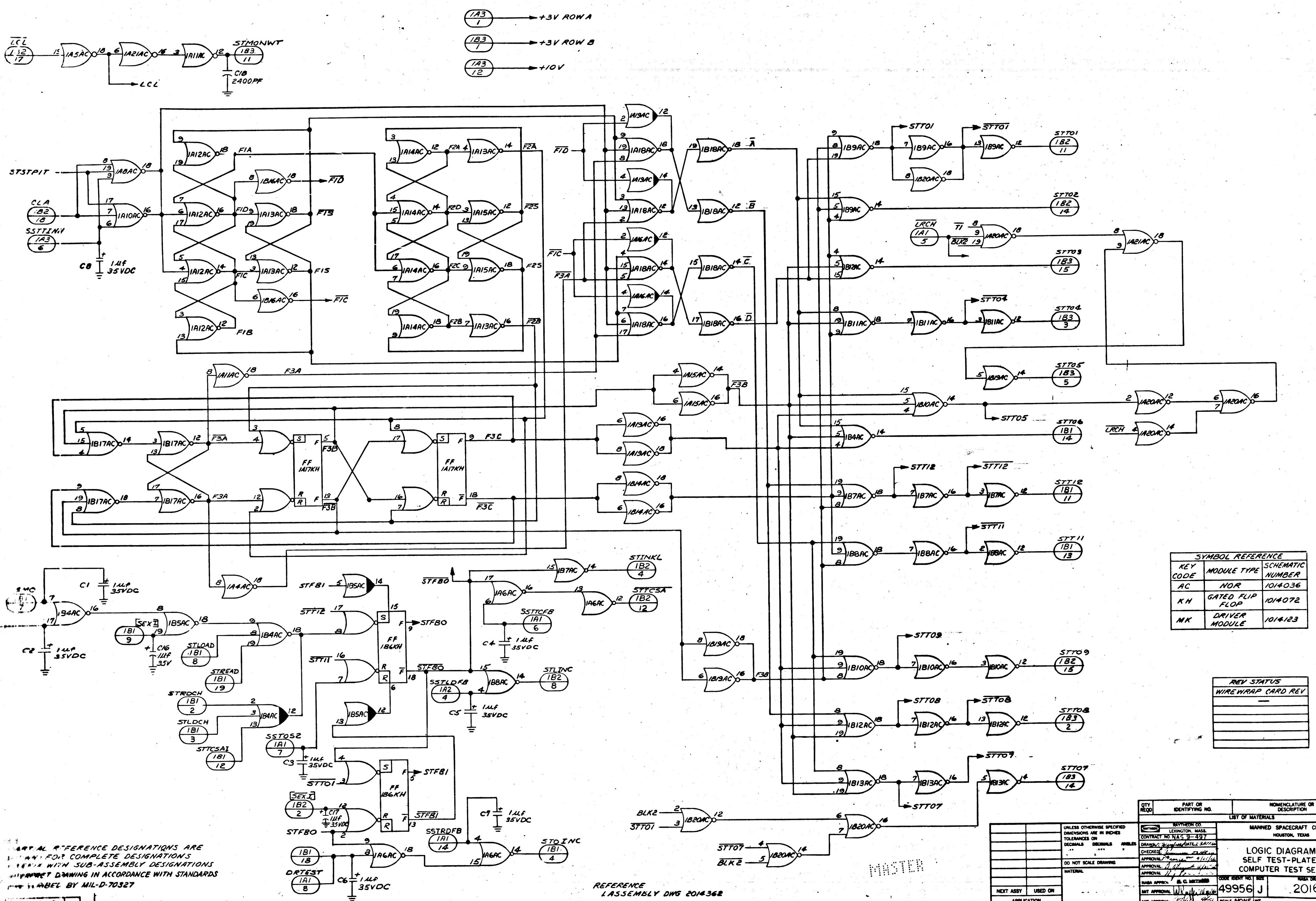
MASTER

2016393	—

2016393

2016395	—

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELE[illegible] PER TDRR 2826C		



LCL 1I2 17
1A5AC
1A21AC
1A11AC
STMONWT 1B3 11
C18 2400PF
LCL
1A3 1 → +3V ROW A
1B3 1 → +3V ROW B
1A3 12 → +10V
STSTPIT
CLA 1B2 18
SSTTINH 1A3 6
C8 1μf 35VDC
1A8AC
1A10AC
1A12AC
F1A
F1D
F1B
F1C
F1S
1B16AC
1A13AC
1A14AC
1A13AC
1A15AC
F2A
F2D
F2C
F2B
F2S
1A19AC
1A18AC
1A16AC
1B18AC
1B16AC
A
B
C
D
1B9AC
1B20AC
STT01
STT01 1B2 11
STT02 1B2 14
LRCH 1A1 5
T1
BLK2
1A20AC
1A21AC
STT03 1B3 15
1B12AC
1B11AC
STT04
STT04 1B3 3
1B13AC
STT05 1B3 5
1B10AC
STT05
LRCH
1A20AC
STT06 1B1 14
1B4AC
1A11AC
F3A
F3B
F3C
1A15AC
1A13AC
1B14AC
1B17AC
FF 1A17KH
STT12
STT12 1B1 11
1B7AC
STT11
STT11 1B1 13
1B8AC
1A4AC
STINKL 1B2 4
STTCSA 1B2 12
STFB0
STFB1
1B5AC
1B7AC
1A6AC
SSTTCFB 1A1 6
C4 1μf 35VDC
C1 1μf 35VDC
1B4AC
SEX I
1B1 9
C16 1μf 35V
STLOAD 1B1 8
STREAD 1B1 19
STRDCH 1B1 2
STLDCH 1B1 3
STTCSA1 1B1 12
1B4AC
FF 1B6KH
STT11
STFB0
SSTLDFB 1A2 4
1B8AC
STLINC 1B2 8
C5 1μf 35VDC
C2 1μf 35VDC
SSTOS2 1A1 7
C3 1μf 35VDC
STT01
SEX I 1B2 2
C17 1μf 35VDC
STFB0
1B1 18
DRTEST 1A1 8
C6 1μf 35VDC
SSTRDFB 1A1 14
1A6AC
C7 1μf 35VDC
STOINC 1B1 1
1B19AC
F3B
STT09
STT09 1B2 15
1B10AC
STT08
STT08 1B3 2
1B12AC
STT07
STT07 1B3 14
1B13AC
BLK2
STT01
1B20AC
STT07
BLK2
MASTER

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
AC	NOR	1014036
KH	GATED FLIP FLOP	1014072
MK	DRIVER MODULE	1014123

REV STATUS
WIREWRAP CARD REV
—

[illegible]ARTIAL R[illegible]FERENCE DESIGNATIONS ARE
[illegible] FOR COMPLETE DESIGNATIONS
[illegible] WITH SUB-ASSEMBLY DESIGNATIONS
[illegible] DRAWING IN ACCORDANCE WITH STANDARDS
[illegible]ABEL BY MIL-D-70327

REFERENCE
I.ASSEMBLY DWG 2014362

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .xx DECIMALS .xxx ANGLES
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 23 APR 66
CHECKED
APPROVAL 4/25/66
APPROVAL
APPROVAL
NASA APPROV. E. C. METZGER
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

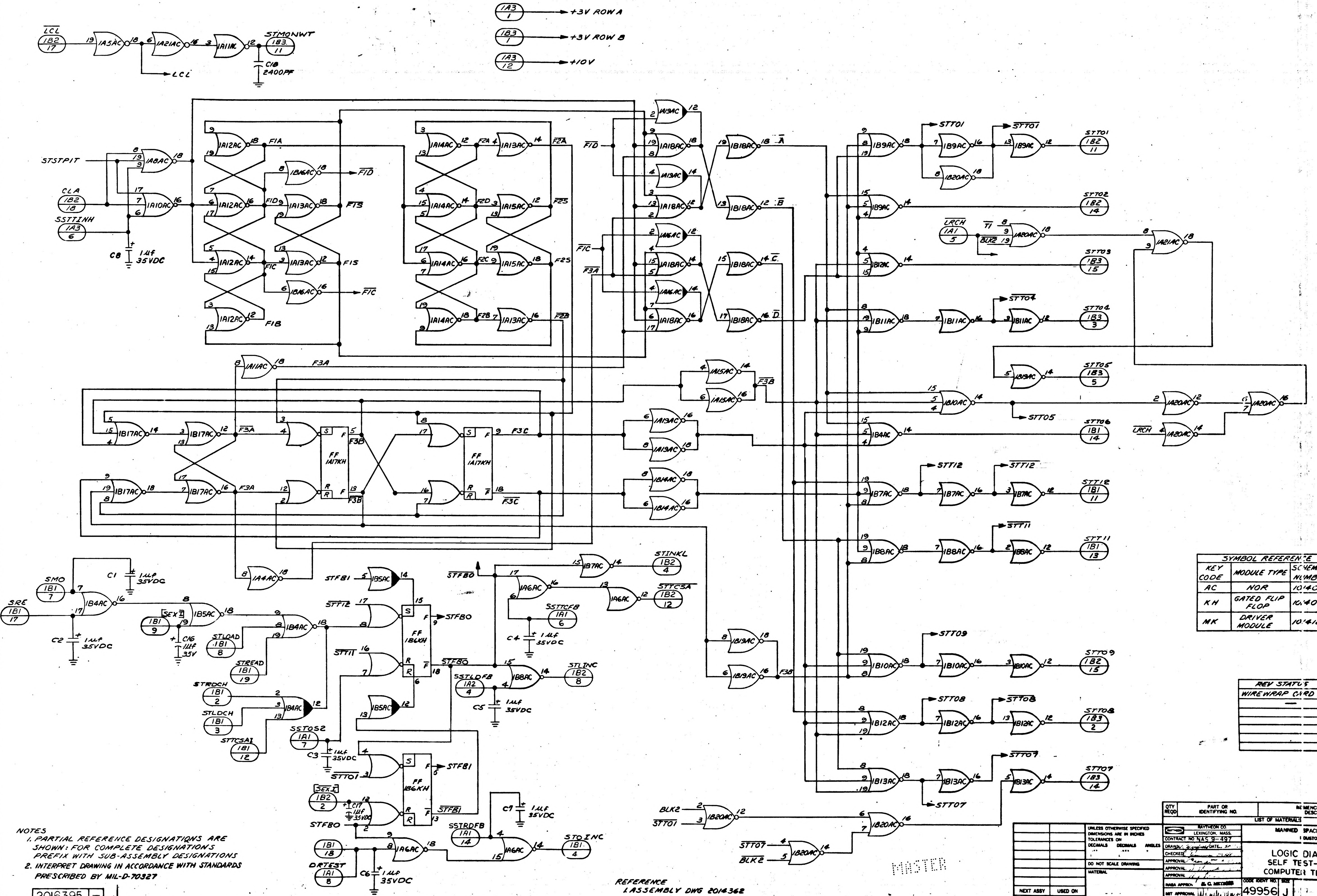
LOGIC DIAGRAM
SELF TEST-PLATE I
COMPUTER TEST SET

CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	J	2016395
SCALE NONE	WT	SHEET 1 OF 2

2016395

E-2

SYM	REVISIONS DESCRIPTION
—	CLASS A [illegible]



LCL
1B2 17
1A5AC
1A21AC
1A11AC
STMONWT
1B3 11
C18 2400PF
LCL
1A3 1 → +3V ROW A
1B3 1 → +3V ROW B
1A3 12 → +10V
STSTPIT
1A8AC
CLA
1B2 18
1A10AC
SSTTINH
1A3 6
C8 1μf 35VDC
1A12AC
F1A
F1B
F1C
F1D
1B16AC
F̅1̅D̅
1A13AC
F1S
F̅1̅S̅
F̅1̅C̅
1A14AC
F2A
F2B
F2C
F2D
1A15AC
F̅2̅A̅
F̅2̅S̅
F2S
F̅2̅B̅
1A19AC
1A18AC
1A16AC
F1D
F1C
F̅3̅A̅
1B18AC
A̅
B̅
C̅
D̅
1B9AC
STT01
S̅T̅T̅0̅1̅
1B20AC
STT01 1B2 11
STT02 1B2 14
LRCH 1A1 5
T1
BLK2
1A20AC
STT03 1B3 15
1B11AC
S̅T̅T̅0̅4̅
STT04 1B3 3
1A21AC
1B13AC
STT05 1B3 5
1A11AC
F3A
1A15AC
F3B
1B10AC
STT05
1A20AC
L̅R̅C̅H̅
1B17AC
F̅3̅A̅
FF 1A17KH
F3B
F̅3̅B̅
F3C
F̅3̅C̅
1A13AC
1B4AC
STT06 1B1 14
1A14AC
1B7AC
STT12
S̅T̅T̅1̅2̅
STT12 1B1 11
1B8AC
S̅T̅T̅1̅1̅
STT11 1B1 13
1A4AC
SMO 1B1 7
SRE 1B1 17
C1 1μf 35VDC
C2 1μf 35VDC
1B4AC
1B5AC
SEX I
1B1 9
C16 1μf 35V
STLOAD 1B1 8
STREAD 1B1 19
STRDCH 1B1 2
STLDCH 1B1 3
STTCSA1 1B1 12
1B4AC
STFB1
1B5AC
S̅T̅T̅1̅2̅
S̅T̅T̅1̅1̅
FF 1B6KH
STFB0
S̅T̅F̅B̅0̅
SSTOS2 1A1 7
C3 1μf 35VDC
STT01
STFB1
S̅T̅F̅B̅1̅
SEX I
1B2 2
C17 1μf 35VDC
STFB0
1B1 18
DRTEST 1A1 8
C6 1μf 35VDC
1A6AC
S̅T̅F̅B̅0̅
1B7AC
STINKL 1B2 4
S̅T̅T̅C̅S̅A̅ 1B2 12
SSTTCFB 1A1 6
C4 1μf 35VDC
SSTLDFB 1A2 4
1B8AC
STLINC 1B2 8
C5 1μf 35VDC
C7 1μf 35VDC
SSTRDFB 1A1 14
STOINC 1B1 4
1B13AC
F3B
1B10AC
STT09
STT09 1B2 15
1B12AC
STT08
S̅T̅T̅0̅8̅
STT08 1B3 2
S̅T̅T̅0̅7̅
STT07
STT07 1B3 14
BLK2
S̅T̅T̅0̅1̅
1B20AC
STT07
BLK2

NOTES

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REFERENCE
1. ASSEMBLY DWG 2014362

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
AC	NOR	1014036
KH	GATED FLIP FLOP	1014072
MK	DRIVER MODULE	1014123

REV STATUS
WIREWRAP CARD REV
—

MASTER

QTY REQD	PART OR IDENTIFYING NO.		NOMENCLATURE OR DESCRIPTION
		LIST OF MATERIALS	

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN
DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROV E. C. METHOD
MIT APPROVAL
MIT APPROVAL

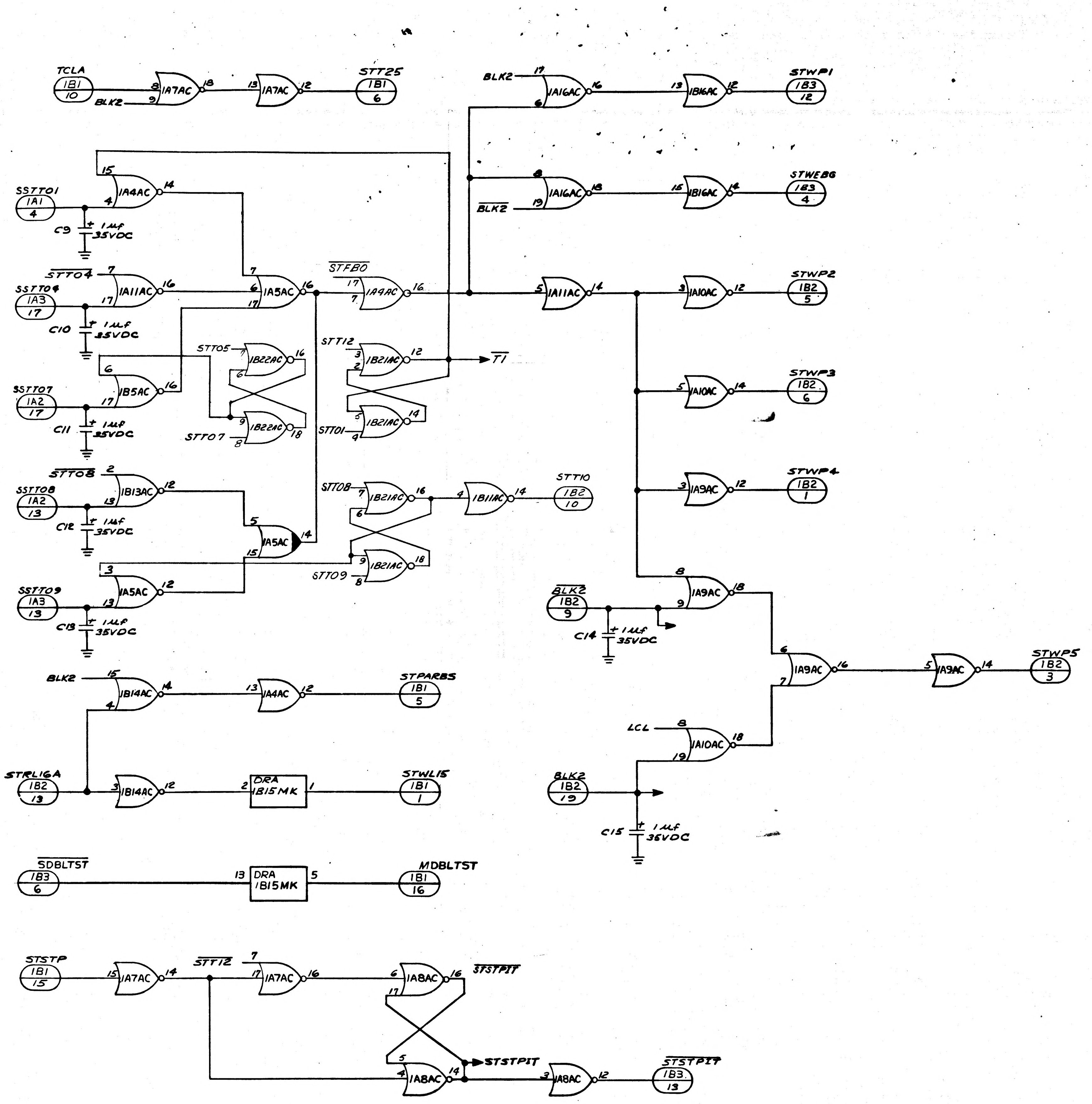
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
SELF TEST-PLATE 1
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
2C
SCALE NONE
WT

-	2016395

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RE ER TDRR 28260		



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BLK2
1A7AC
1A7AC
STT25
1B1 6
BLK2
1A16AC
1B16AC
STWP1
1B3 12
1A16AC
BLK2
1B16AC
STWEB6
1B3 4
SSTT01
1A1 4
1A4AC
C9
1 μf 35VDC
STT04
SSTT04
1A3 17
1A11AC
C10
1 μf 35VDC
1A5AC
STFB0
1A9AC
1A11AC
1A10AC
STWP2
1B2 5
STT05
1B22AC
STT12
1B21AC
T1
SSTT07
1A2 17
1B5AC
C11
1 μf 35VDC
STT07
1B22AC
STT01
1B21AC
1A10AC
STWP3
1B2 6
STT08
SSTT08
1A2 13
1B13AC
C12
1 μf 35VDC
1A5AC
STT08
1B21AC
1B11AC
STT10
1B2 10
1A9AC
STWP4
1B2 1
STT09
1B21AC
SSTT09
1A3 13
1A5AC
C13
1 μf 35VDC
BLK2
1B2 9
C14
1 μf 35VDC
1A9AC
1A9AC
1A9AC
STWP5
1B2 3
BLK2
1B14AC
1A4AC
STPARBS
1B1 5
LCL
1A10AC
BLK2
1B2 19
C15
1 μf 35VDC
STRLIGA
1B2 13
1B14AC
DRA 1B15MK
STWL15
1B1 1
SDBLTST
1B3 6
DRA 1B15MK
MDBLTST
1B1 16
STSTP
1B1 15
1A7AC
STT12
1A7AC
1A8AC
STSTPIT
1A8AC
STSTPIT
1A8AC
STSTPIT
1B3 13

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.

CONTRACT NO. NAS 9-497
DRAWN DATE 23 APR 66
CHECKED 23 APR 66
APPROVAL P. Frazer 4/20/66
APPROVAL 4/25/66
APPROVAL 4/25/66
NASA APPROVAL A. C. METZGER
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
SELF TEST-PLATE I
COMPUTER TEST SET

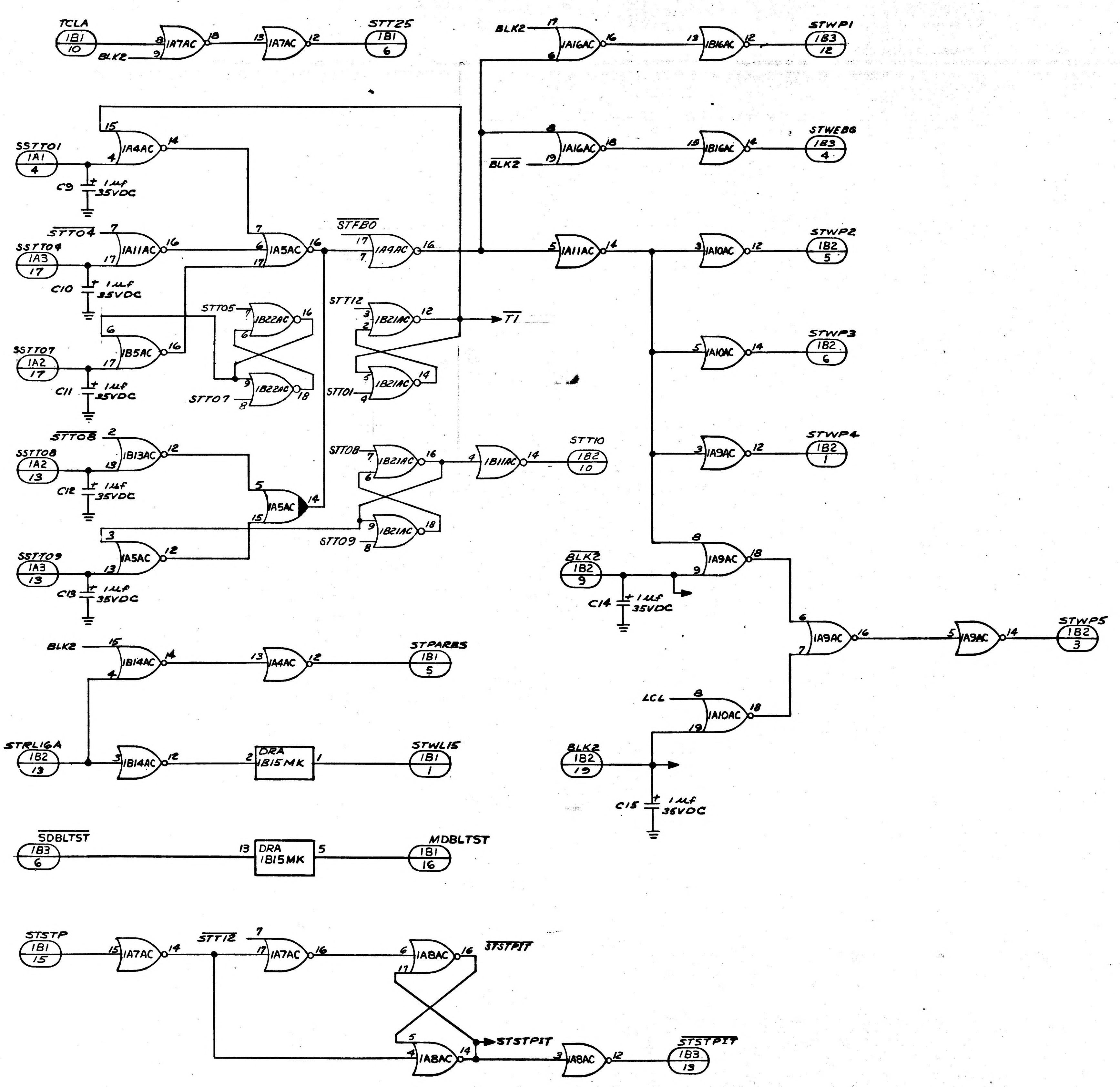
CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016395
SCALE NONE
WT
SHEET 2 OF 2

2016395	-

F-2

2016395 –

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
–	CLASS A [illegible] DRR 282[illegible]		



TCLA
1B1
10
BLK2
1A7AC
STT25
1B1
6
SSTT01
1A1
4
C9
1 µf 35VDC
1A4AC
$\overline{STT04}$
SSTT04
1A3
17
C10
1 µf 35VDC
1A11AC
1A5AC
$\overline{STFB0}$
1A9AC
STT05
1B22AC
STT07
SSTT07
1A2
17
C11
1 µf 25VDC
1B5AC
STT12
1B21AC
STT01
$\overline{T1}$
$\overline{STT08}$
SSTT08
1A2
13
C12
1 µf 35VDC
1B13AC
STT08
1B21AC
1B11AC
STT10
1B2
10
STT09
SSTT09
1A3
13
C13
1 µf 35VDC
BLK2
1B14AC
1A4AC
STPARBS
1B1
5
STRL16A
1B2
13
DRA 1B15MK
STWL15
1B1
1
$\overline{SDBLTST}$
1B3
6
DRA 1B15MK
MDBLTST
1B1
16
STSTP
1B1
15
1A7AC
$\overline{STT12}$
1A8AC
$\overline{STSTPIT}$
STSTPIT
$\overline{STSTPIT}$
1B3
13
BLK2
1A16AC
1B16AC
STWP1
1B3
12
$\overline{BLK2}$
STWEBG
1B3
4
1A11AC
1A10AC
STWP2
1B2
5
STWP3
1B2
6
1A9AC
STWP4
1B2
1
$\overline{BLK2}$
1B2
9
C14
1 µf 35VDC
LCL
1A10AC
BLK2
1B2
19
C15
1 µf 35VDC
STWP5
1B2
3

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

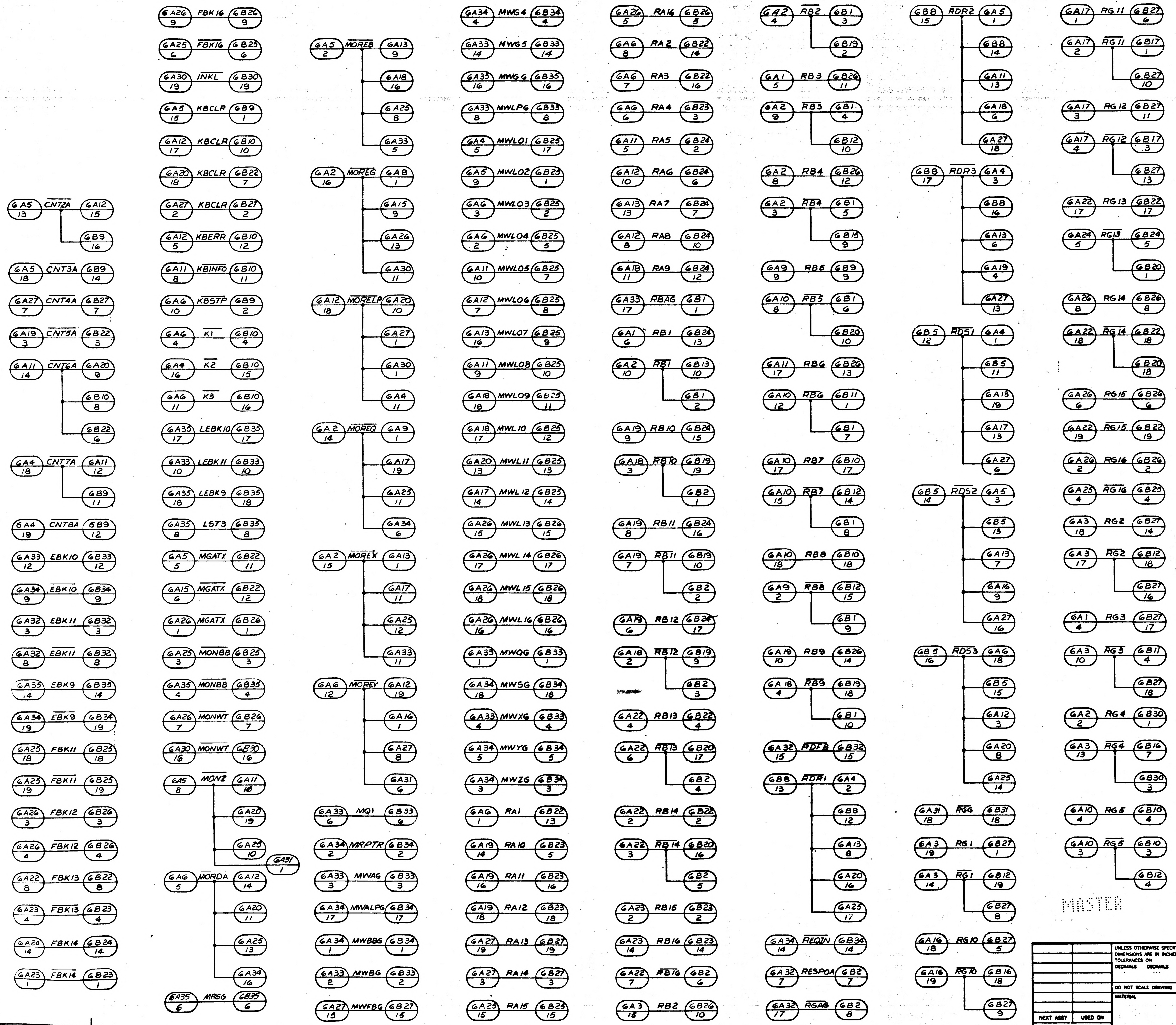
LOGIC DIAGRAM
SELF TEST-PLATE I
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 201
SCALE NONE
WT
SHEET 2 OF 2

2016395 –

2016398 -

SYM	DESCRIPTION	DATE	APPROVAL
—	CLASS A RELEASED PER TDRR 28275		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6A35/6 MRGG 6B35/6
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NOTES:
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCES:
1. ASSEMBLY DWG 2014228

REV STATUS OF WIREWRAP
WIREWRAPCARD REV
—

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .. DECIMALS ... ANGLES .

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN DATE 22APR66
CHECKED 23 APR 66
APPROVAL 4/25/66
APPROVAL 4/25/66
APPROVAL 4/25/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL A. Hassan 4/25/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER I PLATE 6
COMPUTER TEST SET

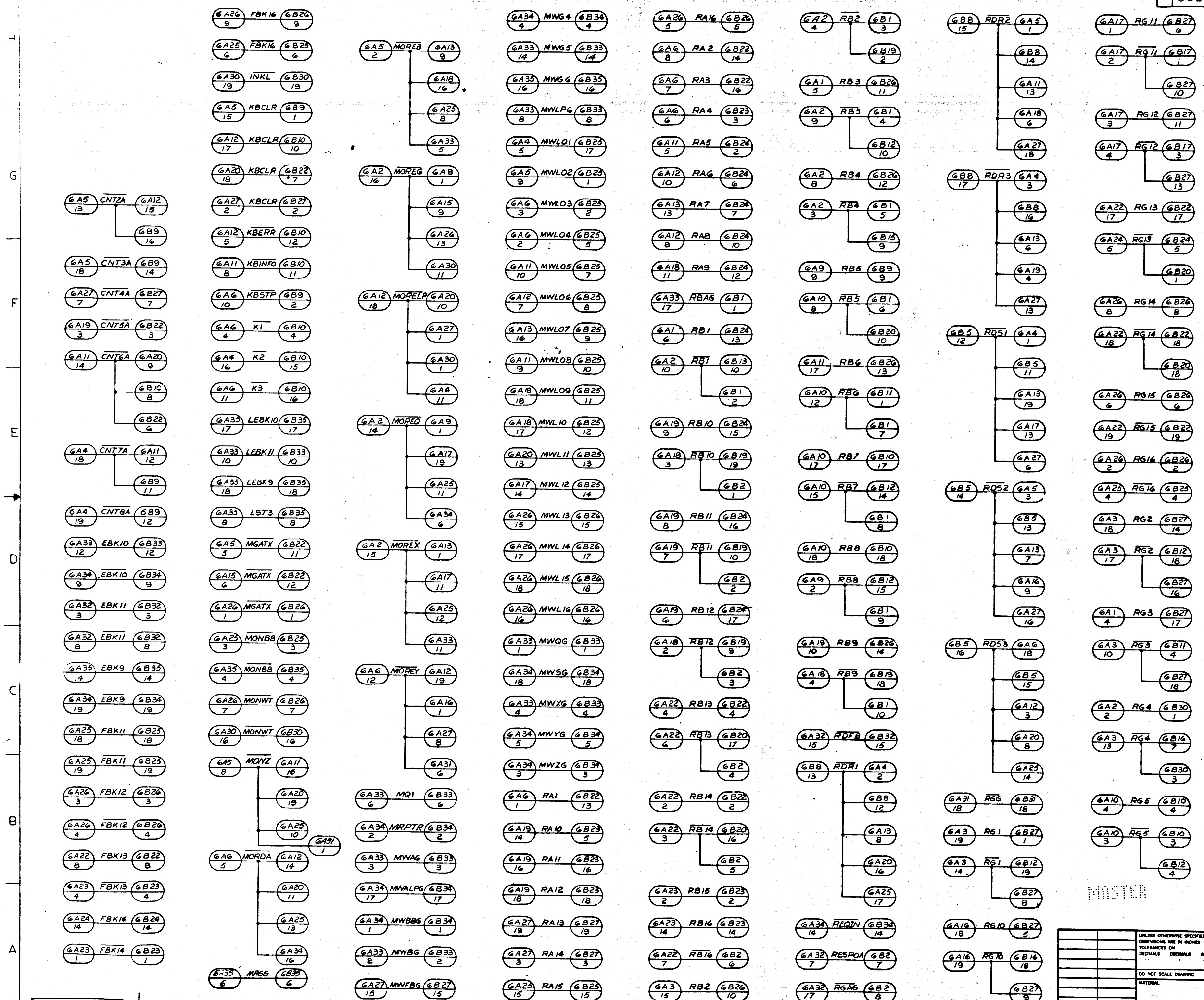
CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016398
SCALE NONE
WT
SHEET 1 OF 3

2016398 -

2016

2016398 —

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28275		



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KBSTP
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MONBB
MONWT
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MONZ
MORDA
MRG6
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MORELP
MOREQ
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NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCES:

1. ASSEMBLY DWG 2014228

REV STATUS OF WIREWRAP
WIREWRAPCARD REV
—

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS DECIMALS ANGLES
DO NOT SCALE DRAWING
MATERIAL

NEXT ASSY | USED ON
APPLICATION

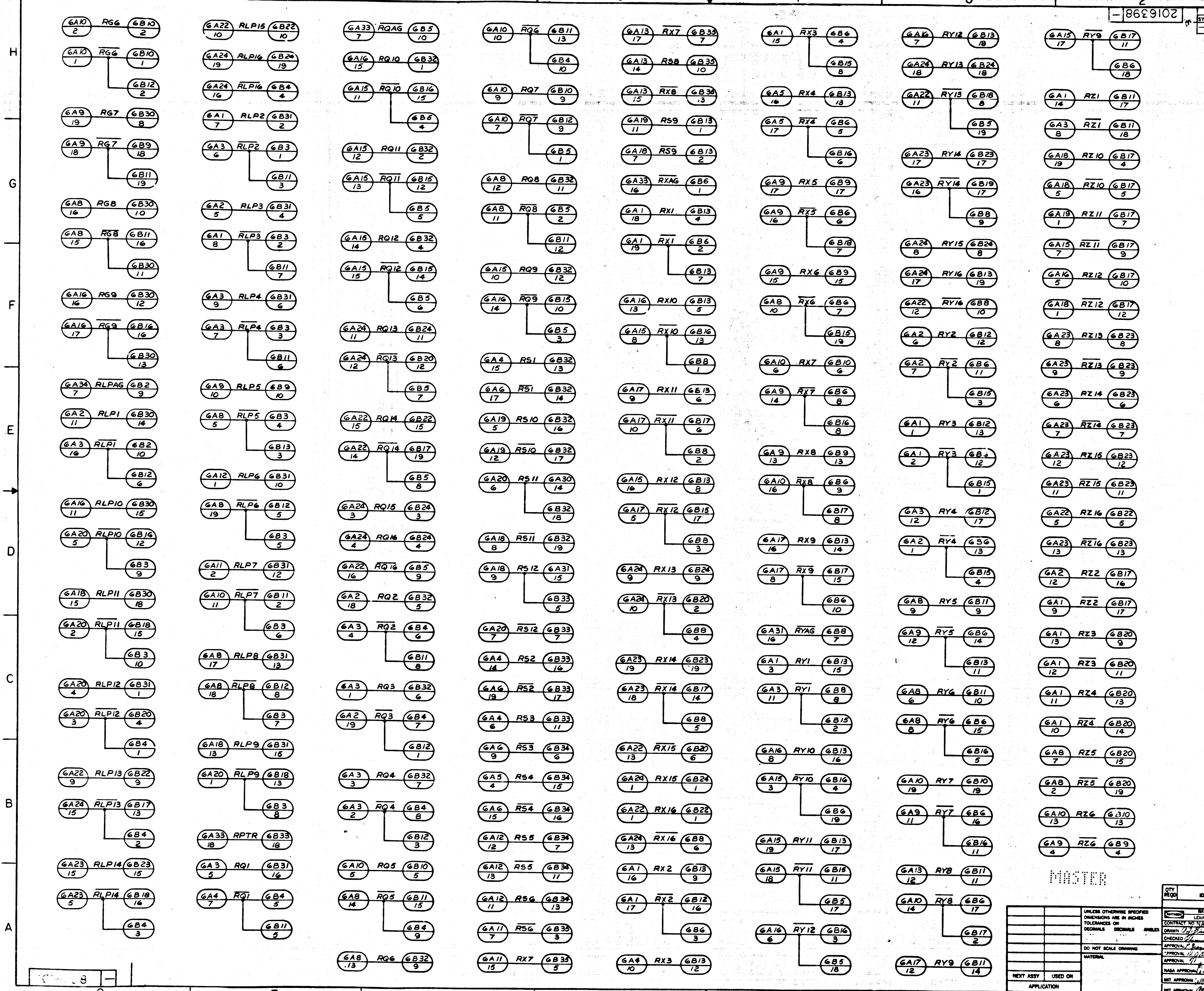
RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1 PLATE 6
COMPUTER TEST SET

CODE IDENT NO. 49956 | SIZE J | NASA DRAWING NO. 2016398
SCALE NONE | WT | SHEET 1 OF 1

2016398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2016398 —

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28275		

MASTER

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APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

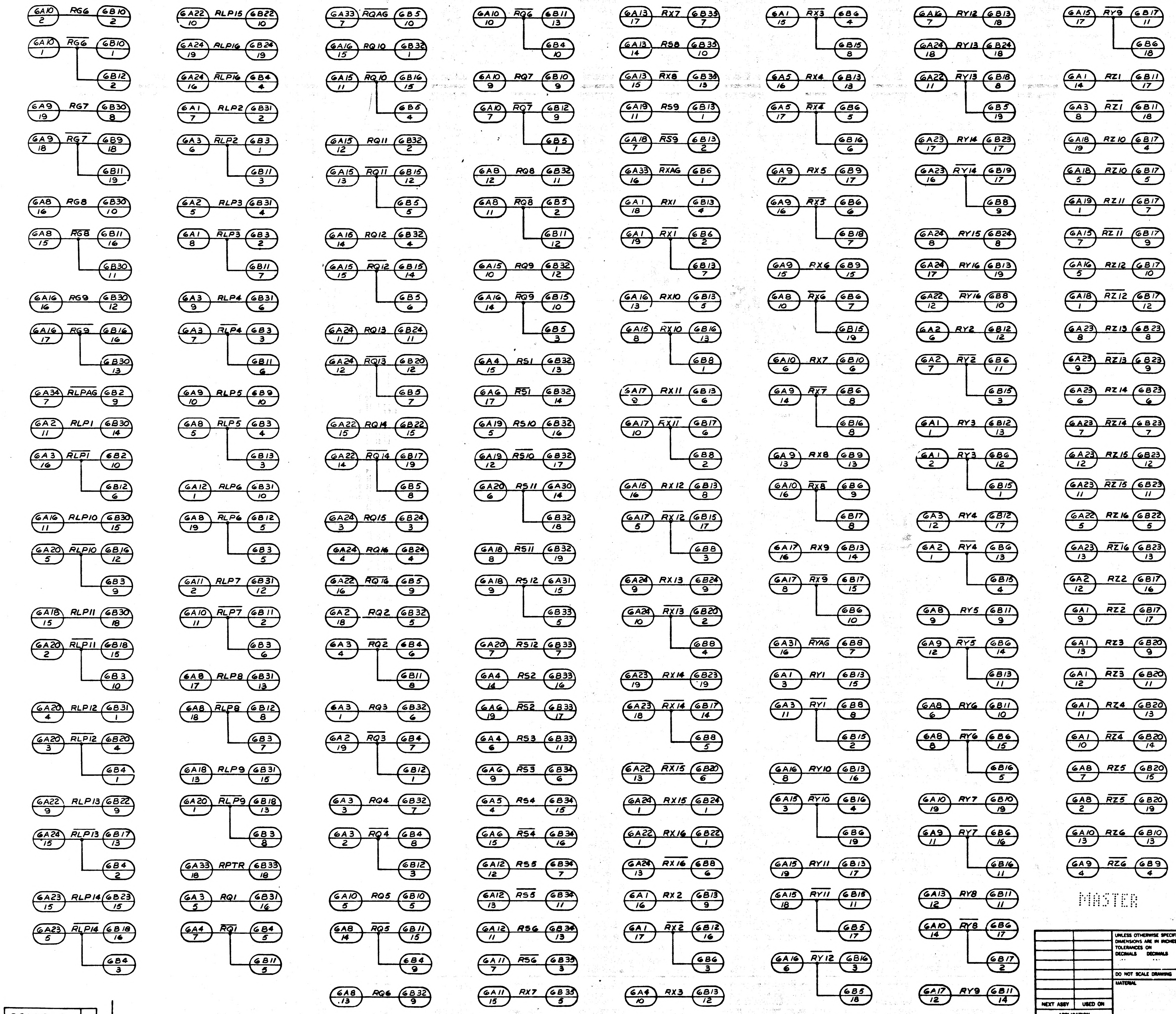
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER I PLATE 6
COMPUTER TEST SET

CODE IDENT NO. 49956 | SIZE J | NASA DRAWING NO. 2016398
SCALE NONE | WT | SHEET 2 OF 3

2016398 –

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28275		



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6A12 12 RS5 6B34 7
6A12 13 $\overline{RS5}$ 6B34 11
6A12 11 RS6 6B34 13
6A11 7 $\overline{RS6}$ 6B33 3
6A11 15 RX7 6B35 5
6A13 17 $\overline{RX7}$ 6B35 7
6A13 14 RS8 6B35 10
6A13 15 $\overline{RX8}$ 6B35 13
6A19 11 RS9 6B13 1
6A18 7 $\overline{RS9}$ 6B13 2
6A33 16 $\overline{RXAG}$ 6B6 1
6A1 18 RX1 6B13 4
6A1 19 $\overline{RX1}$ 6B6 2 6B13 7
6A16 13 RX10 6B13 5
6A15 8 $\overline{RX10}$ 6B16 13 6B8 1
6A17 9 RX11 6B13 6
6A17 10 $\overline{RX11}$ 6B17 6 6B8 2
6A15 16 RX12 6B13 8
6A17 5 $\overline{RX12}$ 6B15 17 6B8 3
6A24 9 RX13 6B24 9
6A24 10 $\overline{RX13}$ 6B20 2 6B8 4
6A23 19 RX14 6B23 19
6A23 18 $\overline{RX14}$ 6B17 14 6B8 5
6A22 13 $\overline{RX15}$ 6B20 6
6A24 1 RX15 6B24 1
6A22 1 RX16 6B22 1
6A24 13 $\overline{RX16}$ 6B8 6
6A1 16 RX2 6B13 9
6A1 17 $\overline{RX2}$ 6B12 8 6B6 3
6A4 10 RX3 6B13 12
6A1 15 $\overline{RX3}$ 6B6 4 6B15 8
6A5 16 RX4 6B13 13
6A5 17 $\overline{RX4}$ 6B6 5 6B16 6
6A9 17 RX5 6B9 17
6A9 16 $\overline{RX5}$ 6B6 6 6B18 7
6A9 15 RX6 6B9 15
6A8 10 $\overline{RX6}$ 6B6 7 6B15 19
6A10 6 RX7 6B10 6
6A9 14 $\overline{RX7}$ 6B6 8 6B16 8
6A9 13 RX8 6B9 13
6A10 16 $\overline{RX8}$ 6B6 9 6B17 8
6A17 16 RX9 6B13 14
6A17 8 $\overline{RX9}$ 6B17 15 6B6 10
6A31 16 $\overline{RYAG}$ 6B8 7
6A1 3 RY1 6B13 15
6A3 11 $\overline{RY1}$ 6B8 8 6B15 2
6A16 8 RY10 6B13 16
6A15 3 $\overline{RY10}$ 6B16 4 6B6 19
6A15 19 RY11 6B13 17
6A15 18 $\overline{RY11}$ 6B15 11 6B5 17
6A16 6 $\overline{RY12}$ 6B16 3 6B5 18
6A16 7 RY12 6B13 18
6A24 18 RY13 6B24 18
6A22 11 $\overline{RY13}$ 6B18 8 6B5 19
6A23 17 RY14 6B23 17
6A23 16 $\overline{RY14}$ 6B19 17 6B8 9
6A24 8 RY15 6B24 8
6A24 17 RY16 6B13 19
6A22 12 $\overline{RY16}$ 6B8 10
6A2 6 RY2 6B12 12
6A2 7 $\overline{RY2}$ 6B6 11 6B15 3
6A1 1 RY3 6B12 13
6A1 2 $\overline{RY3}$ 6B6 12 6B15 1
6A3 12 RY4 6B12 17
6A2 1 $\overline{RY4}$ 6B6 13 6B15 4
6A8 9 RY5 6B11 9
6A9 12 $\overline{RY5}$ 6B6 14 6B13 11
6A8 6 RY6 6B11 10
6A8 8 $\overline{RY6}$ 6B6 15 6B16 5
6A10 19 RY7 6B10 19
6A9 11 $\overline{RY7}$ 6B6 16 6B16 11
6A13 12 RY8 6B11 11
6A10 14 $\overline{RY8}$ 6B6 17 6B17 2
6A17 12 RY9 6B11 14
6A15 17 $\overline{RY9}$ 6B17 11 6B6 18
6A1 14 RZ1 6B11 17
6A3 8 $\overline{RZ1}$ 6B11 18
6A18 19 RZ10 6B17 4
6A18 5 $\overline{RZ10}$ 6B17 5
6A19 1 RZ11 6B17 7
6A15 7 $\overline{RZ11}$ 6B17 9
6A16 5 RZ12 6B17 10
6A18 1 $\overline{RZ12}$ 6B17 12
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6A23 9 $\overline{RZ13}$ 6B23 9
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6A22 5 RZ16 6B22 5
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6A2 12 RZ2 6B17 16
6A1 9 $\overline{RZ2}$ 6B17 17
6A1 13 RZ3 6B20 9
6A1 12 $\overline{RZ3}$ 6B20 11
6A1 11 RZ4 6B20 13
6A1 10 $\overline{RZ4}$ 6B20 14
6A8 7 RZ5 6B20 15
6A8 2 $\overline{RZ5}$ 6B20 19
6A10 13 RZ6 6B10 13
6A9 4 $\overline{RZ6}$ 6B9 4
8
7
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1
H
G
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C
B
A

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN
CHECKED
APPROVAL 4/25/66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

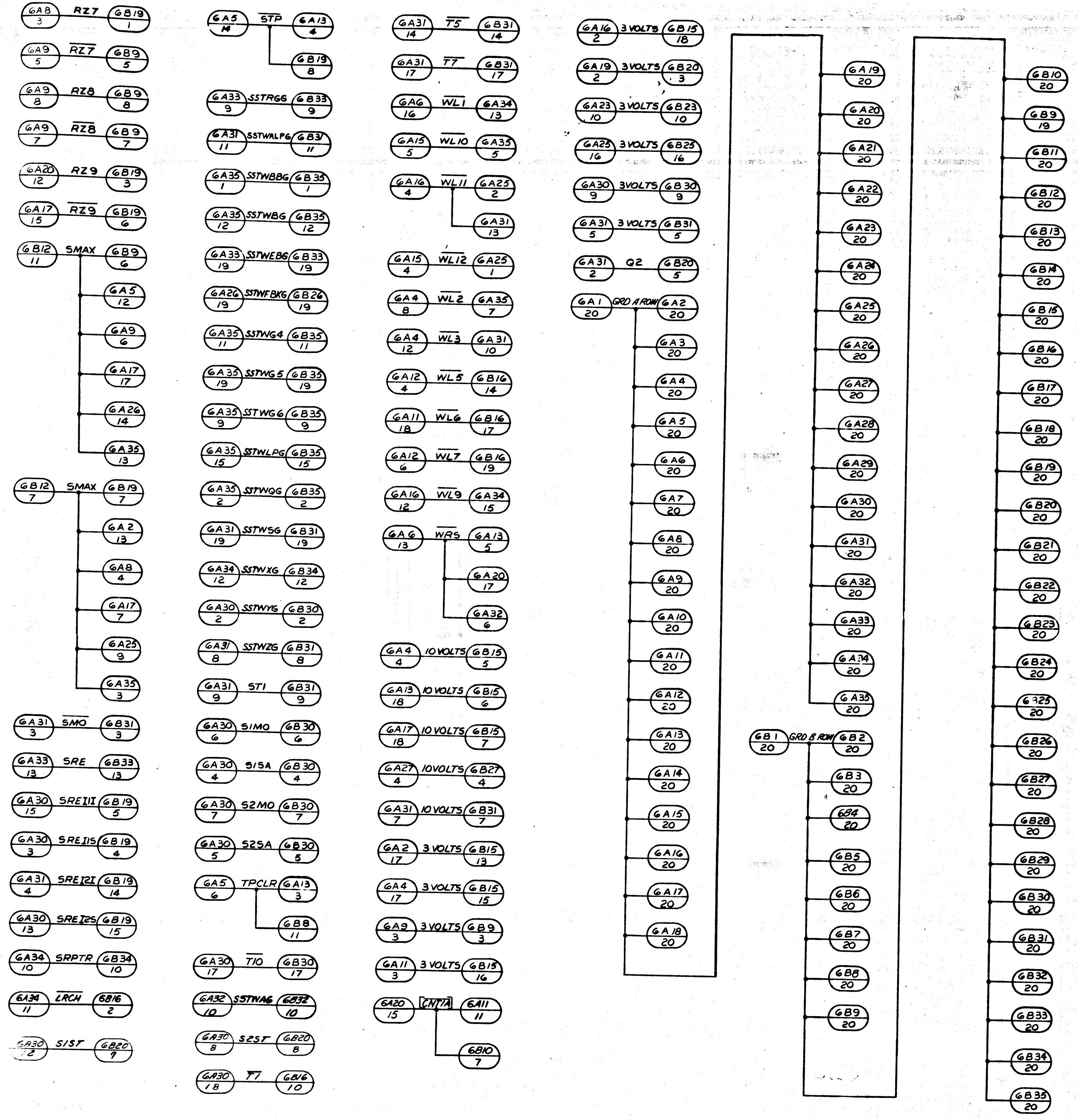
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER I PLATE 6
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016398
SCALE NONE
WT
SHEET 2 OF 3

2016398 –

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER ... 22275		



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GA9 5 RZ7 GB9 5
GA9 8 RZ8 GB9 8
GA9 7 RZ8 GB9 7
GA20 12 RZ9 GB19 3
GA17 15 RZ9 GB19 6
GB12 11 SMAX GB9 6
GA5 12
GA9 6
GA17 17
GA26 14
GA35 13
GB12 7 SMAX GB19 7
GA2 13
GA8 4
GA17 7
GA25 9
GA35 3
GA31 3 SMO GB31 3
GA33 13 SRE GB33 13
GA30 15 SRE1I1 GB19 5
GA30 3 SRE1I5 GB19 4
GA31 4 SRE2I1 GB19 14
GA30 13 SRE2I5 GB19 15
GA34 10 SRPTR GB34 10
GA34 11 LRCH GB16 2
GA30 12 S1ST GB20 7
GA5 14 STP GA13 4
GB19 8
GA33 9 SSTRGG GB33 9
GA31 11 SSTWALPG GB31 11
GA35 1 SSTWBBG GB35 1
GA35 12 SSTWBG GB35 12
GA33 19 SSTWEBG GB33 19
GA26 19 SSTWFBKG GB26 19
GA35 11 SSTWG4 GB35 11
GA35 19 SSTWG5 GB35 19
GA35 9 SSTWG6 GB35 9
GA35 15 SSTWLPG GB35 15
GA35 2 SSTWQG GB35 2
GA31 19 SSTWSG GB31 19
GA34 12 SSTWXG GB34 12
GA30 2 SSTWYG GB30 2
GA31 8 SSTWZG GB31 8
GA31 9 ST1 GB31 9
GA30 6 S1MO GB30 6
GA30 4 S1SA GB30 4
GA30 7 S2MO GB30 7
GA30 5 S2SA GB30 5
GA5 6 TPCLR GA13 3
GB8 11
GA30 17 T10 GB30 17
GA32 10 SSTWAG GB32 10
GA30 8 S2ST GB20 8
GA30 18 T7 GB16 10
GA31 14 T5 GB31 14
GA31 17 T7 GB31 17
GA6 16 WL1 GA34 13
GA15 5 WL10 GA35 5
GA16 4 WL11 GA25 2
GA31 13
GA15 4 WL12 GA25 1
GA4 8 WL2 GA35 7
GA4 12 WL3 GA31 10
GA12 4 WL5 GB16 14
GA11 18 WL6 GB16 17
GA12 6 WL7 GB16 19
GA16 12 WL9 GA34 15
GA6 13 WRS GA13 5
GA20 17
GA32 6
GA4 4 10 VOLTS GB15 5
GA13 18 10 VOLTS GB15 6
GA17 18 10 VOLTS GB15 7
GA27 4 10VOLTS GB27 4
GA31 7 10 VOLTS GB31 7
GA2 17 3 VOLTS GB15 13
GA4 17 3 VOLTS GB15 15
GA9 3 3 VOLTS GB9 3
GA11 3 3 VOLTS GB15 16
GA20 15 CNTTA GA11 11
GB10 7
GA16 2 3 VOLTS GB15 18
GA19 2 3 VOLTS GB20 3
GA23 10 3 VOLTS GB23 10
GA25 16 3 VOLTS GB25 16
GA30 9 3VOLTS GB30 9
GA31 5 3 VOLTS GB31 5
GA31 2 Q2 GB20 5
GA1 20 GRD A ROW GA2 20
GA3 20
GA4 20
GA5 20
GA6 20
GA7 20
GA8 20
GA9 20
GA10 20
GA11 20
GA12 20
GA13 20
GA14 20
GA15 20
GA16 20
GA17 20
GA18 20
GA19 20
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GA21 20
GA22 20
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GA25 20
GA26 20
GA27 20
GA28 20
GA29 20
GA30 20
GA31 20
GA32 20
GA33 20
GA34 20
GA35 20
GB1 20 GRD B ROW GB2 20
GB3 20
GB4 20
GB5 20
GB6 20
GB7 20
GB8 20
GB9 20
GB10 20
GB9 19
GB11 20
GB12 20
GB13 20
GB14 20
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GB17 20
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GB19 20
GB20 20
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GB23 20
GB24 20
GB25 20
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GB30 20
GB31 20
GB32 20
GB33 20
GB34 20
GB35 20

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS DECIMALS ANGLES
DO NOT SCALE DRAWING
MATERIAL

NEXT ASSY USED ON
APPLICATION

RAYTHEON CO. LEXINGTON, MASS.
CONTRACT NO. NAS 9-497

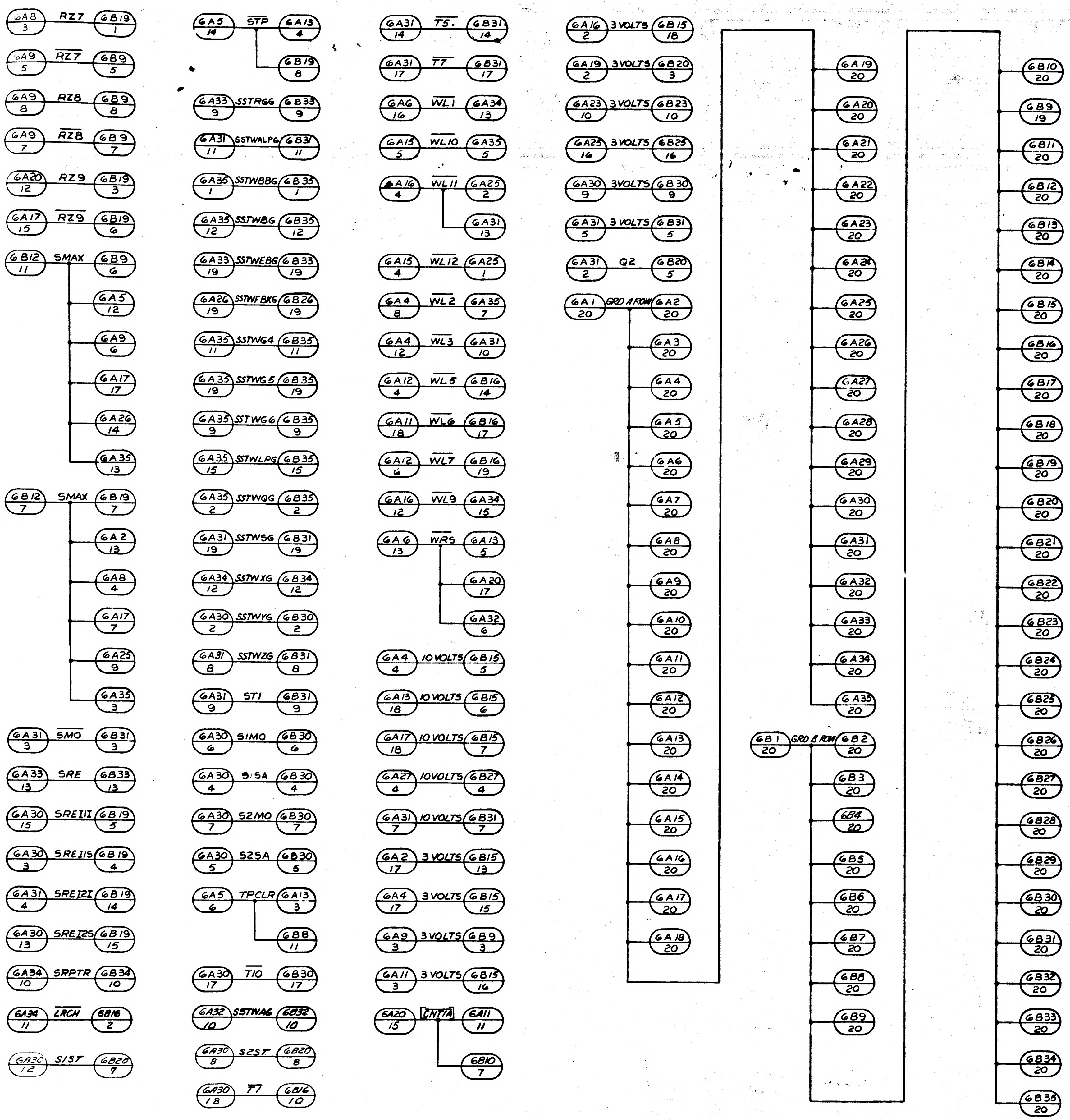
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1 PLATE 6
COMPUTER TEST SET

CODE IDENT NO. 49956 SIZE J
NASA DRAWING NO. 2016398
SCALE NONE
SHEET 3 OF 3

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED		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GA9 5 RZ7 GB9 5
GA9 8 RZ8 GB9 8
GA9 7 RZ8 GB9 7
GA20 12 RZ9 GB19 3
GA17 15 RZ9 GB19 6
GB12 11 SMAX GB9 6 GA5 12 GA9 6 GA17 17 GA26 14 GA35 13
GB12 7 SMAX GB19 7 GA2 13 GA8 4 GA17 7 GA25 9 GA35 3
GA31 3 SMO GB31 3
GA33 13 SRE GB33 13
GA30 15 SREIII GB19 5
GA30 3 SREIIS GB19 4
GA31 4 SREI2I GB19 14
GA30 13 SREI25 GB19 15
GA34 10 SRPTR GB34 10
GA34 11 LRCH 6B16 2
GA30 12 SIST GB20 7
GA5 14 STP GA13 4 GB19 8
GA33 9 SSTRGG GB33 9
GA31 11 SSTWALPG GB31 11
GA35 1 SSTWBBG GB35 1
GA35 12 SSTWBG GB35 12
GA33 19 SSTWEBG GB33 19
GA26 19 SSTWFBKG GB26 19
GA35 11 SSTWG4 GB35 11
GA35 19 SSTWG5 GB35 19
GA35 9 SSTWG6 GB35 9
GA35 15 SSTWLPG GB35 15
GA35 2 SSTWQG GB35 2
GA31 19 SSTWSG GB31 19
GA34 12 SSTWXG GB34 12
GA30 2 SSTWYG GB30 2
GA31 8 SSTWZG GB31 8
GA31 9 ST1 GB31 9
GA30 6 SIMO GB30 6
GA30 4 S1SA GB30 4
GA30 7 S2MO GB30 7
GA30 5 S2SA GB30 5
GA5 6 TPCLR GA13 3 GB8 11
GA30 17 T10 GB30 17
GA32 10 SSTWAG GB32 10
GA30 8 S2ST GB20 8
GA30 18 T1 GB16 10
GA31 14 T5. GB31 14
GA31 17 T7 GB31 17
GA6 16 WL1 GA34 13
GA15 5 WL10 GA35 5
GA16 4 WL11 GA25 2 GA31 13
GA15 4 WL12 GA25 1
GA4 8 WL2 GA35 7
GA4 12 WL3 GA31 10
GA12 4 WL5 GB16 14
GA11 18 WL6 GB16 17
GA12 6 WL7 GB16 19
GA16 12 WL9 GA34 15
GA6 13 WRS GA13 5 GA20 17 GA32 6
GA4 4 10 VOLTS GB15 5
GA13 18 10 VOLTS GB15 6
GA17 18 10 VOLTS GB15 7
GA27 4 10 VOLTS GB27 4
GA31 7 10 VOLTS GB31 7
GA2 17 3 VOLTS GB15 13
GA4 17 3 VOLTS GB15 15
GA9 3 3 VOLTS GB9 3
GA11 3 3 VOLTS GB15 16
GA20 15 CNT1A GA11 11 GB10 7
GA16 2 3 VOLTS GB15 18
GA19 2 3 VOLTS GB20 3
GA23 10 3 VOLTS GB23 10
GA25 16 3 VOLTS GB25 16
GA30 9 3 VOLTS GB30 9
GA31 5 3 VOLTS GB31 5
GA31 2 Q2 GB20 5
GA1 20 GRD A ROW GA2 20 GA3 20 GA4 20 GA5 20 GA6 20 GA7 20 GA8 20 GA9 20 GA10 20 GA11 20 GA12 20 GA13 20 GA14 20 GA15 20 GA16 20 GA17 20 GA18 20
GA19 20 GA20 20 GA21 20 GA22 20 GA23 20 GA24 20 GA25 20 GA26 20 GA27 20 GA28 20 GA29 20 GA30 20 GA31 20 GA32 20 GA33 20 GA34 20 GA35 20
GB1 20 GRD B ROW GB2 20 GB3 20 GB4 20 GB5 20 GB6 20 GB7 20 GB8 20 GB9 20
GB10 20 GB9 19 GB11 20 GB12 20 GB13 20 GB14 20 GB15 20 GB16 20 GB17 20 GB18 20 GB19 20 GB20 20 GB21 20 GB22 20 GB23 20 GB24 20 GB25 20 GB26 20 GB27 20 GB28 20 GB29 20 GB30 20 GB31 20 GB32 20 GB33 20 GB34 20 GB35 20

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING

MATERIAL

NEXT ASSY | USED ON

APPLICATION

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497

DRAWN DATE 20 APR 66
CHECKED 22 APR 66
APPROVAL 4/21/66
APPROVAL 4/21/66
APPROVAL 4/21/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

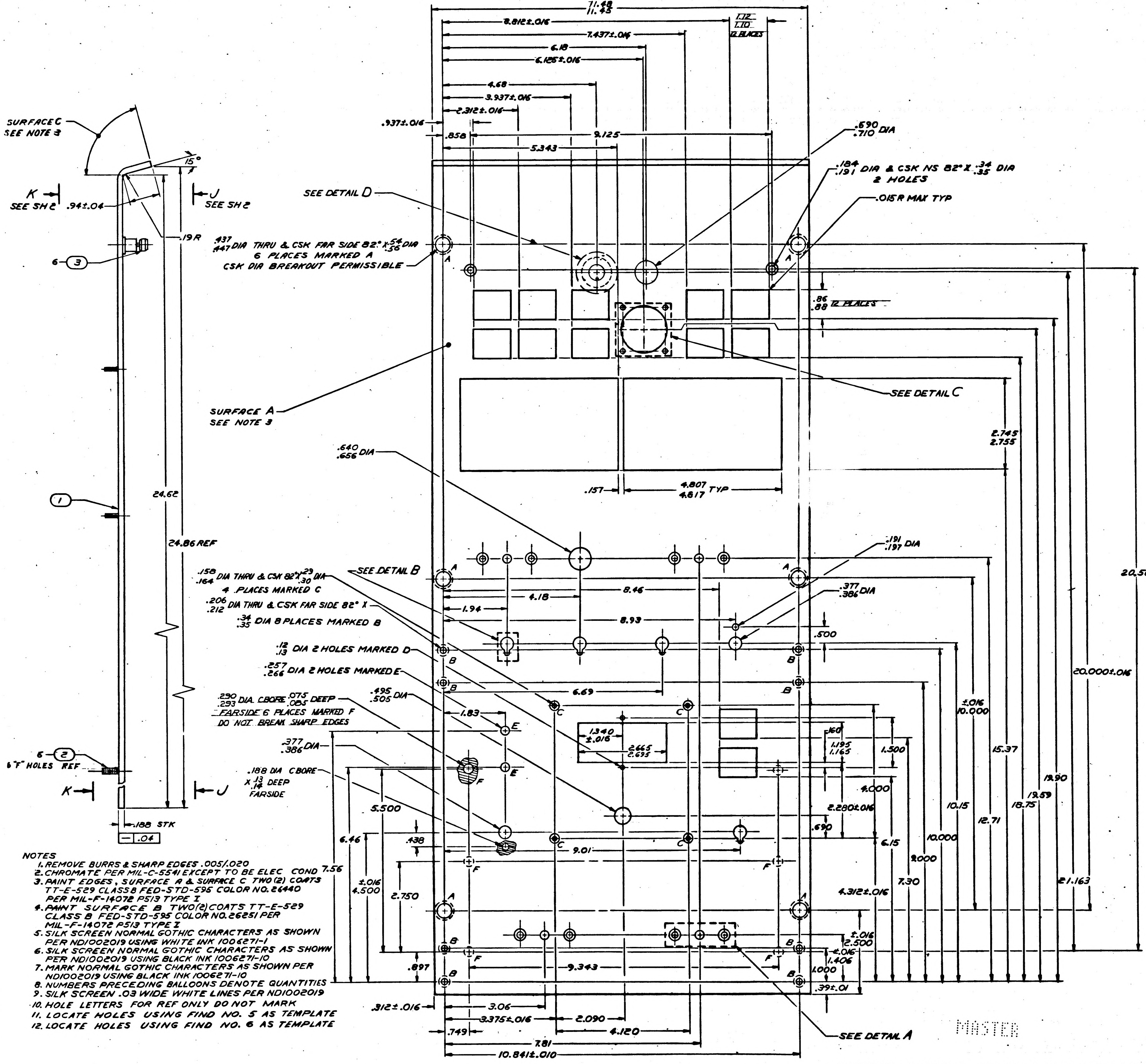
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

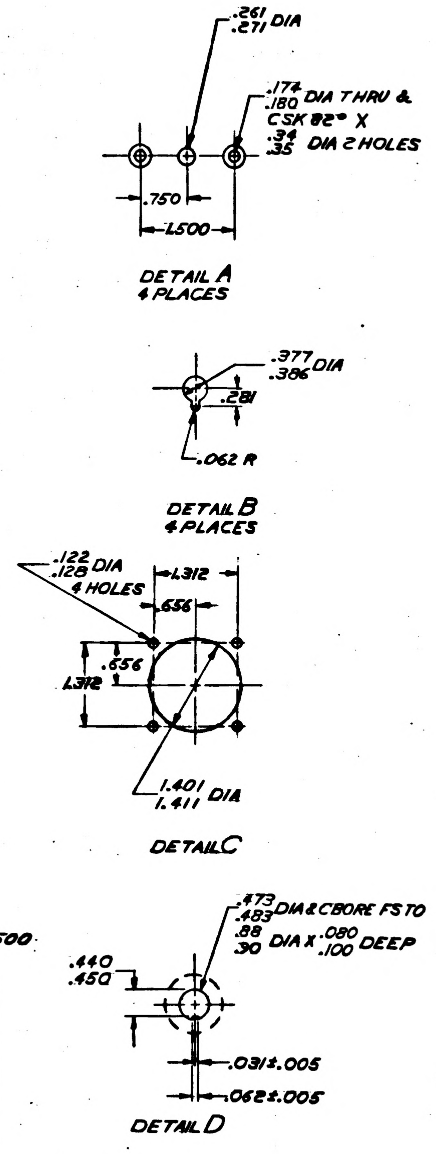
LOGIC DIAGRAM
LOGIC DRAWER 1 PLATE 6
COMPUTER TEST SET

CODE IDENT NO. 49956 SIZE J NASA DRAWING NO. 2[illegible]8 —
SCALE NONE WT SHEET 3 OF 3

SYM	DESCRIPTION	DATE	APPROV
—	CLASS A RELEASED PER TDRR 28113		

2016401 —


SURFACE C
SEE NOTE 3
15°
K
SEE SH 2
.94±.04
J
SEE SH 2
.19 R
6 — 3
1
24.62
24.86 REF
6 — 2
6 "F" HOLES REF
K
J
.188 STK
— .04
11.48
11.45
8.812±.016
7.437±.016
6.18
6.125±.016
4.68
3.937±.016
2.312±.016
.937±.016
.858
9.125
5.343
1.12
1.10
12 PLACES
SEE DETAIL D
.690
.710 DIA
.184
.191 DIA & CSK NS 82° X .34
.35 DIA
2 HOLES
.015 R MAX TYP
.437
.447 DIA THRU & CSK FAR SIDE 82° X .54
.56 DIA
6 PLACES MARKED A
CSK DIA BREAKOUT PERMISSIBLE
A
.86
.88 12 PLACES
SEE DETAIL C
SURFACE A
SEE NOTE 3
2.745
2.755
.640
.656 DIA
.157
4.807
4.817 TYP
20.500
.191
.197 DIA
.158
.164 DIA THRU & CSK 82° X .29
.30 DIA
4 PLACES MARKED C
SEE DETAIL B
.206
.212 DIA THRU & CSK FAR SIDE 82° X
.34
.35 DIA 8 PLACES MARKED B
.377
.386 DIA
4.18
8.46
1.94
8.93
.500
.12
.13 DIA 2 HOLES MARKED D
.257
.266 DIA 2 HOLES MARKED E
.495
.505 DIA
.290
.293 DIA CBORE .075
.085 DEEP
FARSIDE 6 PLACES MARKED F
DO NOT BREAK SHARP EDGES
.377
.386 DIA
.188 DIA CBORE
X .13
.14 DEEP
FARSIDE
6.69
20.000±.016
±.016
10.000
1.83
1.340
±.016
2.665
2.695
.160
1.195
1.165
1.500
15.37
19.90
19.59
18.75
12.71
10.15
4.000
2.280±.016
5.500
6.46
7.56
.438
±.016
4.500
2.750
9.01
.690
6.15
10.000
8.000
7.30
21.163
4.312±.016
±.016
2.500
.016
1.406
1.000
.39±.01
.897
9.343
.312±.016
3.06
3.375±.016
2.090
.749
4.120
7.81
10.841±.010
SEE DETAIL A
A
B
C
D
E
F


.261
.271 DIA
.174
.180 DIA THRU &
CSK 82° X
.34
.35 DIA 2 HOLES
.750
1.500
DETAIL A
4 PLACES
.377
.386 DIA
.281
.062 R
DETAIL B
4 PLACES
.122
.128 DIA
4 HOLES
1.312
.656
.656
1.312
1.401
1.411 DIA
DETAIL C
.473
.483 DIA & CBORE FS TO
.88
.90 DIA X .080
.100 DEEP
.440
.450
.031±.005
.062±.005
DETAIL D

NOTES
1. REMOVE BURRS & SHARP EDGES .005/.020
2. CHROMATE PER MIL-C-5541 EXCEPT TO BE ELEC COND
3. PAINT EDGES, SURFACE A & SURFACE C TWO (2) COATS TT-E-529 CLASS B FED-STD-595 COLOR NO. 26440 PER MIL-F-14072 P513 TYPE I
4. PAINT SURFACE B TWO (2) COATS TT-E-529 CLASS B FED-STD-595 COLOR NO. 26251 PER MIL-F-14072 P513 TYPE I
5. SILK SCREEN NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING WHITE INK 1006271-1
6. SILK SCREEN NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006271-10
7. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006271-10
8. NUMBERS PRECEDING BALLOONS DENOTE QUANTITIES
9. SILK SCREEN .03 WIDE WHITE LINES PER ND1002019
10. HOLE LETTERS FOR REF ONLY DO NOT MARK
11. LOCATE HOLES USING FIND NO. 5 AS TEMPLATE
12. LOCATE HOLES USING FIND NO. 6 AS TEMPLATE

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
8	MS20426A2-6	RIVET, SOLID FLAT HD	7
2	1004844-001	STRAP, RETAINING	6
2	1004844-003	STRAP, RETAINING	5
2	1006951-003	STUD, CAPTIVE, SELF-CLINCHING	4
6	1006942-1	FASTENER ASSY, CAPTIVE	3
6	1006951-007	STUD, CAPTIVE, SELF-CLINCHING	2
1	2016401-001	PANEL, FRONT	1

LIST OF MATERIALS

NEXT ASSY	USED ON
2014297	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .xx ±.03 DECIMALS .xxx ±.005 ANGLES ±1°
DO NOT SCALE DRAWING
MATERIAL
AL, 5052-H22 PER QQ-A-250/8

RAYTHEON CO.
LEXINGTON MASS.
CONTRACT NO. NAS 9-497
DRAWN J. May DATE 2 APR 66
CHECKED C. Gemmon 9 APR 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

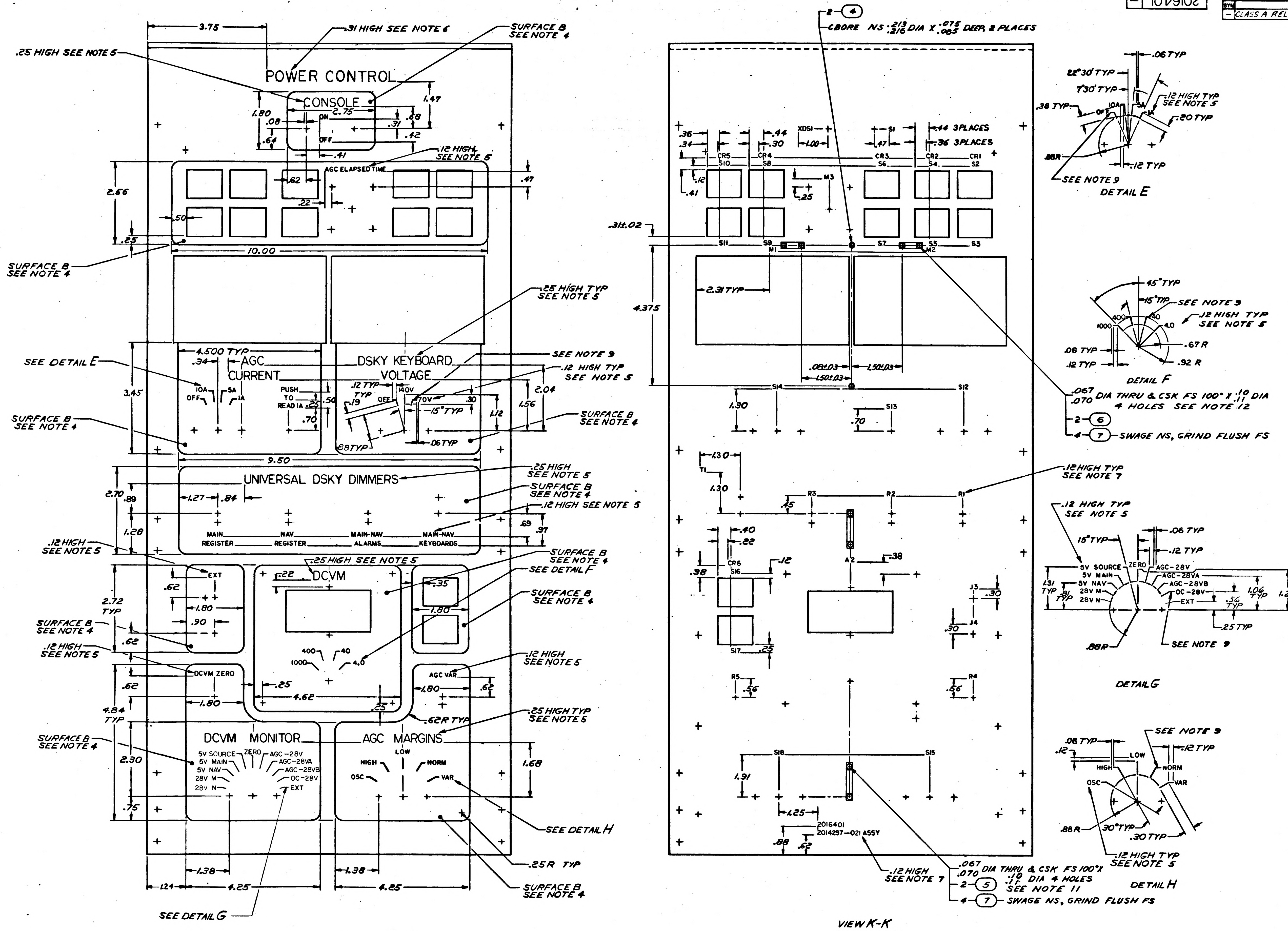
FRONT PANEL,
POWER CONTROL
OPERATION CONSOLE

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016401
SCALE
WT
SHEET 1 OF 2

2016401 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPR
–	CLASS A RELEASED PER TORR 28113		

2016401 –



2-④
CBORE NS .213/.216 DIA X .075/.085 DEEP, 2 PLACES
POWER CONTROL
CONSOLE
.31 HIGH SEE NOTE 6
.25 HIGH SEE NOTE 5
SURFACE B SEE NOTE 4
AGC ELAPSED TIME
.12 HIGH SEE NOTE 6
AGC CURRENT
DSKY KEYBOARD VOLTAGE
PUSH TO READ IA
SEE DETAIL E
SEE NOTE 9
.12 HIGH TYP SEE NOTE 5
.25 HIGH TYP SEE NOTE 5
UNIVERSAL DSKY DIMMERS
MAIN REGISTER
NAV REGISTER
MAIN-NAV ALARMS
MAIN-NAV KEYBOARDS
.12 HIGH SEE NOTE 5
DCVM
.25 HIGH SEE NOTE 5
SEE DETAIL F
EXT
DCVM ZERO
AGC VAR
DCVM MONITOR
5V SOURCE
5V MAIN
5V NAV
28V M
28V N
ZERO
AGC-28V
AGC-28VA
AGC-28VB
OC-28V
AGC MARGINS
HIGH
LOW
NORM
OSC
VAR
SEE DETAIL H
.25R TYP
SEE DETAIL G
.62R TYP
VIEW J-J SEE SHEET 1
XDS1
S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13 S14 S15 S16 S17 S18
CR1 CR2 CR3 CR4 CR5 CR6
M1 M2 M3
R1 R2 R3 R4 R5
T1
A2
J3 J4
.44 3 PLACES
.36 3 PLACES
2.31 TYP
.067/.070 DIA THRU & CSK FS 100° X .10/.11 DIA 4 HOLES SEE NOTE 12
2-⑥
4-⑦ SWAGE NS, GRIND FLUSH FS
.12 HIGH TYP SEE NOTE 7
2016401
2014297-021 ASSY
.12 HIGH SEE NOTE 7
.067/.070 DIA THRU & CSK FS 100° X .10/.11 DIA 4 HOLES SEE NOTE 11
2-⑤
4-⑦ SWAGE NS, GRIND FLUSH FS
VIEW K-K SEE SHEET 1
DETAIL E
SEE NOTE 9
DETAIL F
DETAIL G
DETAIL H
.30 TYP
30° TYP
.88R

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.06
DECIMALS .XXX ±.005
ANGLES ±1°
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN J. May DATE 2 APR 66
CHECKED B. Ammon 9 APR 66
APPROVAL 4/14/66
APPROVAL 4/14/66
APPROVAL 4/14
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRONT PANEL,
POWER CONTROL
OPERATION CONSOLE

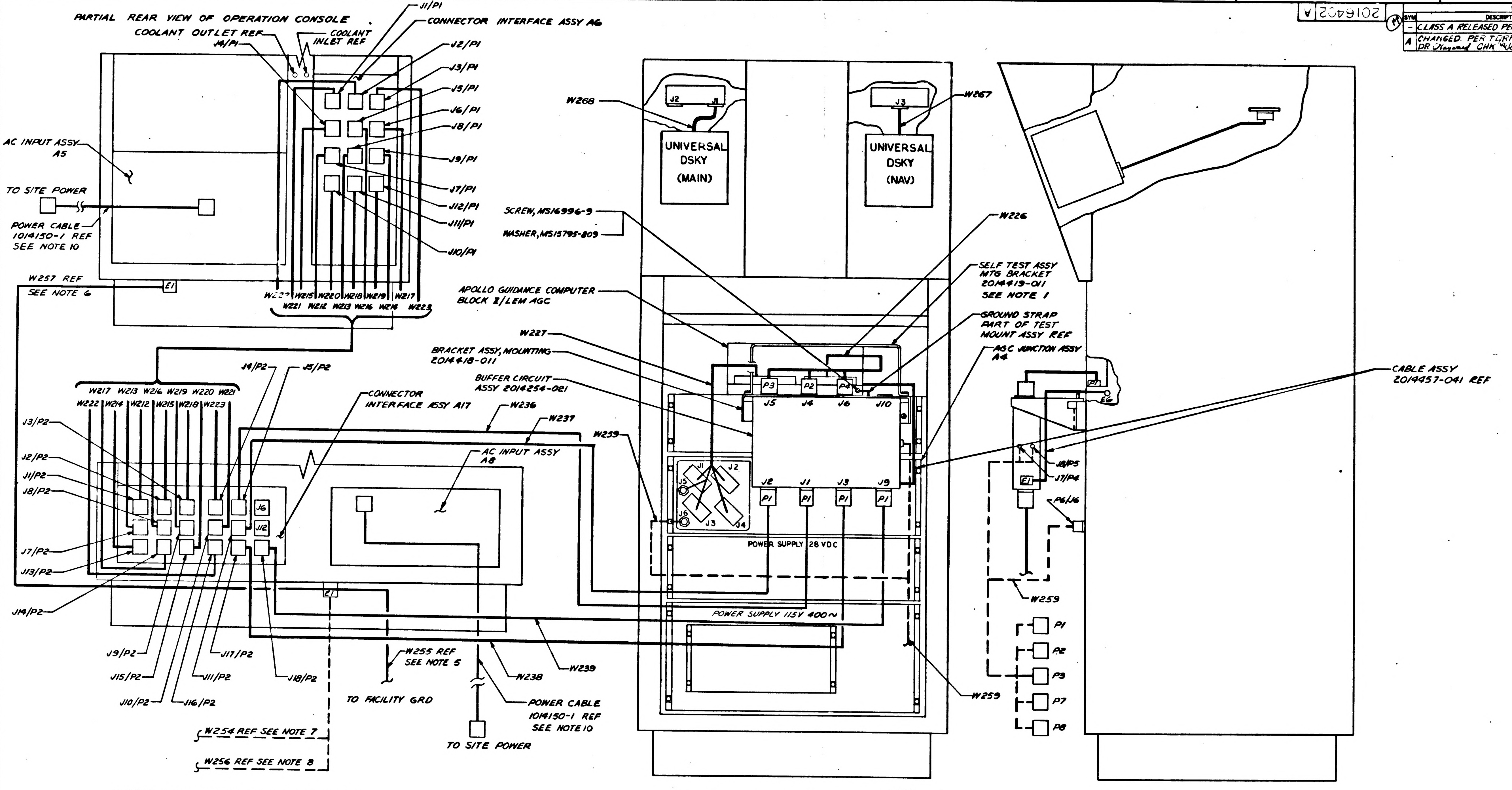
CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016401
SCALE 1/1
WT
SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

2016401 –

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
-	CLASS A RELEASED PER TDRR 28281		
A	CHANGED PER TDRR 29326 DR Hayward CHK APPD		


PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT OUTLET REF
COOLANT INLET REF
J4/P1
J1/P1
CONNECTOR INTERFACE ASSY A6
J2/P1
J3/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF SEE NOTE 10
W257 REF SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
J4/P2
J5/P2
J3/P2
J2/P2
J1/P2
J8/P2
J7/P2
J13/P2
J14/P2
J6
J12
CONNECTOR INTERFACE ASSY A17
W236
W237
AC INPUT ASSY A8
J9/P2
J15/P2
J10/P2
J16/P2
J11/P2
J17/P2
J18/P2
W255 REF SEE NOTE 5
TO FACILITY GRD
W238
W239
POWER CABLE 1014150-1 REF SEE NOTE 10
TO SITE POWER
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
W268
J2 J1
UNIVERSAL DSKY (MAIN)
W267
J3
UNIVERSAL DSKY (NAV)
SCREW, MS16996-9
WASHER, MS15795-809
W226
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
APOLLO GUIDANCE COMPUTER BLOCK II/LEM AGC
GROUND STRAP PART OF TEST MOUNT ASSY REF
W227
AGC JUNCTION ASSY A4
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021
P3 P2 P4
J5 J4 J6 J10
J2 J1 J3 J9
P1 P1 P1 P1
W259
J1 J2 J5 J6 J3 J4
POWER SUPPLY 28 VDC
POWER SUPPLY 115V 400~
CABLE ASSY 2014457-041 REF
P7
E6
J8/P5
J7/P4
E1
P6/J6
W259
P1
P2
P3
P7
P8
W259

PARTIAL REAR VIEW OF COMPUTER TEST SET

FRONT VIEW OF OPERATION CONSOLE

NOTES

1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021 & 2014042-031
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CALIBRATION CONSOLE 2014059-021
9. W263 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST
10. POWER CABLES SUPPLIED WITH CTS 2014042-021 AND 2014042-031 AND OPERATION CONSOLE 2014024-021

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W226	2014137 -011	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392 -011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470 -011	P1 P2 P5 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
UNIVERSAL (MAIN) DSKY	—	P1	W268	2016408 -011	P2	J1	OPERATION CONSOLE	
UNIVERSAL (NAV) DSKY	—	P1	W267	2016406 -011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W227	2014199 -011	P6 P2 P3 P4 P5	J1 J2 J3 J4 J5	OPERATION CONSOLE AGC JUNCTION	
OPERATION CONSOLE			W263	2016314 -011			OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

REFERENCE:
1. ASSEMBLY DWG 2014268

MASTER

FOR INFORMATION ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN Moreno DATE 11APR66
CHECKED 12APR66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

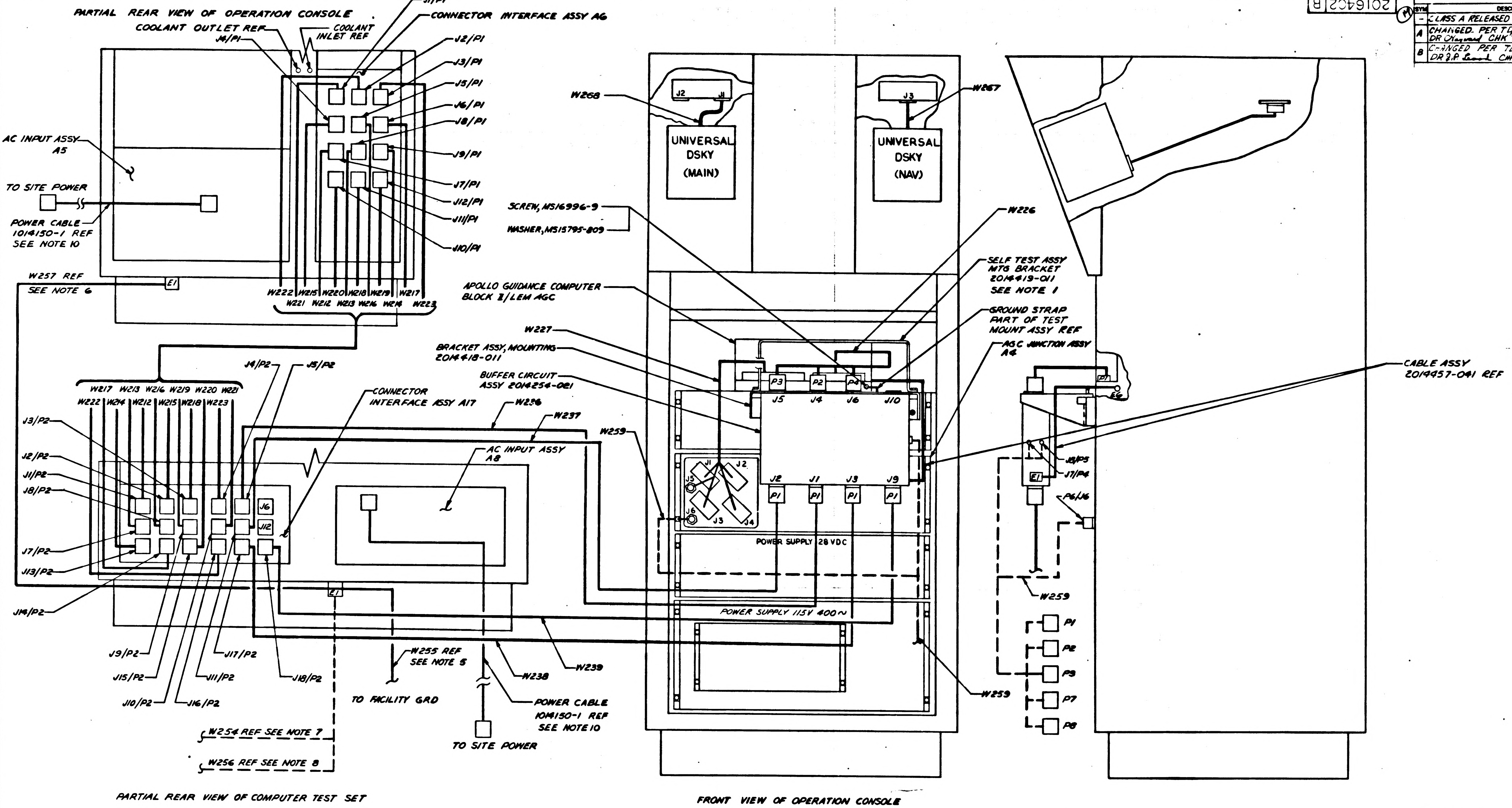
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II/LEM
SUB-SYSTEM TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016402
SCALE NONE WT SHEET 1 OF 1

2016402 B

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
-	CLASS A RELEASED PER TDRR 28281		
A	CHANGED PER TDRR 29326 DR Hayward CHK APPD	6/14/66	
B	CHANGED PER TDRR 30572 DR J.P. Leonard CHK APPD	8/30/66	


PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT OUTLET REF
COOLANT INLET REF
J4/P1
J1/P1
CONNECTOR INTERFACE ASSY A6
J2/P1
J3/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF SEE NOTE 10
W257 REF SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
J4/P2
J5/P2
J3/P2
J2/P2
J1/P2
J8/P2
J7/P2
J13/P2
J14/P2
J6
J12
CONNECTOR INTERFACE ASSY A17
W236
W237
AC INPUT ASSY A8
E1
J9/P2
J15/P2
J10/P2
J16/P2
J11/P2
J17/P2
J18/P2
W255 REF SEE NOTE 5
TO FACILITY GRD
W238
W239
POWER CABLE 1014150-1 REF SEE NOTE 10
TO SITE POWER
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
PARTIAL REAR VIEW OF COMPUTER TEST SET
W268
J2
J1
UNIVERSAL DSKY (MAIN)
J3
W267
UNIVERSAL DSKY (NAV)
SCREW, MS16996-9
WASHER, MS15795-809
W226
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
GROUND STRAP PART OF TEST MOUNT ASSY REF
AGC JUNCTION ASSY A4
APOLLO GUIDANCE COMPUTER BLOCK II/LEM AGC
W227
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021
W259
P3 P2 P4
J5 J4 J6 J10
J2 J1 J3 J9
P1 P1 P1 P1
J1 J2 J5 J6 J3 J4
POWER SUPPLY 28 VDC
POWER SUPPLY 115V 400~
W259
CABLE ASSY 2019457-041 REF
P7
E6
J8/P5
J7/P4
E1
P6/J6
W259
P1
P2
P3
P7
P8
FRONT VIEW OF OPERATION CONSOLE

NOTES

1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021 OR 2014268-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021 & 2014042-031
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CALIBRATION CONSOLE 2014059-021
9. W263 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST
10. POWER CABLES SUPPLIED WITH CTS 2014042-021 AND 2014042-031 AND OPERATION CONSOLE 2014024-021

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W226	2014137-011 2014137-021	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392 -011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470 -011	P1 P2 P5 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
UNIVERSAL (MAIN) DSKY	—	P1	W268	2016408 -011	P2	J1	OPERATION CONSOLE	
UNIVERSAL (NAV) DSKY	—	P1	W267	2016406 -011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W227	2014199 -011 2014199-021	P6 P2 P3 P4 P5	J1 J2 J3 J4 J5	OPERATION CONSOLE AGC JUNCTION	
OPERATION CONSOLE			W263	2016314 -011			OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

REFERENCE:
1. ASSEMBLY DWG 2014268

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN DATE 11APR66
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II/LEM
SUB-SYSTEM TEST

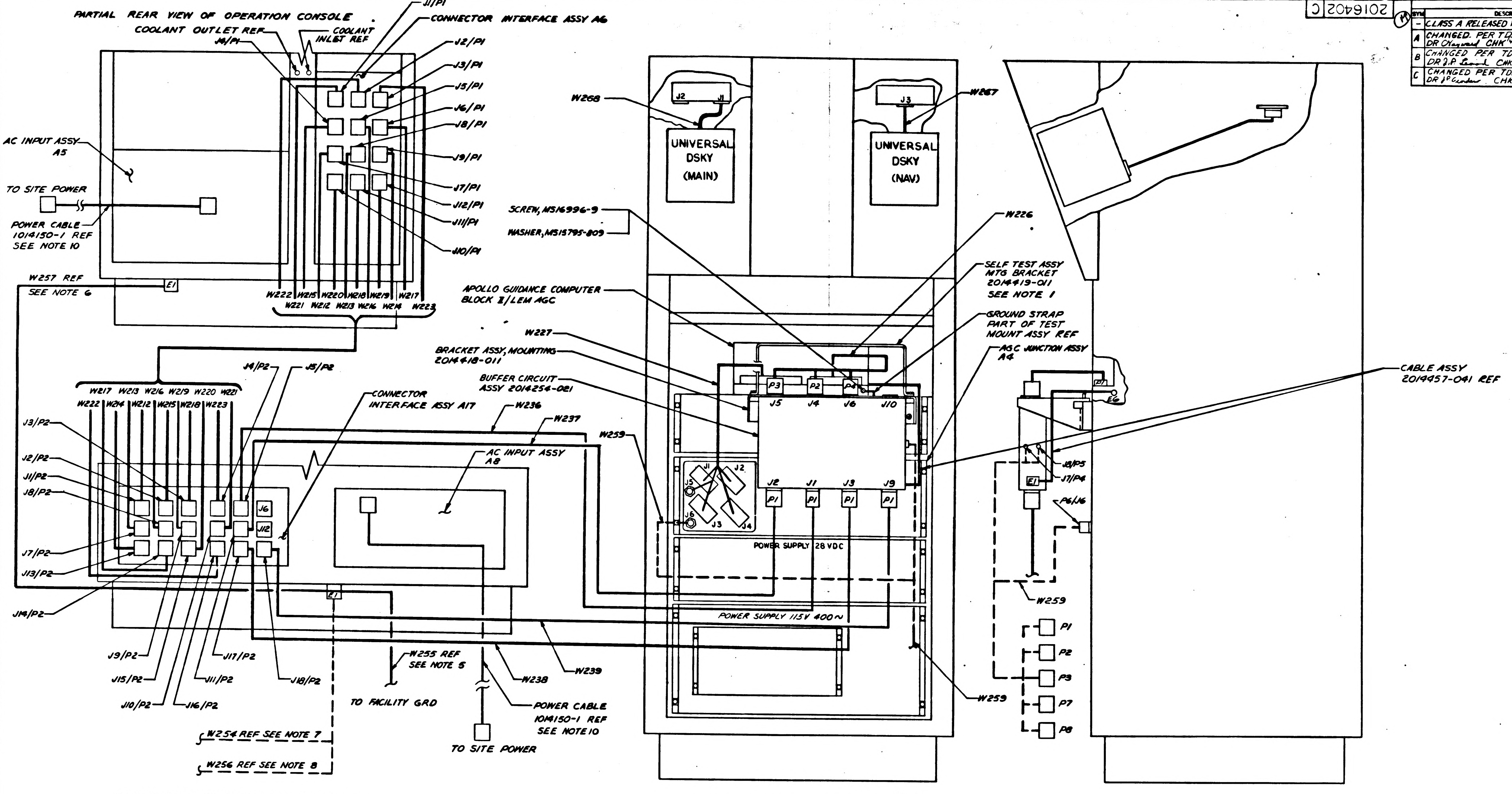
SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016402
SCALE NONE | WT | SHEET 1 OF 1

MASTER

FOR INFORMATION ONLY

2016402 B

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
-	CLASS A RELEASED PER TDRR 28281		
A	CHANGED PER TDRR 29226 DR Hayward CHK APPD	6/14/66	
B	CHANGED PER TDRR 30572 DR J.P. Leonard CHK APPD	8/30/66	
C	CHANGED PER TDRR 31286 DR J.P. Gendron CHK APPD	10/5/66	


PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT OUTLET REF
COOLANT INLET REF
J4/P1
J1/P1
CONNECTOR INTERFACE ASSY A6
J2/P1
J3/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF SEE NOTE 10
W257 REF SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
W268
W267
UNIVERSAL DSKY (MAIN)
UNIVERSAL DSKY (NAV)
J2
J1
J3
SCREW, MS16996-9
WASHER, MS15795-809
W226
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
APOLLO GUIDANCE COMPUTER BLOCK II/LEM AGC
GROUND STRAP PART OF TEST MOUNT ASSY REF
AGC JUNCTION ASSY A4
W227
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021
CABLE ASSY 2019457-041 REF
P3 P2 P4
J5 J4 J6 J10
J2 J1 J3 J9
P1 P1 P1 P1
J1 J2 J3 J4 J5 J6
POWER SUPPLY 28 VDC
POWER SUPPLY 115V 400~
P7
E6
J8/P5
J7/P4
P6/J6
W259
P1
P2
P3
P7
P8
J4/P2
J5/P2
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
J3/P2
J2/P2
J1/P2
J8/P2
J7/P2
J13/P2
J14/P2
J6
J12
CONNECTOR INTERFACE ASSY A17
W236
W237
AC INPUT ASSY A8
J9/P2
J15/P2
J10/P2
J16/P2
J11/P2
J17/P2
J18/P2
W255 REF SEE NOTE 5
TO FACILITY GRD
W238
W239
POWER CABLE 1014150-1 REF SEE NOTE 10
TO SITE POWER
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8

PARTIAL REAR VIEW OF COMPUTER TEST SET

FRONT VIEW OF OPERATION CONSOLE

REFERENCE:
1. ASSEMBLY DWG 2014268

NOTES
1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021 OR 2014268-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021, -031, -041, & -051
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CALIBRATION CONSOLE 2014059-021
9. W263 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST
10. POWER CABLES SUPPLIED WITH CTS 2014042-021, -031, -041, & -051 AND OPERATION CONSOLE 2014024-021

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	OPERATION CONSOLE
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W226	2014137-011 2014137-021	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392 -011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470 -011	P1 P2 P5 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
UNIVERSAL (MAIN) DSKY	—	P1	W268	2016408 -011	P2	J1	OPERATION CONSOLE	
UNIVERSAL (NAV) DSKY	—	P1	W267	2016406 -011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W227	2014199 -011 2014199-021	P6 P2 P3 P4 P5	J1 J2 J3 J4 J5	OPERATION CONSOLE AGC JUNCTION	
OPERATION CONSOLE			W263	2016314 -011			OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
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NASA APPROVAL
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MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II/LEM
SUB-SYSTEM TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016402
SCALE NONE
WT
SHEET 1 OF 1

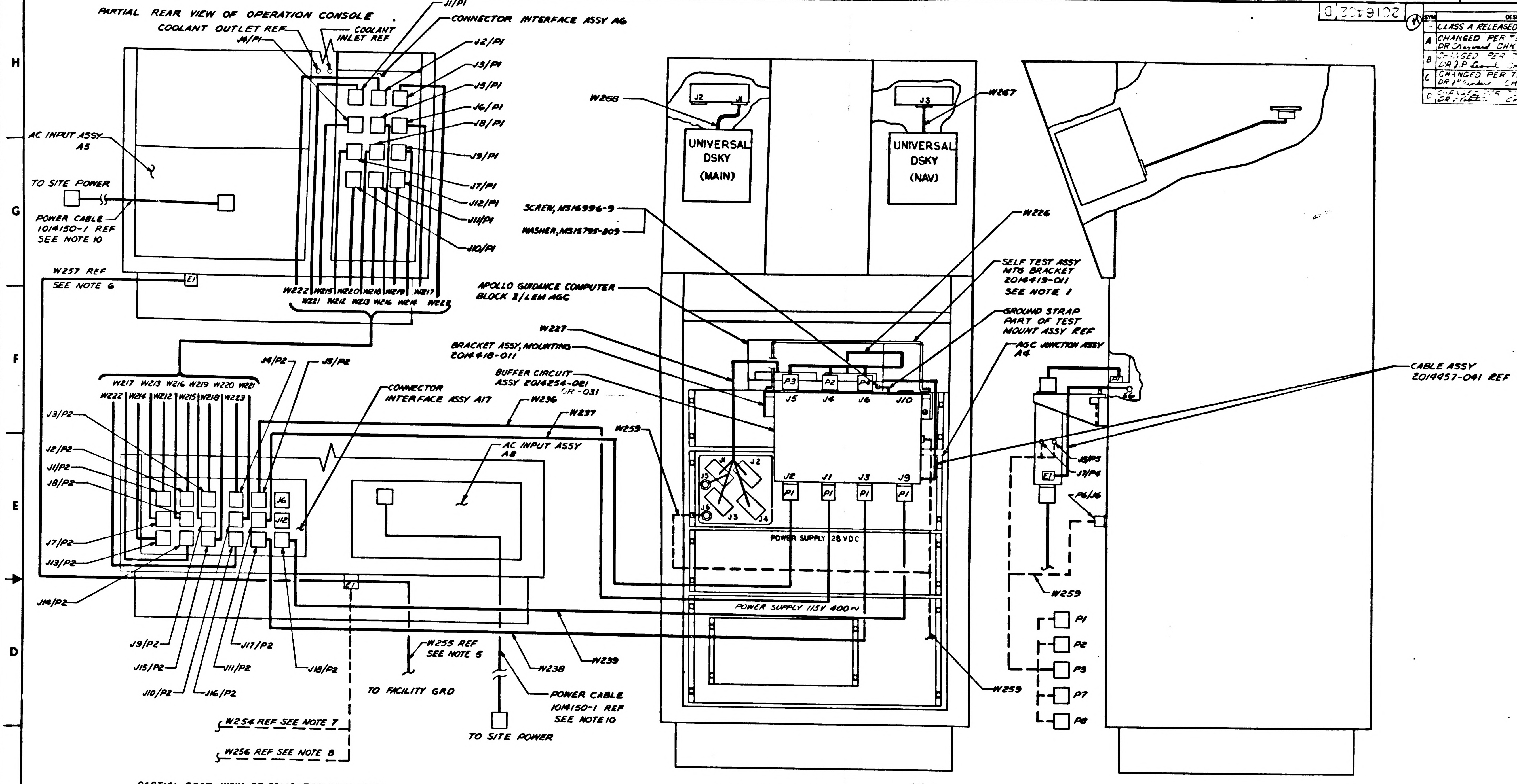
MASTER

FOR INFORMATION ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016402 D

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
–	CLASS A RELEASED PER TDRR 28281		
A	CHANGED PER TDRR 29326 DR Maynard CHK APPD		
B	CHANGED PER TDRR 30572 DR J.P. Leonard CHK APPD		
C	CHANGED PER TDRR 31286 DR J.P. Gordon CHK APPD		
D	CHANGED PER TDRR 33446 DR CHK		


PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT OUTLET REF
COOLANT INLET REF
J4/P1
J1/P1
CONNECTOR INTERFACE ASSY A6
J2/P1
J3/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF SEE NOTE 10
W257 REF SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
W268
W267
UNIVERSAL DSKY (MAIN)
UNIVERSAL DSKY (NAV)
J2
J1
J3
SCREW, MS16996-9
WASHER, MS15795-809
W226
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
GROUND STRAP PART OF TEST MOUNT ASSY REF
AGC JUNCTION ASSY A4
APOLLO GUIDANCE COMPUTER BLOCK II/LEM AGC
W227
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021 OR -031
CABLE ASSY 2014457-041 REF
J4/P2
J5/P2
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
CONNECTOR INTERFACE ASSY A17
W236
W237
W259
AC INPUT ASSY A8
J3/P2
J2/P2
J1/P2
J8/P2
J6
J12
J7/P2
J13/P2
J14/P2
J9/P2
J15/P2
J10/P2
J16/P2
J11/P2
J17/P2
J18/P2
W255 REF SEE NOTE 5
TO FACILITY GRD
W238
W239
POWER CABLE 1014150-1 REF SEE NOTE 10
TO SITE POWER
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
P3 P2 P4
J5 J4 J6 J10
J2 J1 J3 J9
P1 P1 P1 P1
J1 J2 J5 J6 J3 J4
POWER SUPPLY 28 VDC
POWER SUPPLY 115V 400~
J8/P5
J7/P4
E1
P6/J6
P7
E6
W259
P1
P2
P3
P7
P8

PARTIAL REAR VIEW OF COMPUTER TEST SET

FRONT VIEW OF OPERATION CONSOLE

REFERENCE:
1. ASSEMBLY DWG 2014268

NOTES
1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021 OR 2014268-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021, -031, -041, -051, & -061
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CALIBRATION CONSOLE 2014059-021
9. W263 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST
10. POWER CABLES SUPPLIED WITH CTS 2014042-021, -031, -041, -051, & 061 AND OPERATION CONSOLE 2014024-021

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W226	2014137-011 2014137-021	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392 -011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470 -011	P1 P2 P5 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
UNIVERSAL (MAIN) DSKY	—	P1	W268	2016408 -011	P2	J1	OPERATION CONSOLE	
UNIVERSAL (NAV) DSKY	—	P1	W267	2016406 -011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W227	2014199 -011 2014199-021	P6 P2 P3 P4 P5	J1 J2 J3 J4 J5	OPERATION CONSOLE AGC JUNCTION	
OPERATION CONSOLE			W263	2016314 -011			OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON MASS.
CONTRACT NO NAS 9-497
DRAWN Maynard DATE 11 APR
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II/LEM
SUB-SYSTEM TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO 2016402
SCALE NONE
WT
SHEET 1 OF 1

MASTER

FOR INFORMATION ONLY

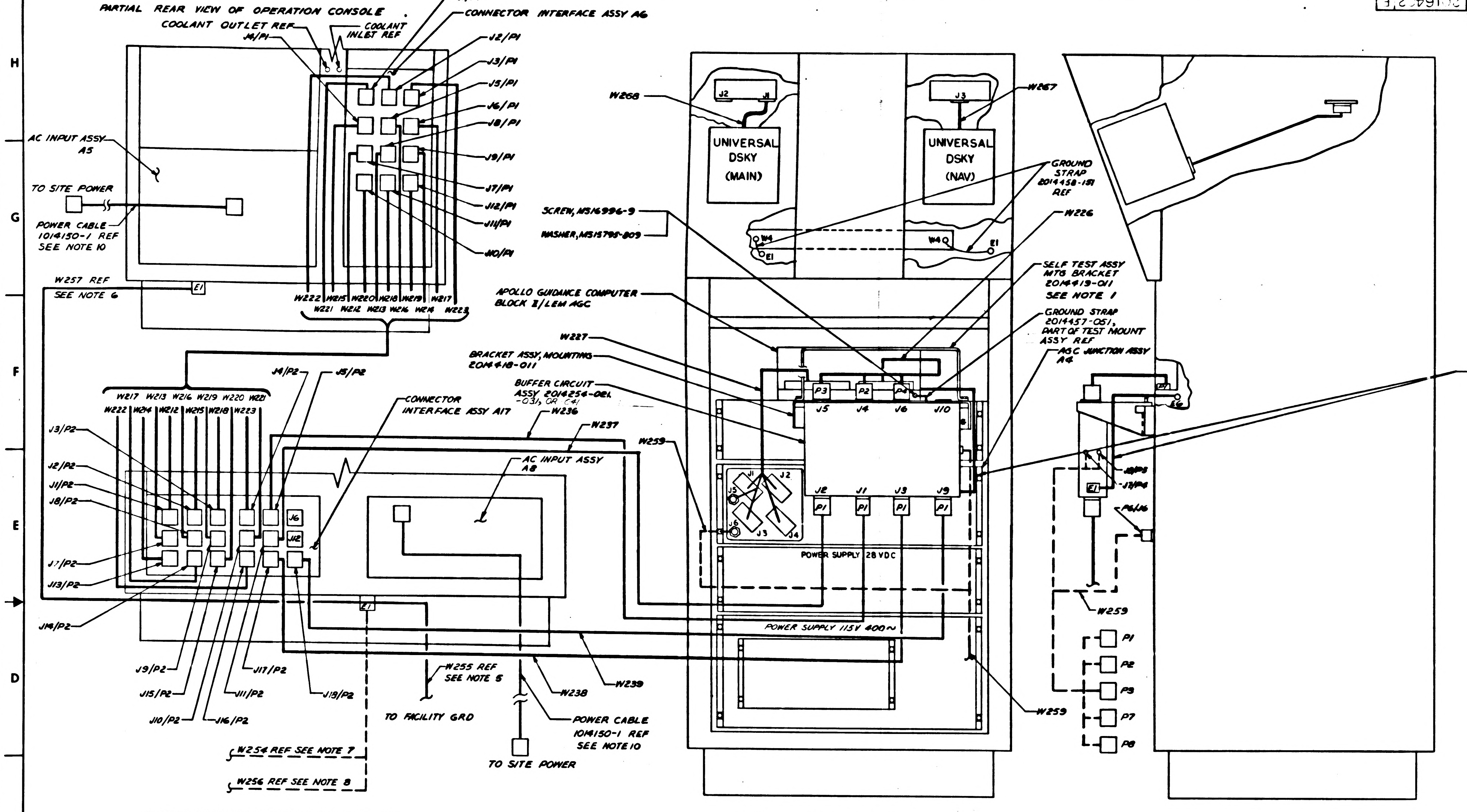
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016402 D

2016402 E

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
-	CLASS A RELEASED PER TDRR 2824[illegible]		
A	CHANGED PER TDRR 2[illegible]326 DR Hayward CHK [illegible] APPD [illegible]	[illegible]	[illegible]
B	CHANGED PER TDRR 3[illegible]572 DR J.P [illegible] CHK [illegible] APPD	[illegible]	[illegible]
C	CHANGED PER TDRR 31286 DR [illegible] CHK [illegible] APPD		[illegible]
D	CHANGED PER TDRR 33[illegible]48 DR [illegible] CHK [illegible]		
E	CHANGED PER TDRR 3553[illegible] DR B Board CHK [illegible] APPD		

PARTIAL REAR VIEW OF OPERATION CONSOLE


J1/P1
CONNECTOR INTERFACE ASSY A6
COOLANT OUTLET REF
COOLANT INLET REF
J4/P1
J2/P1
J3/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF SEE NOTE 10
W257 REF SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
W268
W267
J2
J1
J3
UNIVERSAL DSKY (MAIN)
UNIVERSAL DSKY (NAV)
GROUND STRAP 2014458-151 REF
SCREW, MS16996-9
WASHER, MS15795-809
W226
W4
E1
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
GROUND STRAP 2014457-051, PART OF TEST MOUNT ASSY REF
AGC JUNCTION ASSY A4
APOLLO GUIDANCE COMPUTER BLOCK II/LEM AGC
W227
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021, -031, OR -041
P3 P2 P4
J5 J4 J6 J10
J2 J1 J3 J9
P1 P1 P1 P1
J1 J2 J5 J6 J3 J4
POWER SUPPLY 28 VDC
POWER SUPPLY 115V 400~
CABLE ASSY 2014457-041 REF
E6
J8/P3
J7/P4
P6/J6
W259
P1 P2 P3 P7 P8
J4/P2
J5/P2
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
CONNECTOR INTERFACE ASSY A17
W236
W237
AC INPUT ASSY A8
J3/P2
J2/P2
J1/P2
J8/P2
J7/P2
J13/P2
J14/P2
J6
J12
J9/P2
J15/P2
J10/P2
J17/P2
J11/P2
J16/P2
J18/P2
W255 REF SEE NOTE 5
TO FACILITY GRD
W238
W239
POWER CABLE 1014150-1 REF SEE NOTE 10
TO SITE POWER
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8

PARTIAL REAR VIEW OF COMPUTER TEST SET

FRONT VIEW OF OPERATION CONSOLE

NOTES
1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021 OR 2014268-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021, -031, -041 -051, -061 & -071
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CALIBRATION CONSOLE 2014059-021
9. W263 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST
10. POWER CABLES SUPPLIED WITH CTS 2014042-021, -031, -041, -051, -061, & -071 AND OPERATION CONSOLE 2014024-021

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W226	2014137-011 2014137-021	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011 2014392-021	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P5 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
UNIVERSAL (MAIN) DSKY	—	P1	W268	2016408-011	P2	J1	OPERATION CONSOLE	
UNIVERSAL (NAV) DSKY	—	P1	W267	2016406-011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W227	2014199-011 2014199-021	P6 P2 P3 P4 P5	J1 J2 J3 J4 J5	OPERATION CONSOLE AGC JUNCTION	
OPERATION CONSOLE			W263	2016314-011			OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

REFERENCE:
1. ASSEMBLY DWG 2014268

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .xx ± DECIMALS .xxx ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON MASS.
CONTRACT NO NAS 9-497
DRAWN Hayward DATE 11/4/66
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II/LEM
SUB-SYSTEM TEST

SIZE J
CODE IDENT NO 49956
NASA DRAWING NO 2016402
SCALE NONE
WT
SHEET 1 OF 1

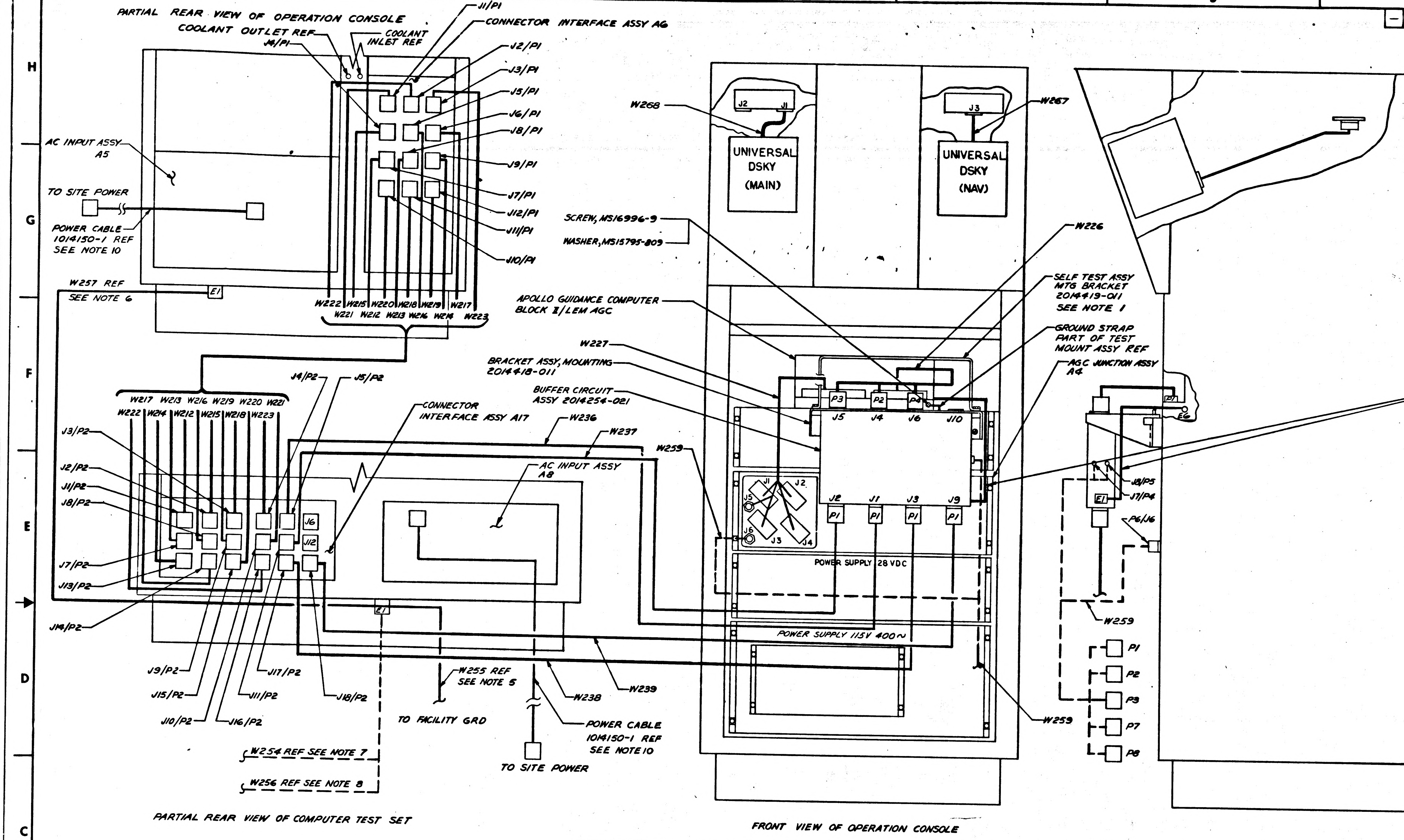
FOR INFORMATION ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016402 E

2016402 -

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28281		


PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT OUTLET REF
COOLANT INLET REF
J4/P1
J1/P1
CONNECTOR INTERFACE ASSY A6
J2/P1
J3/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF SEE NOTE 10
W257 REF SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
J4/P2
J5/P2
J3/P2
J2/P2
J1/P2
J8/P2
J7/P2
J13/P2
J14/P2
J6
J12
CONNECTOR INTERFACE ASSY A17
W236
W237
AC INPUT ASSY A8
J9/P2
J15/P2
J10/P2
J16/P2
J11/P2
J17/P2
J18/P2
W255 REF SEE NOTE 5
TO FACILITY GRD
W238
W239
POWER CABLE 1014150-1 REF SEE NOTE 10
TO SITE POWER
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
PARTIAL REAR VIEW OF COMPUTER TEST SET
W268
J2
J1
UNIVERSAL DSKY (MAIN)
W267
J3
UNIVERSAL DSKY (NAV)
SCREW, MS16996-9
WASHER, MS15795-809
W226
APOLLO GUIDANCE COMPUTER BLOCK II/LEM AGC
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
GROUND STRAP PART OF TEST MOUNT ASSY REF
W227
BRACKET ASSY, MOUNTING 2014418-011
AGC JUNCTION ASSY A4
BUFFER CIRCUIT ASSY 2014254-021
CABLE ASSY 2014457-041 REF
P3 P2 P4
J5 J4 J6 J10
W259
J1 J2 J5 J6 J3 J4
J2 J1 J3 J9
P1 P1 P1 P1
POWER SUPPLY 28 VDC
P7
E6
J8/P5
J7/P4
E1
P6/J6
W259
POWER SUPPLY 115V 400~
W259
P1
P2
P3
P7
P8
FRONT VIEW OF OPERATION CONSOLE

REFERENCE:
1. ASSEMBLY DWG 2014268

NOTES
1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CALIBRATION CONSOLE 2014059-021
9. W263 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST
10. POWER CABLES SUPPLIED WITH CTS 2014042-021 AND OPERATION CONSOLE 2014024-021

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W226	2014137 -011	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392 -011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470 -011	P1 P2 P5 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
UNIVERSAL (MAIN) DSKY	—	P1	W268	2016408 -011	P2	J1	OPERATION CONSOLE	
UNIVERSAL (NAV) DSKY	—	P1	W267	2016406 -011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W227	2014199 -011	P6 P2 P3 P4 P5	J1 J2 J3 J4 J5	OPERATION CONSOLE AGC JUNCTION	
OPERATION CONSOLE			W263	2016314 -011			OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN P. Moreau DATE 11APR66
CHECKED 12 APR 66
APPROVAL 4/25/66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II/LEM
SUB-SYSTEM TEST

SIZE J CODE IDENT NO. 49956 NASA DRAWING NO. 2016402
SCALE NONE WT SHEET 1 OF 1

2016402 -

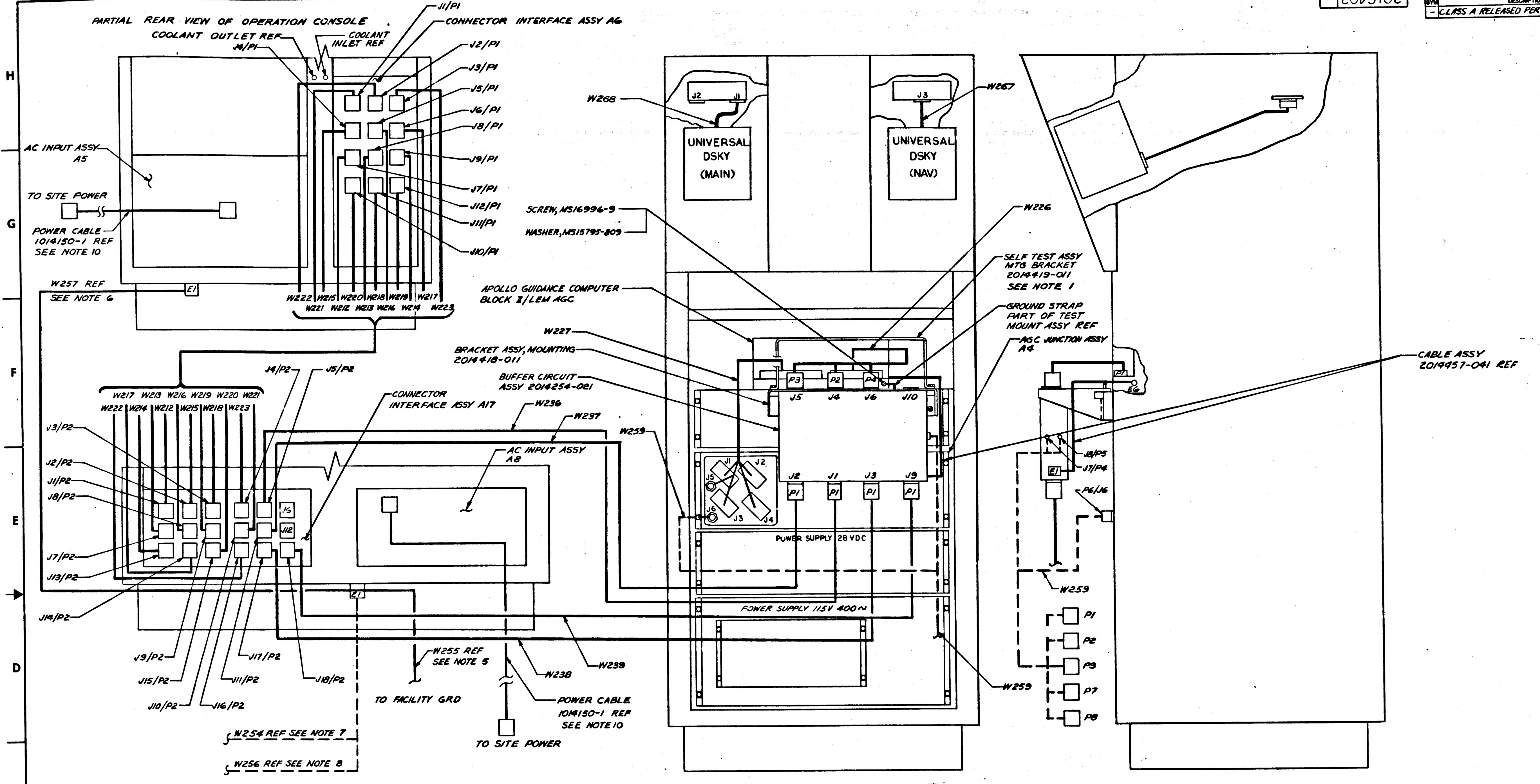
MASTER

FOR INFORMATION ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016402 -

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28281		


J1/P1
CONNECTOR INTERFACE ASSY A6
COOLANT OUTLET REF
COOLANT INLET REF
J4/P1
J2/P1
J3/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF SEE NOTE 10
W257 REF SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
J4/P2
J5/P2
J3/P2
J2/P2
J1/P2
J8/P2
J7/P2
J13/P2
J14/P2
J6
J12
CONNECTOR INTERFACE ASSY A17
W236
W237
AC INPUT ASSY A8
E1
J9/P2
J15/P2
J10/P2
J17/P2
J11/P2
J16/P2
J18/P2
W255 REF SEE NOTE 5
TO FACILITY GRD
W238
W239
POWER CABLE 1014150-1 REF SEE NOTE 10
TO SITE POWER
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
W268
J2 J1
UNIVERSAL DSKY (MAIN)
J3
W267
UNIVERSAL DSKY (NAV)
SCREW, MS16996-9
WASHER, MS15795-809
W226
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
GROUND STRAP PART OF TEST MOUNT ASSY REF
AGC JUNCTION ASSY A4
APOLLO GUIDANCE COMPUTER BLOCK II/LEM AGC
W227
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021
W259
P3 P2 P4
J5 J4 J6 J10
J2 J1 J3 J9
P1 P1 P1 P1
J1 J2 J5 J6 J3 J4
POWER SUPPLY 28 VDC
POWER SUPPLY 115V 400~
W259
W259
P7
E6
J8/P5
J7/P4
E1
P6/J6
CABLE ASSY 2014457-041 REF
P1
P2
P3
P7
P8

PARTIAL REAR VIEW OF OPERATION CONSOLE

PARTIAL REAR VIEW OF COMPUTER TEST SET

FRONT VIEW OF OPERATION CONSOLE

REFERENCE:
1. ASSEMBLY DWG 2014268

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	OPERATION CONSOLE
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W226	2014137 -011	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392 -011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470 -011	P1 P2 P5 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
UNIVERSAL (MAIN) DSKY	—	P1	W268	2016408 -011	P2	J1	OPERATION CONSOLE	
UNIVERSAL (NAV) DSKY	—	P1	W267	2016406 -011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W227	2014199 -011	P6 P2 P3 P4 P5	J1 J2 J3 J4 J5	OPERATION CONSOLE AGC JUNCTION	
OPERATION CONSOLE			W263	2016314 -011			OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

NOTES
1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CALIBRATION CONSOLE 2014059-021
9. W263 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST
10. POWER CABLES SUPPLIED WITH CTS 2014042-021 AND OPERATION CONSOLE 2014024-021

MASTER

FOR INFORMATION ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE
CHECKED
APPROVAL 4/25/66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II/LEM
SUB-SYSTEM TEST

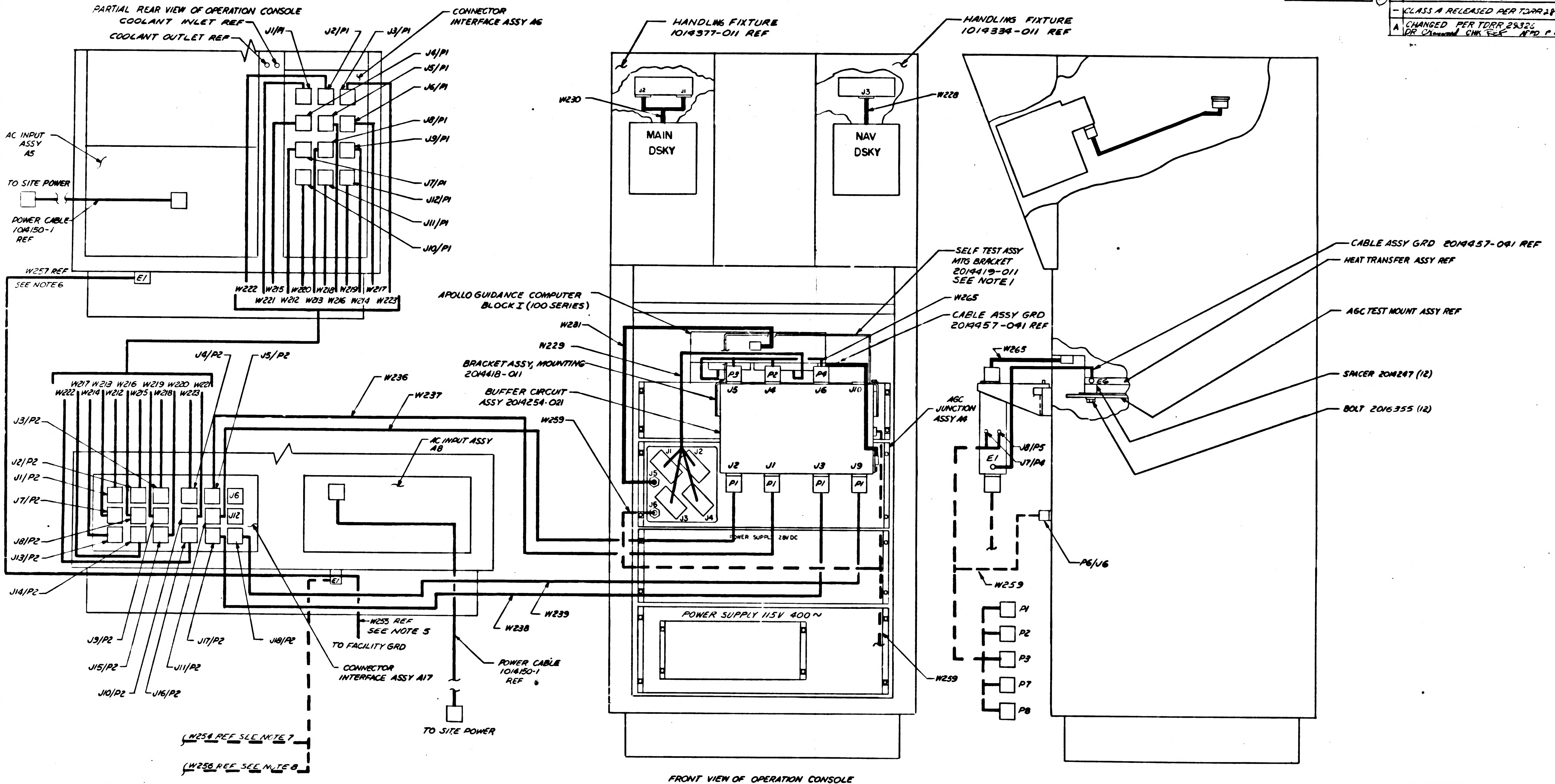
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016402 -

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28281		
A	CHANGED PER TDRR 29325 DR Chaurand CHK RCF APPD P.C.D.		

2016403 A



PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT INLET REF
COOLANT OUTLET REF
J1/P1
J2/P1
J3/P1
CONNECTOR INTERFACE ASSY A6
J4/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF
W257 REF SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
J4/P2
J5/P2
W236
W237
J3/P2
J2/P2
J1/P2
J7/P2
J8/P2
J13/P2
J14/P2
J6
J12
AC INPUT ASSY A8
E1
W255 REF SEE NOTE 5
TO FACILITY GRD
J9/P2
J15/P2
J10/P2
J17/P2
J11/P2
J16/P2
J18/P2
CONNECTOR INTERFACE ASSY A17
W238
W239
POWER CABLE 1014150-1 REF
TO SITE POWER
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
HANDLING FIXTURE 1014377-011 REF
HANDLING FIXTURE 1019334-011 REF
W230
J2
J1
J3
W228
MAIN DSKY
NAV DSKY
APOLLO GUIDANCE COMPUTER BLOCK I (100 SERIES)
W281
W229
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021
W259
P3 P2 P4
J5 J4 J6 J10
J1 J2 J5 J6 J3 J4
J2 J1 J3 J9
P1 P1 P1 P1
POWER SUPPLY 28V DC
POWER SUPPLY 115V 400~
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
W265
CABLE ASSY GRD 2014457-041 REF
AGC JUNCTION ASSY A4
W265
E6
J8/P5
J7/P4
E1
P6/J6
W259
P1
P2
P3
P7
P8
W259
CABLE ASSY GRD 2014457-041 REF
HEAT TRANSFER ASSY REF
AGC TEST MOUNT ASSY REF
SPACER 2014247 (12)
BOLT 2016355 (12)

FRONT VIEW OF OPERATION CONSOLE

PARTIAL REAR VIEW OF COMPUTER TEST SET

REFERENCE:
1. ASSEMBLY DWG 2014268

INTERCONNECTION CHART							
FROM		UNIT/CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W265	2016360-011	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART								
FROM		UNIT/CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
MAIN DSKY	—	P1	W230	2014487-011	P2 P3	J1 J2	OPERATION CONSOLE	
NAV DSKY	—	P1	W228	2014489-011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W229	2014488-011	P5 P2 P3 P4	J1 J2 J3 J4	OPERATION CONSOLE AGC JUNCTION	
	PWR CONN	P1	W231	2014485-011	P2	J5		
OPERATION CONSOLE	J5	P1	W258	2014456-011	P2	J7	OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

NOTES
1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSEMBLY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERM TOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT G OUND S PPORT EQUIPMENT AND BLOCK I (100 SE S) APOLLO GUIDANCE COMPUTERS USING AGC/GSE TERCONNECTION SET 2014268-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014024 & 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021 & 2014042-031
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. W258 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST

2016403 A

FOR INFORMATION ONLY

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INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

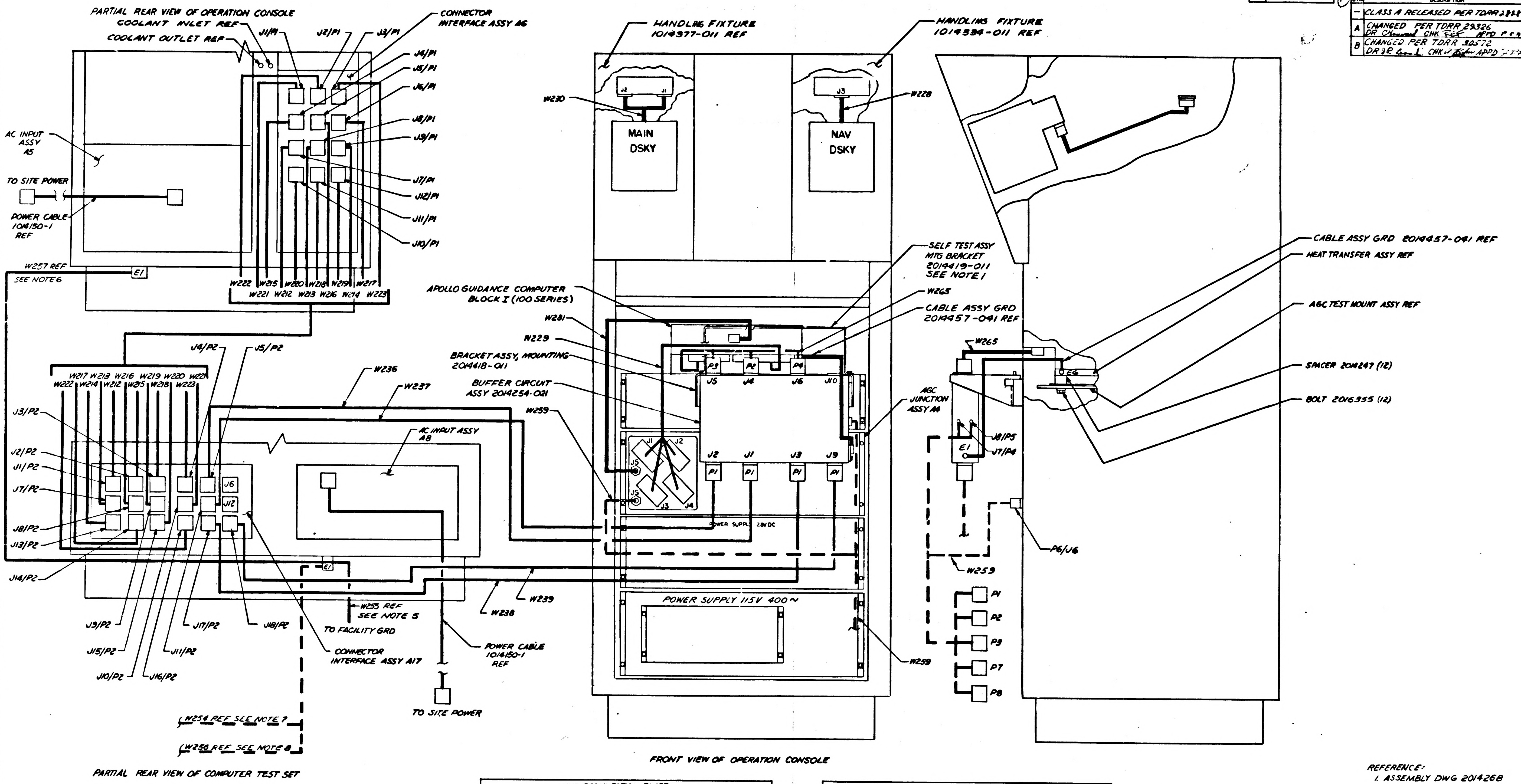
RAYTHEON CO.
LEXINGTON MASS.
CONTRACT NO NAS 9-497
DRAWN Chaurand DATE 23 APR 66
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK I (100 SERIES)
SUB-SYSTEM TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016403
SCALE NONE
WT
SHEET 1 OF 1

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
—	CLASS A RELEASED PER TDRR 28281		
A	CHANGED PER TDRR 29326 DR [illegible] CHK [illegible] APPD [illegible]	5/4/66	[illegible]
B	CHANGED PER TDRR 30572 DR [illegible] CHK [illegible] APPD [illegible]	[illegible]	[illegible]


PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT INLET REF
COOLANT OUTLET REF
J1/P1
J2/P1
J3/P1
CONNECTOR INTERFACE ASSY A6
J4/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF
W257 REF
SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
J4/P2
J5/P2
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
J3/P2
J2/P2
J1/P2
J7/P2
J8/P2
J13/P2
J14/P2
J6
J12
W236
W237
AC INPUT ASSY A8
W255 REF
SEE NOTE 5
TO FACILITY GRD
CONNECTOR INTERFACE ASSY A17
W238
W239
POWER CABLE 1014150-1 REF
TO SITE POWER
J9/P2
J17/P2
J18/P2
J15/P2
J11/P2
J10/P2
J16/P2
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
PARTIAL REAR VIEW OF COMPUTER TEST SET
HANDLING FIXTURE 1014377-011 REF
HANDLING FIXTURE 1014334-011 REF
W230
J2
J1
MAIN DSKY
J3
W228
NAV DSKY
APOLLO GUIDANCE COMPUTER BLOCK I (100 SERIES)
W281
W229
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021
W259
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
W265
CABLE ASSY GRD 2014457-041 REF
P3
P2
P4
J5
J4
J6
J10
J2
J1
J3
J9
P1
J5
J4
POWER SUPPLY 28V DC
POWER SUPPLY 115V 400~
AGC JUNCTION ASSY A4
J8/P5
J7/P4
E1
P6/J6
W259
P1
P2
P3
P7
P8
E6
CABLE ASSY GRD 2014457-041 REF
HEAT TRANSFER ASSY REF
AGC TEST MOUNT ASSY REF
SPACER 2014247 (12)
BOLT 2016355 (12)
FRONT VIEW OF OPERATION CONSOLE

REFERENCE:
1. ASSEMBLY DWG 2014268

INTERCONNECTION CHART							
FROM		UNIT/CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W265	2016360-011	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART								
FROM		UNIT/CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
MAIN DSKY	—	P1	W230	2014487-011	P2 P3	J1 J2	OPERATION CONSOLE	
NAV DSKY	—	P1	W228	2014489-011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W229	2014488-011	P5 P2 P3 P4	J1 J2 J3 J4	OPERATION CONSOLE AGC JUNCTION	
	PWR CONN	P1	W231	2014485-011	P2	J5		
OPERATION CONSOLE	J5	P1	W258	2014456-011	P2	J7	OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

NOTES

1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSEMBLY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021 OR 2014268-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014024 & 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021 & 2014042-031
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. W258 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST

FOR INFORMATION ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON MASS.
CONTRACT NO NAS9-497
DRAWN [illegible] DATE 23 APR [illegible]
CHECKED [illegible]
APPROVAL [illegible] 9/2/66
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

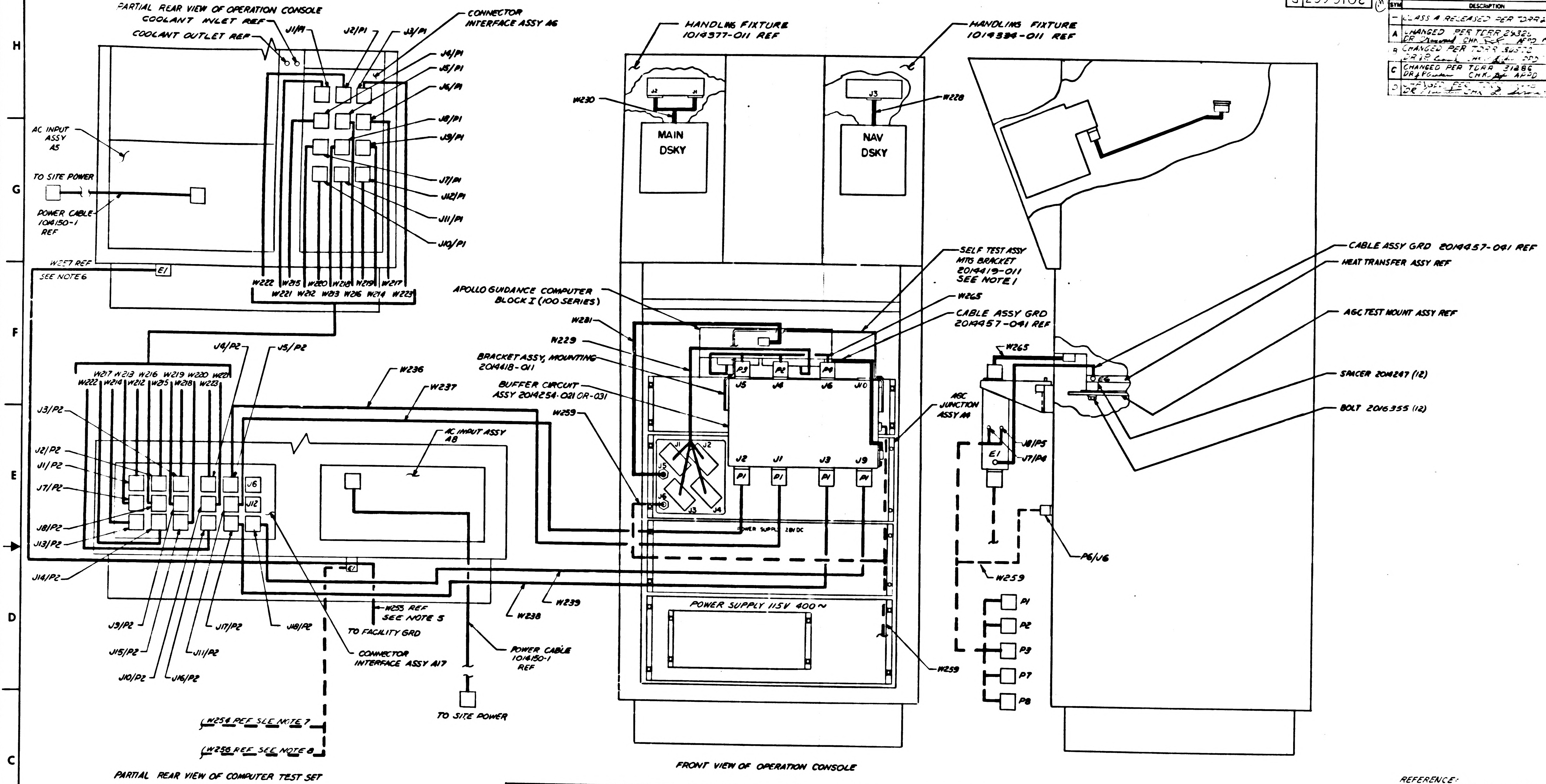
AGC/GSE INTERCONNECTIONS
BLOCK I (100 SERIES)
SUB-SYSTEM TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016403
SCALE NONE WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016403 D

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
—	CLASS A RELEASED PER TDRR 28281		
A	CHANGED PER TDRR 28323 DR [illegible] CHK [illegible] APPD [illegible]	[illegible]	[illegible]
B	CHANGED PER TDRR 30572 DR [illegible] CHK [illegible] APPD	[illegible]	[illegible]
C	CHANGED PER TDRR 31286 DR J P Graham CHK [illegible] APPD	[illegible]	[illegible]
D	CHANGED PER TDRR [illegible] DR [illegible] CHK [illegible]	[illegible]	[illegible]


PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT INLET REF
COOLANT OUTLET REF
J1/P1
J2/P1
J3/P1
CONNECTOR INTERFACE ASSY A6
J4/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF
W257 REF SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
J4/P2
J5/P2
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
W236
W237
J3/P2
J2/P2
J1/P2
J7/P2
J8/P2
J13/P2
J14/P2
J6
J12
AC INPUT ASSY A8
E1
W255 REF SEE NOTE 5
TO FACILITY GRD
CONNECTOR INTERFACE ASSY A17
POWER CABLE 1014150-1 REF
TO SITE POWER
W238
W239
J9/P2
J17/P2
J18/P2
J15/P2
J11/P2
J10/P2
J16/P2
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
PARTIAL REAR VIEW OF COMPUTER TEST SET
HANDLING FIXTURE 1014377-011 REF
HANDLING FIXTURE 1014334-011 REF
W230
J2
J1
MAIN DSKY
J3
W228
NAV DSKY
APOLLO GUIDANCE COMPUTER BLOCK I (100 SERIES)
W281
W229
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021 OR-031
W259
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
W265
CABLE ASSY GRD 2014457-041 REF
P3
P2
P4
J5
J4
J6
J10
J2
J1
J3
J9
P1
P1
P1
P1
J1
J2
J5
J6
J3
J4
POWER SUPPLY 28V DC
POWER SUPPLY 115V 400~
W259
AGC JUNCTION ASSY A4
W265
J8/P5
J7/P4
E1
E6
P6/J6
W259
P1
P2
P3
P7
P8
CABLE ASSY GRD 2014457-041 REF
HEAT TRANSFER ASSY REF
AGC TEST MOUNT ASSY REF
SPACER 2014247 (12)
BOLT 2016355 (12)

FRONT VIEW OF OPERATION CONSOLE

REFERENCE:
1. ASSEMBLY DWG 2014268

INTERCONNECTION CHART							
FROM		UNIT/CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W265	2016360-011	P2 P3 P4	J4 J5 J6	BUFFER ASST

INTERCONNECTION CHART							
FROM		UNIT/CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392 - 011	P4	J10	BUFFER ASSY
BUFFER ASSY	J7 J8	P4 P5	W259	2014470 - 011	P1 P2 P3 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT
OPERATION CONSOLE AGC JUNCTION	J6	P6					
MAIN DSKY	—	P1	W230	2014487 - 011	P2 P3	J1 J2	OPERATION CONSOLE
NAV DSKY	—	P1	W228	2014489 - 011	P2	J3	OPERATION CONSOLE
COMPUTER	S/C CONN	P1	W229	2014488 - 011	P5 P2 P3 P4	J1 J2 J3 J4	OPERATION CONSOLE AGC JUNCTION
	PWR CONN	P1	W231	2014485 - 011	P2	J5	
OPERATION CONSOLE	J5	P1	W258	2014456 - 011	P2	J7	OPERATION CONSOLE

NOT SHOWN SEE NOTE 1

SEE NOTE 2

NOT SHOWN SEE NOTE 9

NOTES
1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSEMBLY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021 OR 2014268-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014024 & 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021, -031, -041, -051 & -061
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. W258 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST

2016403 D

FOR INFORMATION ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

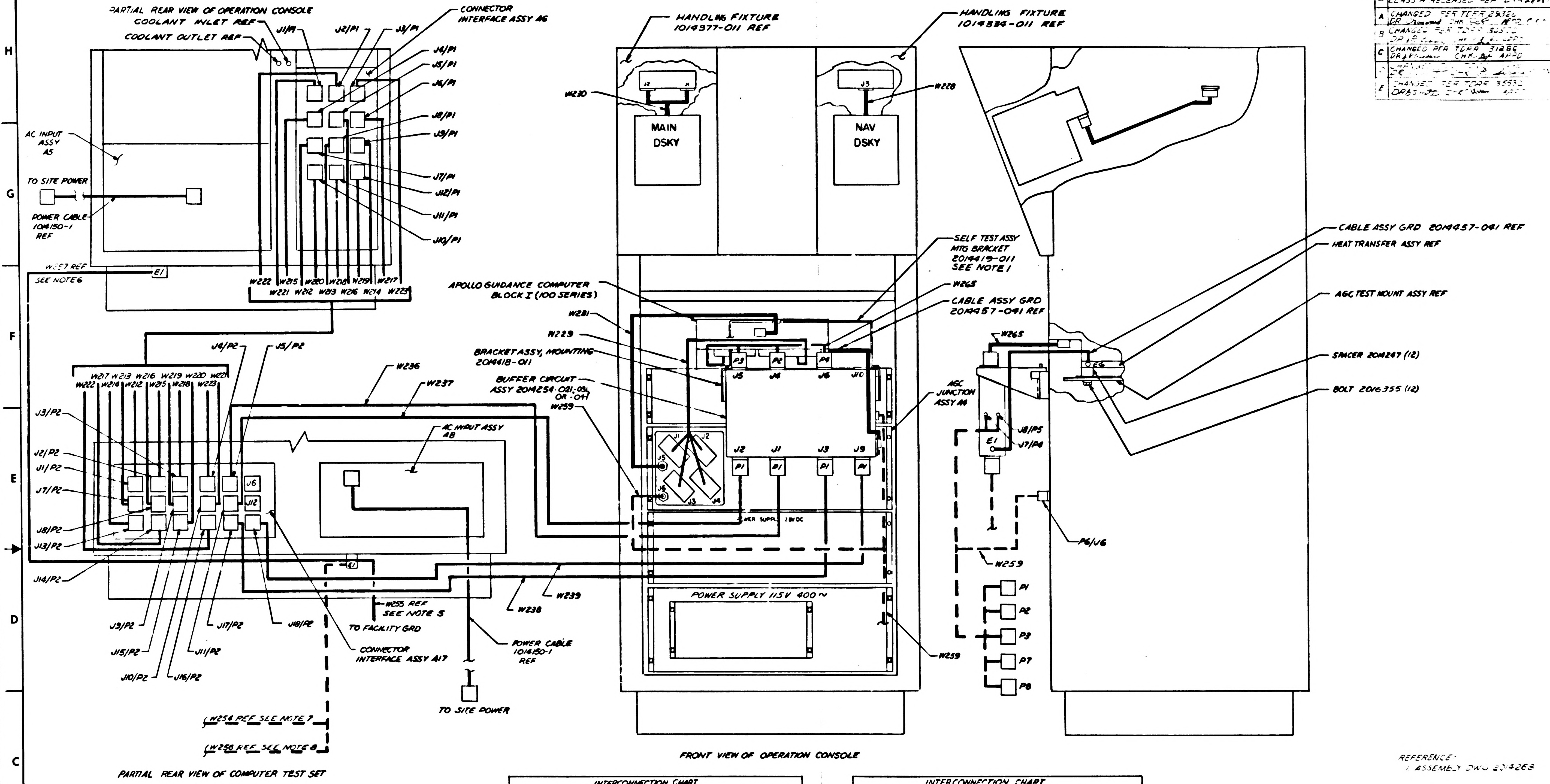
RAYTHEON CO
LEXINGTON MASS.
CONTRACT NO NAS 9-497
DRAWN [illegible] DATE 23 APR 64
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK I (100 SERIES)
SUB-SYSTEM TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016403
SCALE NONE
WT
SHEET 1 OF 1

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
–	CLASS A RELEASED PER TDRR 28281		
A	CHANGED PER TDRR 29326 DR [illegible] CHK [illegible] APPD [illegible]	[illegible]	[illegible]
B	CHANGED PER TDRR 30570 DR [illegible] CHK [illegible] APPD	[illegible]	[illegible]
C	CHANGED PER TDRR 31286 DR [illegible] CHK [illegible] APPD	[illegible]	[illegible]
D	[illegible] DR [illegible] CHK [illegible]	[illegible]	[illegible]
E	CHANGED PER TDRR 35530 DR [illegible] CHK [illegible] APPD	[illegible]	[illegible]


PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT INLET REF
COOLANT OUTLET REF
J1/P1
J2/P1
J3/P1
CONNECTOR INTERFACE ASSY A6
J4/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF
W257 REF SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
J4/P2
J5/P2
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
W236
W237
J3/P2
J2/P2
J1/P2
J7/P2
J8/P2
J13/P2
J14/P2
J6
J12
AC INPUT ASSY A8
E1
W255 REF SEE NOTE 5
TO FACILITY GRD
J9/P2
J15/P2
J10/P2
J16/P2
J11/P2
J17/P2
J18/P2
CONNECTOR INTERFACE ASSY A17
POWER CABLE 1014150-1 REF
TO SITE POWER
W238
W239
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
PARTIAL REAR VIEW OF COMPUTER TEST SET
HANDLING FIXTURE 1014377-011 REF
W230
J2
J1
MAIN DSKY
HANDLING FIXTURE 1014334-011 REF
J3
W228
NAV DSKY
APOLLO GUIDANCE COMPUTER BLOCK I (100 SERIES)
W281
W229
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021,-031 OR -041
W259
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
W265
CABLE ASSY GRD 2014457-041 REF
P3
P2
P4
J5
J4
J6
J10
J2
J1
J3
J9
P1
P1
P1
P1
J1
J2
J5
J6
J3
J4
POWER SUPPLY 28V DC
POWER SUPPLY 115V 400~
W259
AGC JUNCTION ASSY A4
FRONT VIEW OF OPERATION CONSOLE
W265
J8/P5
J7/P4
E1
P6/J6
W259
P1
P2
P3
P7
P8
CABLE ASSY GRD 2014457-041 REF
HEAT TRANSFER ASSY REF
AGC TEST MOUNT ASSY REF
SPACER 2014247 (12)
BOLT 2016355 (12)

REFERENCE:
1. ASSEMBLY DWG 2014268

INTERCONNECTION CHART

FROM		UNIT/CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W265	2016360-011	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART

FROM		UNIT/CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011 2014392-021	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
MAIN DSKY	—	P1	W230	2014487-011	P2 P3	J1 J2	OPERATION CONSOLE	
NAV DSKY	—	P1	W228	2014483-011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W229	2014488-011	P5 P2 P3 P4	J1 J2 J3 J4	OPERATION CONSOLE AGC JUNCTION	
	PWR CONN	P1	W231	2014485-011	P2	J5		
OPERATION CONSOLE	J5	P1	W258	2014456-011	P2	J7	OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

NOTES

1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSEMBLY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021 OR 2014268-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014024 & 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014092-021, -031, -041, -051, -061, & -071
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. W258 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST

FOR INFORMATION ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES
.XX .XXX ±
± ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON MASS
CONTRACT NO NAS9-4[illegible]
DRAWN [illegible] DATE [illegible]
CHECKED [illegible]
APPROVAL [illegible]
APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

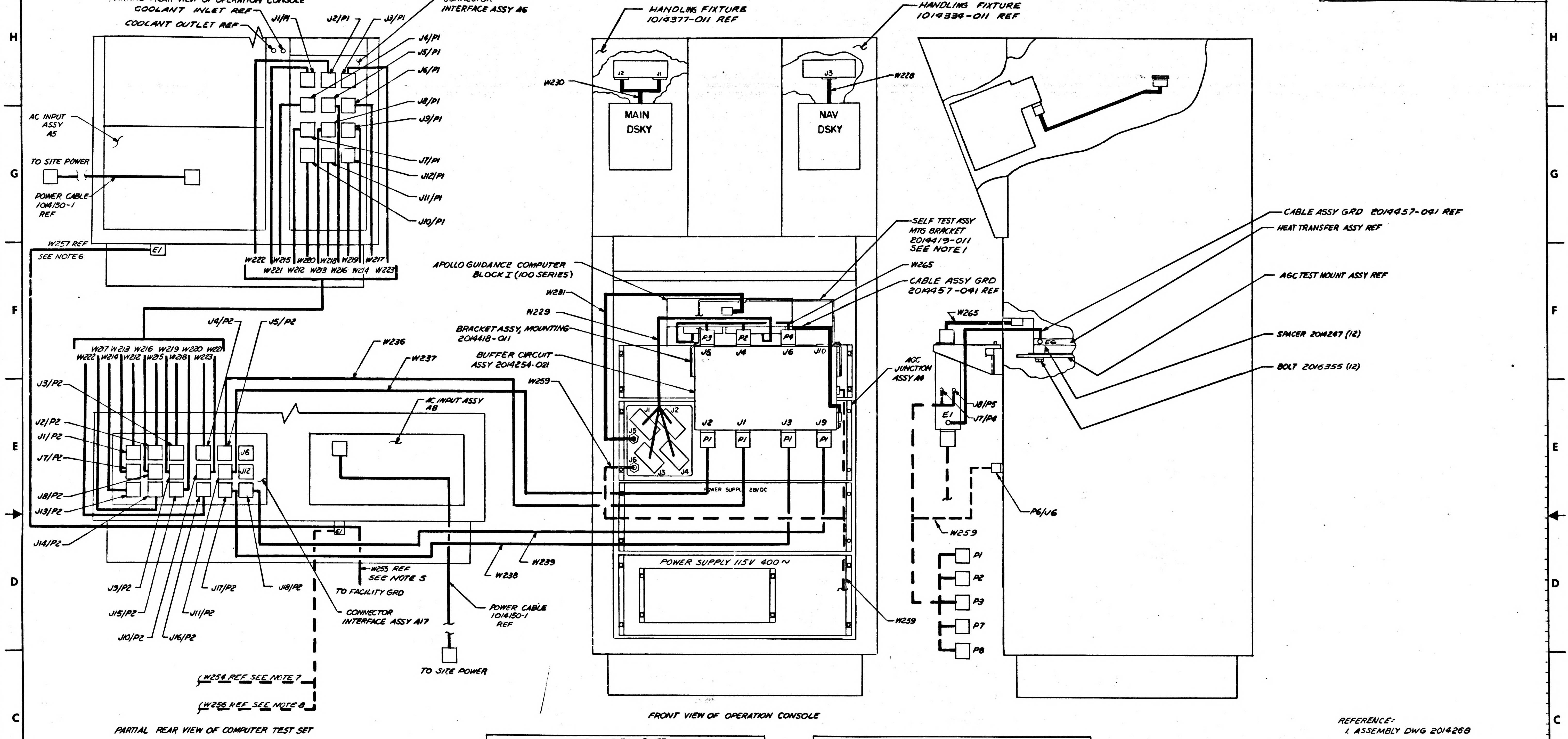
AGC/GSE INTERCONNECTIONS
BLOCK I (100 SERIES)
SUB-SYSTEM TEST

SIZE J
CODE IDENT NO 49956
NASA DRAWING NO 2016403
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016403 E

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28281		


PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT INLET REF
COOLANT OUTLET REF
J1/P1
J2/P1
J3/P1
CONNECTOR INTERFACE ASSY A6
J4/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF
W257 REF
SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
HANDLING FIXTURE 1014377-011 REF
HANDLING FIXTURE 1014334-011 REF
W230
J2 J1
MAIN DSKY
J3
W228
NAV DSKY
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
W265
CABLE ASSY GRD 2014457-041 REF
APOLLO GUIDANCE COMPUTER BLOCK I (100 SERIES)
W231
W229
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021
W259
P3 P2 P4
J5 J4 J6 J10
J2 J1 J3 J9
P1 P1 P1 P1
J1 J2 J5 J6 J3 J4
POWER SUPPLY 28V DC
POWER SUPPLY 115V 400~
AGC JUNCTION ASSY A4
W265
J8/P5
J7/P4
E1
P6/J6
W259
P1
P2
P3
P7
P8
CABLE ASSY GRD 2014457-041 REF
HEAT TRANSFER ASSY REF
AGC TEST MOUNT ASSY REF
E6
SPACER 2014247 (12)
BOLT 2016355 (12)
J4/P2
J5/P2
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
W236
W237
J3/P2
J2/P2
J1/P2
J7/P2
J8/P2
J13/P2
J14/P2
J6
J12
AC INPUT ASSY A8
E1
W255 REF
SEE NOTE 5
TO FACILITY GRD
W239
W238
J9/P2
J15/P2
J10/P2
J16/P2
J11/P2
J17/P2
J18/P2
CONNECTOR INTERFACE ASSY A17
POWER CABLE 1014150-1 REF
TO SITE POWER
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
PARTIAL REAR VIEW OF COMPUTER TEST SET
FRONT VIEW OF OPERATION CONSOLE

REFERENCE:
1. ASSEMBLY DWG 2014268

INTERCONNECTION CHART							
FROM		UNIT/CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W265	2016360-011	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART							
FROM		UNIT/CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392 -011	P4	J10	BUFFER ASSY
BUFFER ASSY	J7 J8	P4 P5	W259	2014470 -011	P1 P2 P3 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT
OPERATION CONSOLE AGC JUNCTION	J6	P6					
MAIN DSKY	—	P1	W230	2014487 -011	P2 P3	J1 J2	OPERATION CONSOLE
NAV DSKY	—	P1	W228	2014489 -011	P2	J3	OPERATION CONSOLE
COMPUTER	S/C CONN	P1	W229	2014488 -011	P5 P2 P3 P4	J1 J2 J3 J4	OPERATION CONSOLE AGC JUNCTION
	PWR CONN	P1	W231	2014485 -011	P2	J5	
OPERATION CONSOLE	J5	P1	W258	2014456 -011	P2	J7	OPERATION CONSOLE

NOT SHOWN SEE NOTE 1

SEE NOTE 2

NOT SHOWN SEE NOTE 9

MASTER

NOTES

1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSEMBLY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014024 & 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014092-021
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-02
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-02
9. W258 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST

FOR INFORMATION ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS9-497
DRAWN DATE 23 APR 66
CHECKED 23 APR 66
APPROVAL 9/2/66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 9/25/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

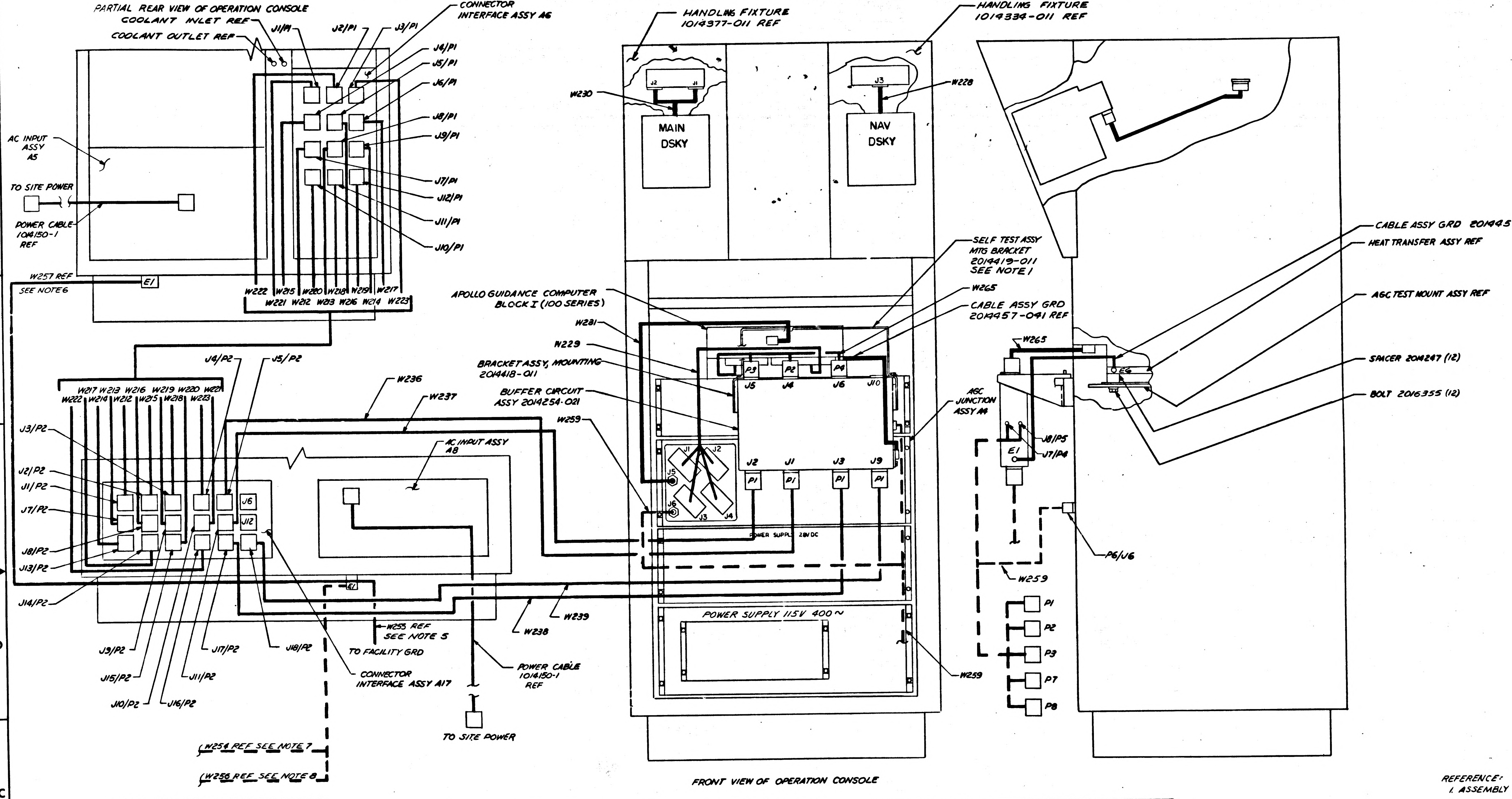
AGC/GSE INTERCONNECTIONS
BLOCK I (100 SERIES)
SUB-SYSTEM TEST

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016403
SCALE NONE | WT | SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016403 -

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
-	CLASS A RELEASED ENT 11VAY 28281		


PARTIAL REAR VIEW OF OPERATION CONSOLE
COOLANT INLET REF
COOLANT OUTLET REF
J1/P1
J2/P1
J3/P1
CONNECTOR INTERFACE ASSY A6
J4/P1
J5/P1
J6/P1
J8/P1
J9/P1
J7/P1
J12/P1
J11/P1
J10/P1
AC INPUT ASSY A5
TO SITE POWER
POWER CABLE 1014150-1 REF
W257 REF
SEE NOTE 6
E1
W222 W215 W220 W218 W219 W217
W221 W212 W213 W216 W214 W223
J4/P2
J5/P2
W236
W237
W217 W213 W216 W219 W220 W221
W222 W214 W212 W215 W218 W223
J3/P2
J2/P2
J1/P2
J7/P2
J8/P2
J13/P2
J14/P2
J6
J12
AC INPUT ASSY A8
E1
W255 REF
SEE NOTE 5
TO FACILITY GRD
J9/P2
J17/P2
J18/P2
J15/P2
J11/P2
J10/P2
J16/P2
CONNECTOR INTERFACE ASSY A17
POWER CABLE 1014150-1 REF
TO SITE POWER
W238
W239
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
PARTIAL REAR VIEW OF COMPUTER TEST SET
HANDLING FIXTURE 1014377-011 REF
HANDLING FIXTURE 1014334-011 REF
W230
J2
J1
MAIN DSKY
J3
W228
NAV DSKY
APOLLO GUIDANCE COMPUTER BLOCK I (100 SERIES)
W231
W229
BRACKET ASSY, MOUNTING 2014418-011
BUFFER CIRCUIT ASSY 2014254-021
W259
SELF TEST ASSY MTG BRACKET 2014419-011 SEE NOTE 1
W265
CABLE ASSY GRD 2014457-041 REF
P3
P2
P4
J5
J4
J6
J10
J1
J2
J5
J6
J3
J4
J2
J1
J3
J9
P1
P1
P1
P1
POWER SUPPLY 28V DC
POWER SUPPLY 115V 400~
AGC JUNCTION ASSY A4
W265
E6
E1
J8/P5
J7/P4
P6/J6
W259
P1
P2
P3
P7
P8
W259
CABLE ASSY GRD 2014457-041 REF
HEAT TRANSFER ASSY REF
AGC TEST MOUNT ASSY REF
SPACER 2014247 (12)
BOLT 2016355 (12)
FRONT VIEW OF OPERATION CONSOLE

REFERENCE:
1. ASSEMBLY DWG 2014268

INTERCONNECTION CHART							
FROM		UNIT/CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT
CTS	J5	P2	W236	2014463-011	P1	J1	BUFFER ASSY
	J11	P2	W237	2014462-011	P1	J2	
	J17	P2	W238	2014462-021	P1	J3	
	J18	P2	W239	2014462-031	P1	J9	BUFFER ASSY
	J1	P2	W212	1006482-001	P1	J7	OPERATION CONSOLE
	J7	P2	W213	-002	P1	J8	
	J13	P2	W214	-003	P1	J9	
	J2	P2	W215	-004	P1	J4	
	J8	P2	W216	-005	P1	J5	
	J14	P2	W217	-006	P1	J6	
	J3	P2	W218	-007	P1	J11	
	J9	P2	W219	-008	P1	J12	
	J15	P2	W220	-009	P1	J10	
	J10	P2	W221	-010	P1	J1	
	J16	P2	W222	-011	P1	J2	
CTS	J4	P2	W223	1006482-012	P1	J3	
COMPUTER	TEST CONN	P1	W265	2016360-011	P2 P3 P4	J4 J5 J6	BUFFER ASSY

INTERCONNECTION CHART								
FROM		UNIT/CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392 -011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
BUFFER ASSY	J7 J8	P4 P5	W259	2014470 -011	P1 P2 P3 P7 P8	—	CALIBRATION & MEASUREMENT EQUIPMENT	SEE NOTE 2
OPERATION CONSOLE AGC JUNCTION	J6	P6						
MAIN DSKY	—	P1	W230	2014487 -011	P2 P3	J1 J2	OPERATION CONSOLE	
NAV DSKY	—	P1	W228	2014489 -011	P2	J3	OPERATION CONSOLE	
COMPUTER	S/C CONN	P1	W229	2014488 -011	P5 P2 P3 P4	J1 J2 J3 J4	OPERATION CONSOLE AGC JUNCTION	
	PWR CONN	P1	W231	2014485 -011	P2	J5		
OPERATION CONSOLE	J5	P1	W258	2014456 -011	P2	J7	OPERATION CONSOLE	NOT SHOWN SEE NOTE 9

NOTES
1. SELF TEST ASSY TO BE MOUNTED ON BRACKET 2014419-011 AND CONNECTED AT BUFFER CIRCUIT ASSEMBLY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL & THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014268-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014024 & 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. W258 IS CONNECTED AT OPERATION CONSOLE CONNECTOR INTERFACE ASSY FOR AGC SELF TEST

FOR INFORMATION ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS9-497
DRAWN DATE 23 APR 66
CHECKED 23 APR 66
APPROVAL 4/2/66
APPROVAL 4/25/66
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK I (100 SERIES)
SUB-SYSTEM TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 20[illegible]
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016403 -

2016404 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28119		

JUMPER CHART

COND IDENT	FROM	TO	COLOR	AWG	REMARKS
F1	S24-1	S24-3	BUS	24	
F2	S24-3	S23-1	WHT	↑	
F3	S23-1	S23-3	BUS		
F4	S23-3	S22-1	WHT		
F5	S22-1	S22-3	BUS		
F6	S22-3	S21-1	WHT		
F7	S21-1	S21-3	BUS		
F8	S21-3	S20-1	WHT		
F9	S20-1	S20-3	BUS		
F10	S20-3	S19-1	WHT		
F11	S19-1	S19-3	BUS		
F12	S12-1	S12-3	BUS		
F13	S12-3	S10-1	WHT		
F14	S10-1	S10-3	BUS		
F15	S10-3	S11-1	WHT		
F16	S11-1	S11-3	BUS		
F17	S11-3	S13-1	WHT		
F18	S13-1	S13-3	BUS		
F19	S13D-NO	S11D-NO	WHT		
F20	S11D-NO	S12D-NO	↑		
F21	S19D-NO	S20D-NO			
F22	S20D-NO	S21D-NO			
F23	S21D-NO	S22D-NO			
F24	S22D-NO	S23D-NO			
F25	S23D-NO	S24D-NO			
F26	S36D-NO	S35Q-NO			
F27	S35D-NO	S34D-NO			
F28	S34D-NO	S33D-NO			
F29	S33D-NO	S32D-NO			
F30	S32D-NO	S31D-NO			
F31	S31D-NO	S30D-NO			
F32	S30D-NO	S29D-NO			
F33	S29D-NO	S28D-NO			
F34	S28D-NO	S27D-NO			
F35	S27D-NC	S28D-NC			
F36	S28D-NC	S29D-NC			
F37	S29D-NC	S30D-NC			
F38	S30D-NC	S31D-NC			
F39	S31D-NC	S32D-NC			
F40	S32D-NC	S33D-NC			
F41	S33D-NC	S34D-NC			
F42	S34D-NC	S35D-NC			
F43	S35D-NC	S36D-NC			
F44	S24D-NC	S23D-NC			
F45	S23D-NC	S22D-NC			
F46	S22D-NC	S21D-NC			
F47	S21D-NC	S20D-NC			
F48	S20D-NC	S19D-NC			
F49	S12D-NC	S13D-NC			
F50	S13D-NC	S11D-NC	↓		
F51	S11D-NC	S10D-NC	WHT		
F52	S11-2	S11D-C	BUS		
F53	S10-2	S10D-C	↑		
F54	S12-2	S12D-C			
F55	S13-2	S13D-C			
F56	S19-2	S19D-C			
F57	S36-2	S36D-C			
F58	S35-2	S35D-C			
F59	S34-2	S34D-C			
F60	S33-2	S33D-C			
F61	S32-2	S32D-C			
F62	S31-2	S31D-C			
F63	S30-2	S30D-C			
F64	S29-2	S29D-C			
F65	S28-2	S28D-C			
F66	S27-2	S27D-C	↓		
F67	S20-2	S20D-C	BUS	↓	
F68	S10A-C	S11A-C	WHT	24	

⚠ DO NOT INSULATE WITH SLEEVING

JUMPER CHART

COND IDENT	FROM	TO	COLOR	AWG	REMARKS
F69	S11A-C	S13A-C	WHT	24	
F70	S27A-C	S28A-C	↑	↑	
F71	S28A-C	S29A-C			
F72	S29A-C	S30A-C			
F73	S30A-C	S31A-C			
F74	S31A-C	S32A-C	↓		
F75	S32A-C	S33A-C	WHT		
F76	S27-1	S27-3	BUS		
F77	S27-3	S28-1	WHT		
F78	S28-1	S28-3	BUS		
F79	S28-3	S29-1	WHT		
F80	S29-1	S29-3	BUS		
F81	S29-3	S30-1	WHT		
F82	S30-1	S30-3	BUS		
F83	S30-3	S31-1	WHT		
F84	S31-1	S31-3	BUS		
F85	S31-3	S32-1	WHT		
F86	S32-1	S32-3	BUS		
F87	S33-3	S34-1	WHT		
F88	S34-1	S34-3	BUS		
F89	S34-3	S35-1	WHT		
F90	S35-1	S35-3	BUS		
F91	S35-3	S36-1	WHT		
F92	S36-1	S36-3	BUS		
F93	S17A-C1	S17A-A3	BUS		
F94	S17A-B1	S17A-D3	WHT		
F95	S8A-C	S9A-C	WHT		
F96	S8B-C	S9B-C	WHT		
F97	S15A-A2	S15A-A6	WHT		
F98	S15A-D5	S15A-C6	WHT		
F99	S15A-B2	S15A-C6	WHT		
F100	S9-1	S9-3	BUS		
F101	S9-3	S8-1	WHT		
F102	S8-1	S8-3	BUS		
F103	S9-2	S9D-C	BUS		
F104	S8-2	S8D-C	BUS		
F105	S9D-NC	S8D-NC	WHT		
F106	S9D-NO	S8D-NO	WHT		
F107	S5-3	S5-1	BUS		
F108	S5-1	S6-3	WHT		
F109	S6-3	S6-1	BUS		
F110	S5D-NO	S6D-NO	WHT		
F111	S5D-NC	S6D-NC	WHT		
F112	S17A-B3	S17A-D1	BUS		
F113	S17A-C3	S17A-A1	WHT		
F114	S6-2	S6D-C	BUS		
F115	S5-2	S5D-C	BUS		
F116	S5A-C	S6A-C	WHT		
F117	S5B-C	S6B-C	WHT		
F118	S15A-C5	S15A-C7	BUS		
F119	S15A-C7	S15A-B1	WHT		
F120	S15A-A1	S15A-A5	WHT		
F121	S15A-A5	S15A-A7	BUS		
F122	S15A-A6	S15A-B5	WHT		
F123	S15A-D-ARM	S15A-C-ARM	WHT		
F124	S15A-B7	S15A-B6	BUS		⚠
F125	S15A-A3	S15A-B6	WHT		
F126	S24-2	S24D-C	BUS		
F127	S23-2	S23D-C	↑		
F128	S22-2	S22D-C	↓		
F129	S21-2	S21D-C	BUS		
F130	S25-4	S26-4	WHT		
F131	XDS1-C	XDS2-C	↑		
F132	XDS2-C	XDS3-C			
F133	XDS3-C	XDS6-C			
F134	XDS4-C	XDS5-C			
F135	XDS5-C	XDS6-C	↓	↓	
F136	XDS6-C	XDS9-C	WHT	24	

JUMPER CHART

COND IDENT	FROM	TO	COLOR	AWG	REMARKS
F137	XDS7-C	XDS8-C	WHT	24	
F138	XDS8-C	XDS9-C	↑	↑	
F139	XDS9-C	XDS12-C			
F140	XDS10-C	XDS11-C			
F141	XDS11-C	XDS12-C			
F142	XDS12-C	XDS15-C			
F143	XDS13-C	XDS14-C			
F144	XDS14-C	XDS15-C			
F145	XDS15-C	XDS18-C			
F146	XDS16-C	XDS17-C			
F147	XDS17-C	XDS18-C			
F148	XDS18-C	XDS21-C			
F149	XDS19-C	XDS20-C			
F150	XDS20-C	XDS21-C			
F151	S32-3	S33-1			
F152	XDS22-C	XDS23-C			
F153	XDS23-C	XDS24-C			
F154	XDS24-C	XDS27-C			
F155	XDS25-C	XDS26-C			
F156	XDS26-C	XDS27-C			
F157	XDS27-C	XDS30-C			
F158	XDS28-C	XDS29-C			
F159	XDS29-C	XDS30-C			
F160	XDS30-C	XDS33-C			
F161	XDS31-C	XDS32-C			
F162	XDS32-C	XDS33-C			
F163	XDS33-C	XDS36-C			
F164	XDS34-C	XDS35-C	↓	↓	
F165	XDS35-C	XDS36-C	WHT	24	
F166	J6 SHELL	J7 SHELL	BLK	22	
F167	S17B-C1	S17B-C3	BUS	24	
F168	J8 SHELL	J9 SHELL	BLK	22	
F169	S17B-D1	S17B-D3	BUS	24	
F170	S14-2	S14-4	BLK	24	
F171	S33-1	S33-3	BUS	24	
F172	XDS37-C	XDS38-C	WHT	24	
F173	XDS38-C	XDS39-C	WHT	24	
F174	S17B-A1	S17B-A3	BUS	24	
F175	S17B-B1	S17B-B3	BUS	24	
F176	S10D-NO	S11D-NO	WHT	24	
F177	S16A-D4	S16A-C4	WHT	24	
F178	S15A-B3	S15A-D7	BUS	24	
F179	S15A-D7	S15A-L6	BUS	24	⚠
F180	S13A-C	S33A-C	WHT	24	
F181	S12-3	S31-3	WHT	24	
F182	S12A-NO	S13B-C	WHT	24	
F183	S12B-NO	S13C-C	BLK	24	

NOTE.
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH SUB-ASSEMBLY DESIGNATION
2. INSULATE ALL BUS WIRE WITH SLEEVING UNLESS OTHERWISE SPECIFIED

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
2014375	
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 9APR66
CHECKED 9APR66
APPROVAL 4/14/66
APPROVAL 4/14/66
APPROVAL 4/14/66
NASA APPROVAL
MIT APPROVAL 4/14/66
MIT APPROVAL 4/19/66

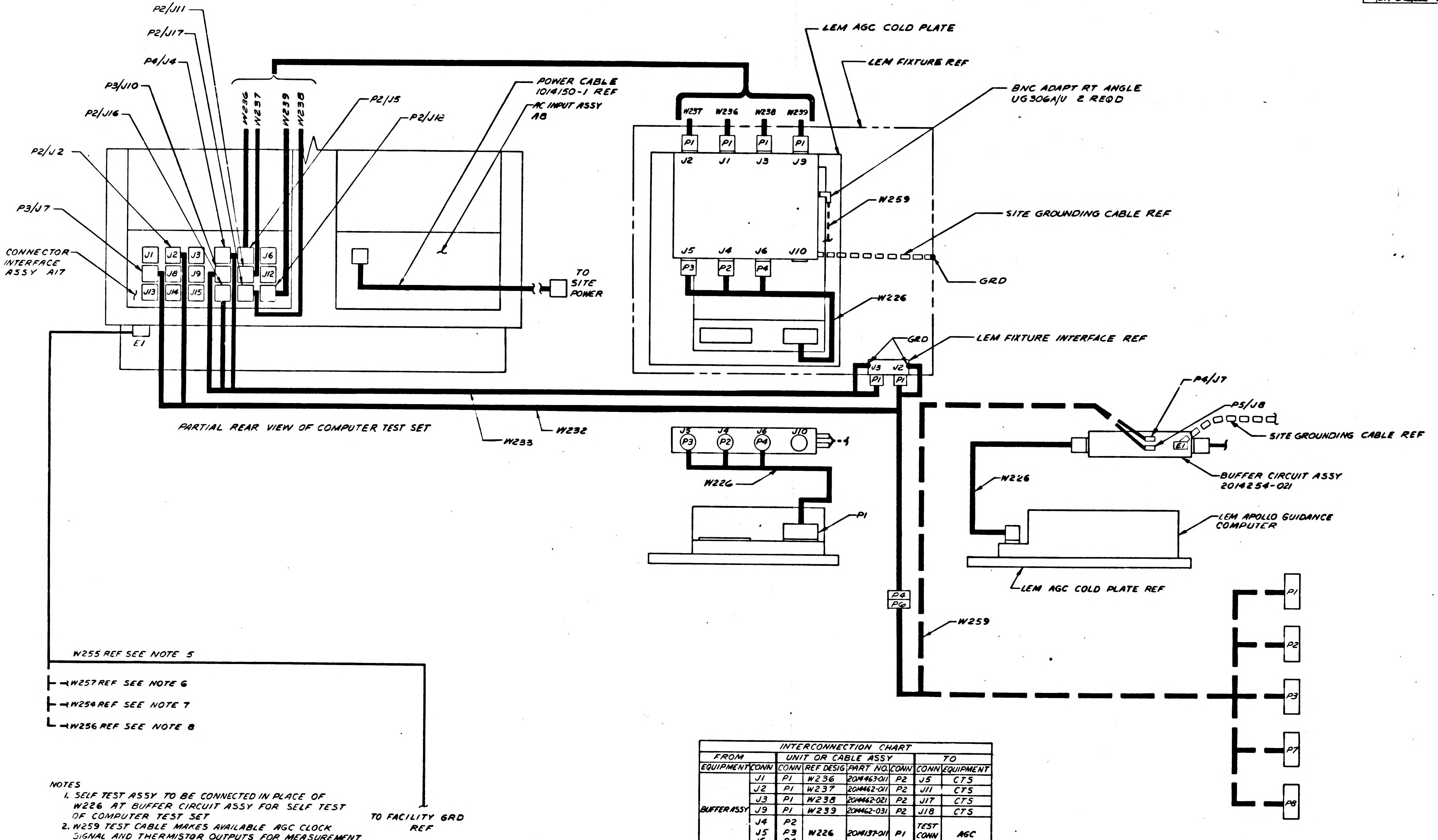
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LEAD ELECTRICAL
XY INTERFACE
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE F
NASA DRAWING NO. 2016404
SCALE NONE
WT
SHEET 1 OF 1

2016405 A

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 23279		
A	CHANGED PER TDRR 29326 DR CHK APPD	7/14/66	



P2/J11
P2/J17
P4/J4
P3/J10
P2/J16
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
W236
W237
W239
W238
P2/J5
P2/J12
J1
J2
J3
J6
J8
J9
J12
J13
J14
J15
E1
POWER CABLE 1014150-1 REF
AC INPUT ASSY A8
TO SITE POWER
PARTIAL REAR VIEW OF COMPUTER TEST SET
W233
W232
LEM AGC COLD PLATE
LEM FIXTURE REF
BNC ADAPT RT ANGLE UG306A/U 2 REQD
W237
W236
W238
W239
P1
J2
J1
J3
J9
W259
SITE GROUNDING CABLE REF
J5
J4
J6
J10
P3
P2
P4
GRD
W226
GRD
LEM FIXTURE INTERFACE REF
J3
J2
P1
P1
J5
J4
J6
J10
P3
P2
P4
W226
P1
P4/J7
P5/J8
E1
SITE GROUNDING CABLE REF
BUFFER CIRCUIT ASSY 2014254-021
W226
LEM APOLLO GUIDANCE COMPUTER
LEM AGC COLD PLATE REF
P4
P6
W259
P1
P2
P3
P7
P8
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
TO FACILITY GRD REF

INTERCONNECTION CHART								
FROM		UNIT OR CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P2 P3 P4	W226	2014137-011	P1	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	J4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1	J2	G&N FIXTURE	
					P4	P6	W259	

NOTES
1. SELF TEST ASSY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT AND CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND LEM APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021 & 2014042-031
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON MASS.
CONTRACT NO NAS 9-497
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTION
LEM
G&N TEST

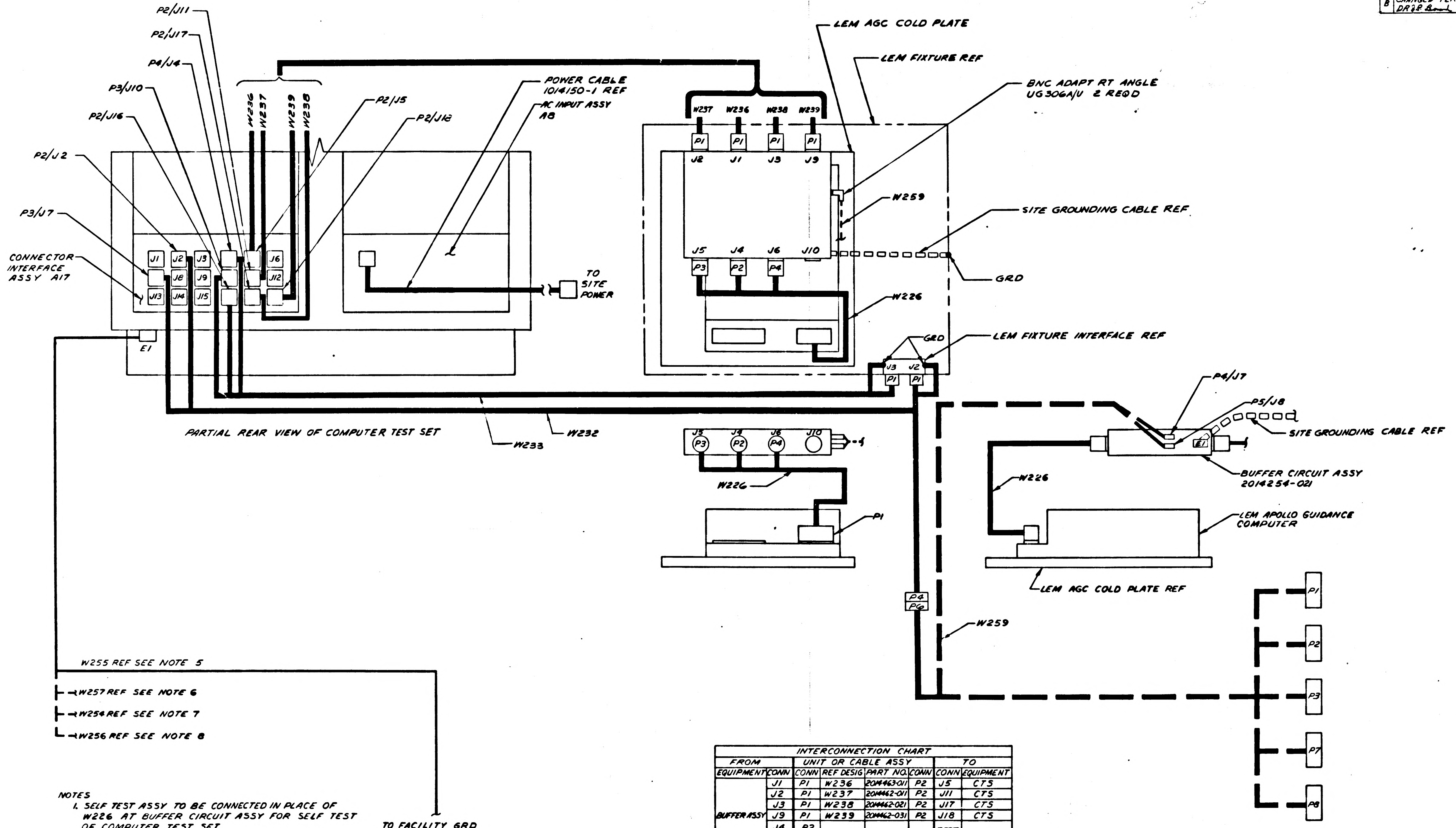
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016405
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016405 A

2016405 B

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28279		
A	CHANGED PER TDRR 29326 DR CHK APPD	7/6/66	
B	CHANGED PER TDRR 30573 DR CHK APPD	8/30/66	


P2/J11
P2/J17
P4/J4
P3/J10
P2/J16
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
W236
W237
W239
W238
P2/J5
P2/J18
J1
J2
J3
J6
J8
J9
J12
J13
J14
J15
E1
POWER CABLE 1014150-1 REF
AC INPUT ASSY A8
TO SITE POWER
PARTIAL REAR VIEW OF COMPUTER TEST SET
W233
W232
LEM AGC COLD PLATE
LEM FIXTURE REF
BNC ADAPT RT ANGLE UG306A/U 2 REQD
W237
W236
W238
W239
P1
J2
J1
J3
J9
W259
SITE GROUNDING CABLE REF
J5
J4
J6
J10
P3
P2
P4
GRD
W226
LEM FIXTURE INTERFACE REF
GRD
J3
J2
P1
P4/J7
P5/J8
SITE GROUNDING CABLE REF
E1
BUFFER CIRCUIT ASSY 2014254-021
W226
LEM APOLLO GUIDANCE COMPUTER
LEM AGC COLD PLATE REF
J5
J4
J6
J10
P3
P2
P4
W226
P1
P4
P6
W259
P1
P2
P3
P7
P8
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
TO FACILITY GRD REF

NOTES

1. SELF TEST ASSY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT AND CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND LEM APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021 OR 2014255-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021 & 2014042-031
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021

INTERCONNECTION CHART

FROM		UNIT OR CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P2 P3 P4	W226	2014137-011 2014137-021	P1	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	J4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014489-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259	

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

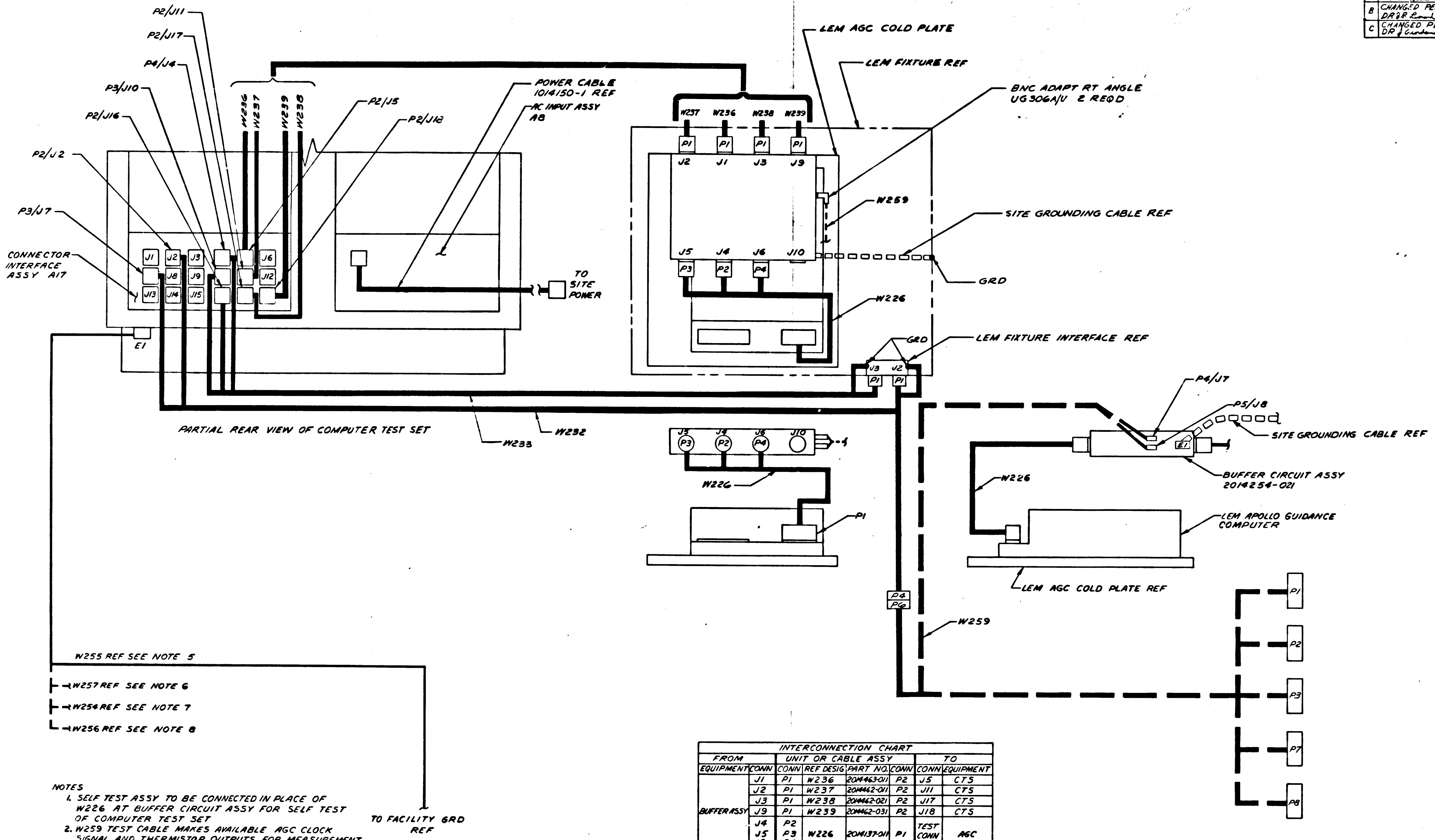
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTION
LEM
G&N TEST

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016405
SCALE NONE | WT | SHEET 1 OF 1

2016405 B

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28279		
A	CHANGED PER TDRR 29326 DR CHK APPD	7/6/66	
B	CHANGED PER TDRR 30573 DR CHK APPD	8/30/66	
C	CHANGED PER TDRR 31287 DR CHK APPD	10/5/66	


P2/J11
P2/J17
P4/J4
P3/J10
P2/J16
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
W236
W237
W239
W238
P2/J5
P2/J12
POWER CABLE 1014150-1 REF
AC INPUT ASSY A8
TO SITE POWER
J1
J2
J3
J6
J8
J9
J12
J13
J14
J15
E1
PARTIAL REAR VIEW OF COMPUTER TEST SET
W233
W232
LEM AGC COLD PLATE
LEM FIXTURE REF
W237
W236
W238
W239
P1
J2
J1
J3
J9
BNC ADAPT RT ANGLE UG306A/U 2 REQD
W259
SITE GROUNDING CABLE REF
J5
J4
J6
J10
P3
P2
P4
GRD
W226
GRD
LEM FIXTURE INTERFACE REF
J3
J2
P1
P4/J7
P5/J8
SITE GROUNDING CABLE REF
E1
BUFFER CIRCUIT ASSY 2014254-021
W226
LEM APOLLO GUIDANCE COMPUTER
LEM AGC COLD PLATE REF
W226
P1
P4
P6
W259
P1
P2
P3
P7
P8
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
TO FACILITY GRD REF

NOTES
1. SELF TEST ASSY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT AND CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND LEM APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021 OR 2014255-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021, -031, -041, & -051
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021

REFERENCE:
1. ASSEMBLY DWG 2014255

INTERCONNECTION CHART

FROM		UNIT OR CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P2 P3 P4	W226	2014137-011 2014137-021	P1	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	J4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259	

FOR INFORMATION ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON MASS.
CONTRACT NO. NAS 9 497
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTION
LEM
G&N TEST

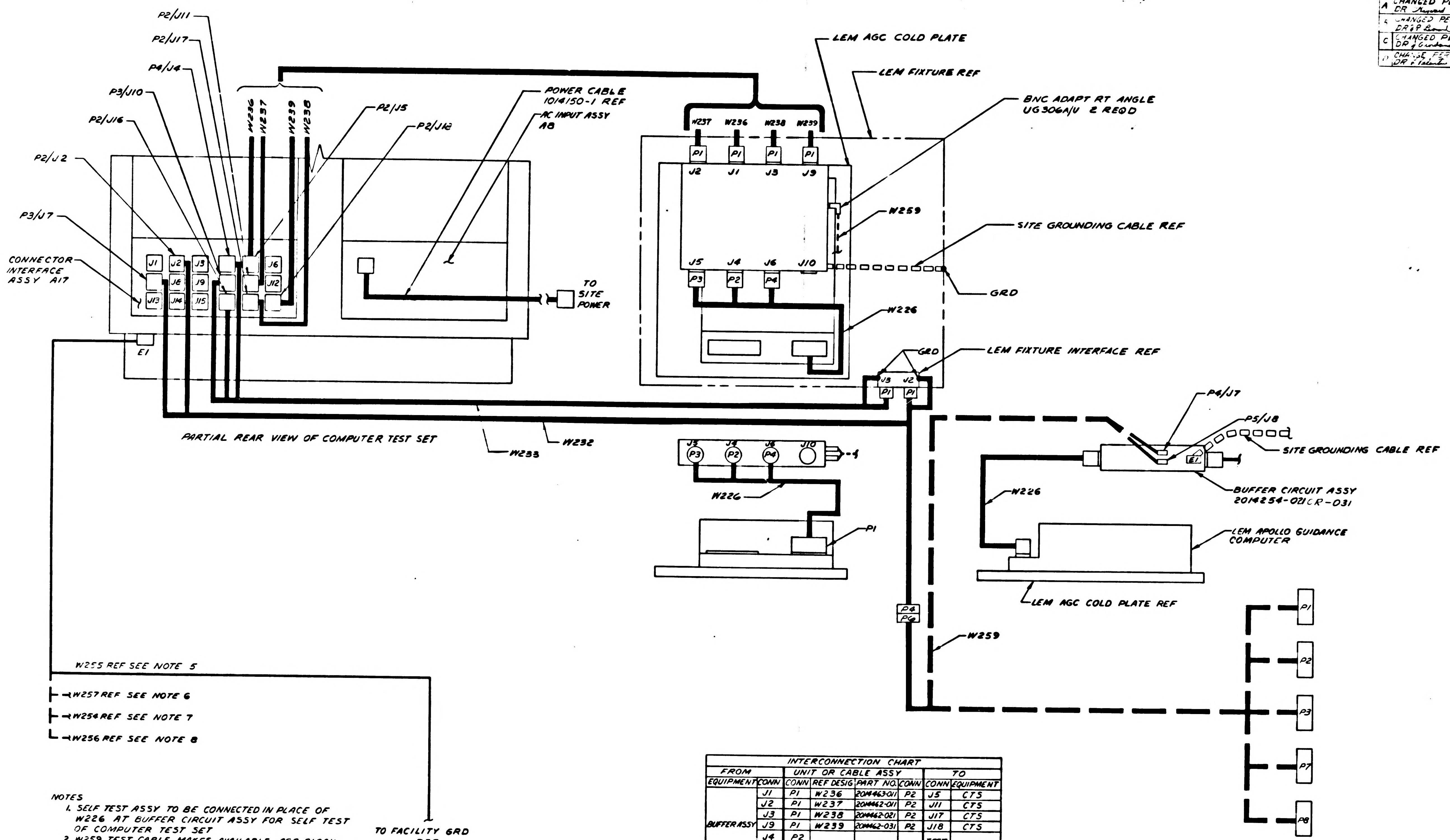
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016405
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016405 C

2016405 J

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
—	CLASS A RELEASED PER TDRR 28279		
A	CHANGED PER TDRR 29326 DR Hayward CHK APPD		
B	CHANGED PER TDRR 30573 DR & P Leonard CHK APPD		
C	CHANGED PER TDRR 31287 DR Giordano CHK APPD		
D	CHANGE PER TDRR 31448 DR Valentine CHK Serone APPD		


P2/J11
P2/J17
P4/J4
P3/J10
P2/J16
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
J1
J2
J3
J13
J8
J9
J14
J15
J6
J12
E1
W236
W237
W239
W238
P2/J5
P2/J12
POWER CABLE 1014150-1 REF
AC INPUT ASSY A8
TO SITE POWER
PARTIAL REAR VIEW OF COMPUTER TEST SET
W233
W232
LEM AGC COLD PLATE
LEM FIXTURE REF
BNC ADAPT RT ANGLE UG306A/U 2 REQD
W237
W236
W238
W239
P1
J2
J1
J3
J9
W259
SITE GROUNDING CABLE REF
J5
J4
J6
J10
P3
P2
P4
GRD
W226
GRD
LEM FIXTURE INTERFACE REF
J3
J2
P1
P1
J5
J4
J6
J10
P3
P2
P4
W226
P1
P4/J7
P5/J8
SITE GROUNDING CABLE REF
E1
BUFFER CIRCUIT ASSY 2014254-021 OR -031
W226
LEM APOLLO GUIDANCE COMPUTER
LEM AGC COLD PLATE REF
P4
P6
W259
P1
P2
P3
P7
P8
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
TO FACILITY GRD REF

NOTES

1. SELF TEST ASSY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT AND CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND LEM APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021, -031, OR -041
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021, -031, -041, C518-061
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021

REFERENCE:
1. ASSEMBLY DWG 2014255

INTERCONNECTION CHART

FROM		UNIT OR CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P2 P3 P4	W226	2014137-011 2014137-021	P1	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	J4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259	

FOR INFORMATION ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON, MASS
CONTRACT NO NAS
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTION
LEM
G&N TEST

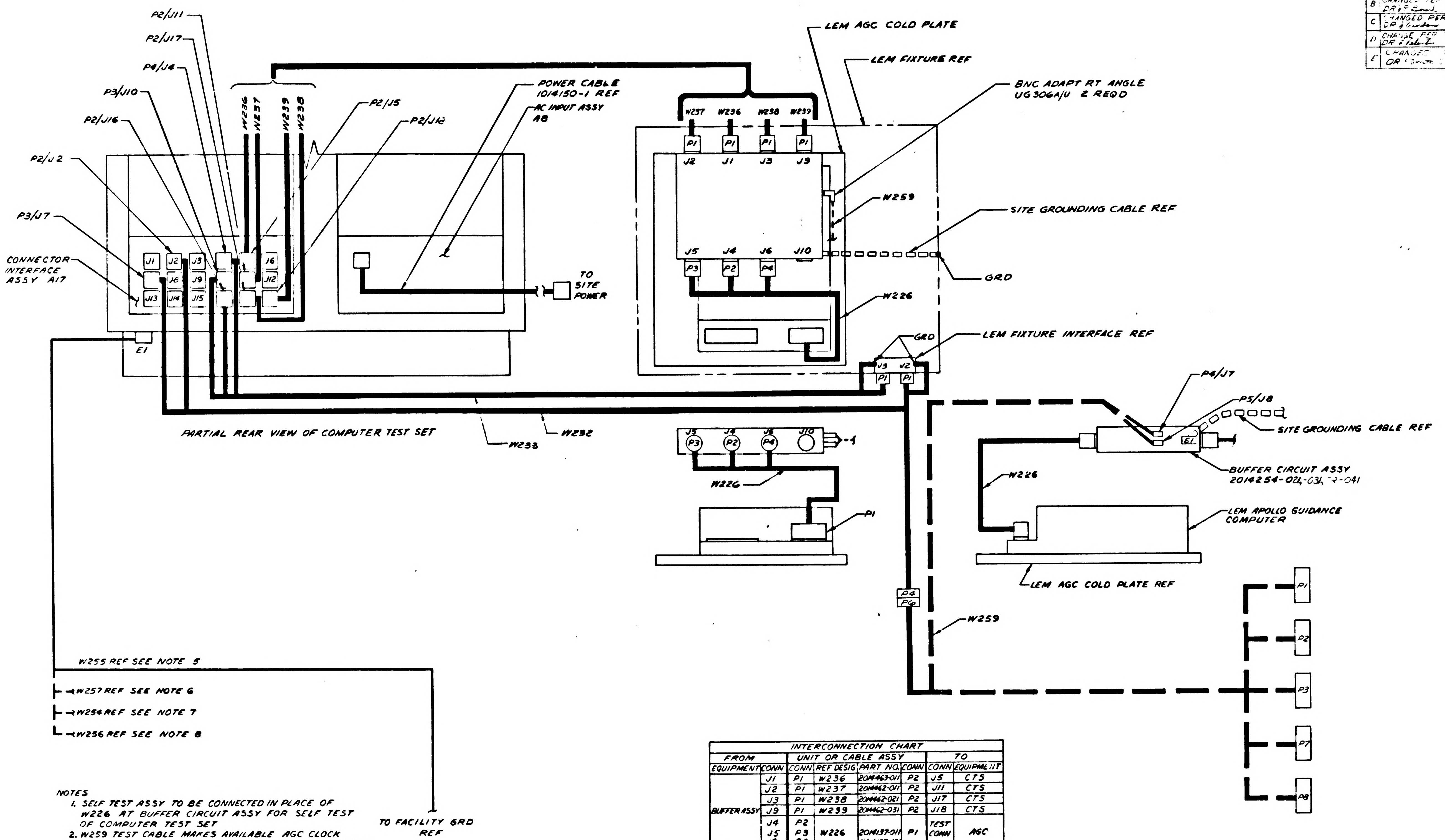
SIZE J
CODE IDENT NO 49956
NASA DRAWING NO 2016405
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016405 D

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 2327?		
A	CHANGED PER TDRR 2?326 DR [illegible] CHK [illegible] APPD [illegible]		
B	CHANGED PER TDRR 3057? DR [illegible] CHK [illegible]		
C	CHANGED PER TDRR 31?57 DR [illegible] CHK APPD		
D	CHANGE PER TDRR [illegible] DR [illegible]		
E	CHANGED PER TDRR [illegible] DR [illegible]		

2016405 E


P2/J11
P2/J17
P4/J4
P3/J10
P2/J16
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
J1 J2 J3 J6 J8 J9 J12 J13 J14 J15
W236 W237 W239 W238
P2/J5
P2/J12
POWER CABLE 1014150-1 REF
AC INPUT ASSY A8
TO SITE POWER
E1
PARTIAL REAR VIEW OF COMPUTER TEST SET
W233
W232
LEM AGC COLD PLATE
LEM FIXTURE REF
BNC ADAPT RT ANGLE UG306A/U 2 REQD
W237 W236 W238 W239
P1 P1 P1 P1
J2 J1 J3 J9
W259
SITE GROUNDING CABLE REF
J5 J4 J6 J10
P3 P2 P4
GRD
W226
GRD
LEM FIXTURE INTERFACE REF
J3 J2
P1 P1
P4/J7
P5/J8
SITE GROUNDING CABLE REF
E1
BUFFER CIRCUIT ASSY 2014254-021,-031,-041
W226
LEM APOLLO GUIDANCE COMPUTER
LEM AGC COLD PLATE REF
J5 J4 J6 J10
P3 P2 P4
W226
P1
P4
P6
W259
P1 P2 P3 P7 P8
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
TO FACILITY GRD REF

INTERCONNECTION CHART							
FROM		UNIT OR CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS
	J2	P1	W237	2014462-011	P2	J11	CTS
	J3	P1	W238	2014462-021	P2	J17	CTS
	J9	P1	W239	2014462-031	P2	J18	CTS
	J4 J5 J6	P2 P3 P4	W226	2014137-011 2014137-021	P1	TEST CONN	AGC
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT
W232	J4	P6					
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011 2014392-021	P4	J10	BUFFER ASSY
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259

SEE NOTE 2

SEE NOTE 1

NOTES
1. SELF TEST ASSY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT AND CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND LEM APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021,-031,-041, OR -051
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021,-031,-041,051,-061 &-071
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014043-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .xx ± DECIMALS .xxx ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON MASS
CONTRACT NO NAS [illegible]
DRAWN [illegible] DATE [illegible]
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTION
LEM
G&N TEST

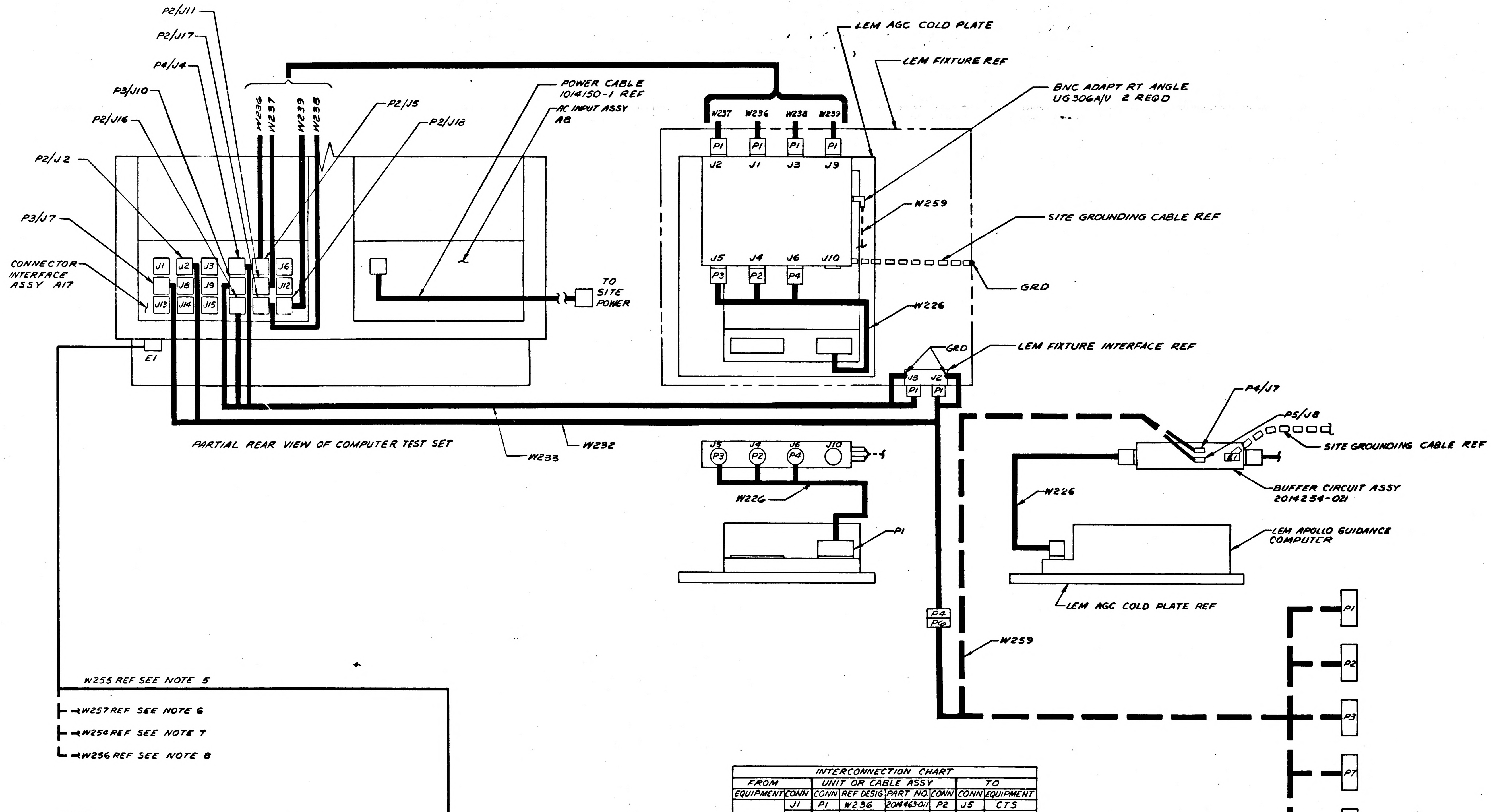
SIZE J
CODE IDENT NO 49956
NASA DRAWING NO 2016405
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016405 E

2016405 -

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28279		


P2/J11
P2/J17
P4/J4
P3/J10
P2/J16
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
W236
W237
W239
W238
P2/J5
P2/J18
POWER CABLE 1014150-1 REF
AC INPUT ASSY A8
TO SITE POWER
J1 J2 J3 J6 J8 J9 J12 J13 J14 J15
E1
PARTIAL REAR VIEW OF COMPUTER TEST SET
W233
W232
LEM AGC COLD PLATE
LEM FIXTURE REF
BNC ADAPT RT ANGLE UG306A/U 2 REQD
W237 W236 W238 W239
P1 P1 P1 P1
J2 J1 J3 J9
W259
SITE GROUNDING CABLE REF
J5 J4 J6 J10
P3 P2 P4
GRD
W226
GRD
LEM FIXTURE INTERFACE REF
J3 J2
P1 P1
J5 J4 J6 J10
P3 P2 P4
W226
P1
P4/J7
P5/J8
SITE GROUNDING CABLE REF
E1
BUFFER CIRCUIT ASSY 2014254-021
W226
LEM APOLLO GUIDANCE COMPUTER
LEM AGC COLD PLATE REF
P4
P6
W259
P1
P2
P3
P7
P8
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
TO FACILITY GRD REF

NOTES
1. SELF TEST ASSY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT AND CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND LEM APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021

INTERCONNECTION CHART

FROM		UNIT OR CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P2 P3 P4	W226	2014137-011	P1	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	J4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259	

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9 497
DRAWN DATE 25 APR 66
CHECKED 25 APR 66
APPROVAL P. 4/25/66
APPROVAL D. 4/25/66
APPROVAL 4/25/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 4/25/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTION
LEM
G&N TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016405
SCALE NONE WT
SHEET 1 OF 1

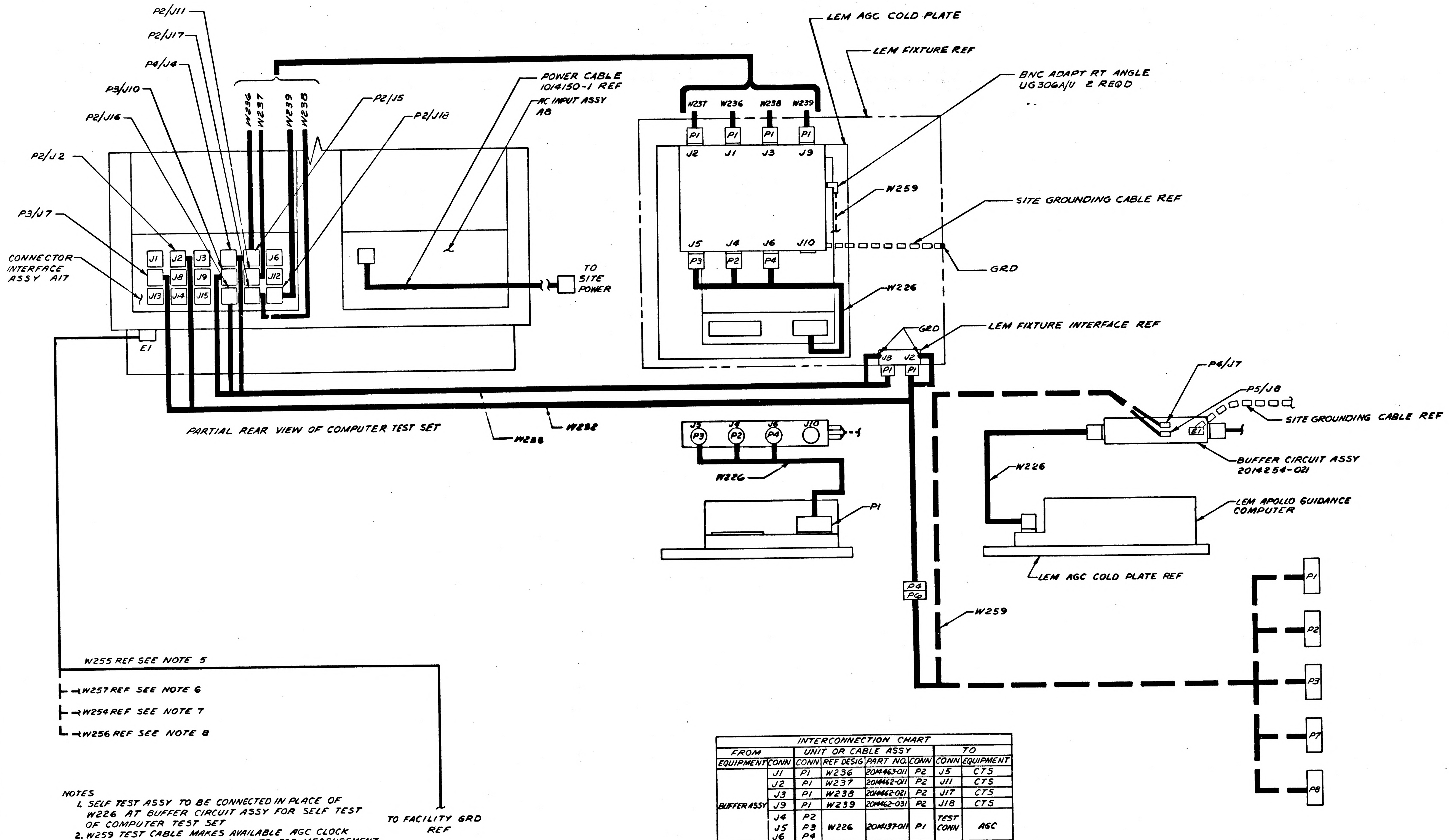
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016405 -

2016405 -

F-2

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28279		


P2/J11
P2/J17
P4/J4
P3/J10
P2/J16
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
W236
W237
W239
W238
P2/J5
P2/J18
POWER CABLE 1014150-1 REF
AC INPUT ASSY A8
J1
J2
J3
J6
J8
J9
J12
J13
J14
J15
TO SITE POWER
E1
PARTIAL REAR VIEW OF COMPUTER TEST SET
W233
W232
LEM AGC COLD PLATE
LEM FIXTURE REF
BNC ADAPT RT ANGLE UG306A/U 2 REQD
W237
W236
W238
W239
P1
P1
P1
P1
J2
J1
J3
J9
W259
SITE GROUNDING CABLE REF
J5
J4
J6
J10
P3
P2
P4
GRD
W226
GRD
LEM FIXTURE INTERFACE REF
J3
J2
P1
P1
P4/J7
P5/J8
SITE GROUNDING CABLE REF
E1
BUFFER CIRCUIT ASSY 2014254-021
W226
LEM APOLLO GUIDANCE COMPUTER
LEM AGC COLD PLATE REF
J3
J4
J6
J10
P3
P2
P4
W226
P1
P4
P6
W259
P1
P2
P3
P7
P8
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
TO FACILITY GRD REF

INTERCONNECTION CHART

FROM		UNIT OR CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DESIG	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P2 P3 P4	W226	2014137-011	P1	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	J4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259	

NOTES

1. SELF TEST ASSY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT AND CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND LEM APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9 497
DRAWN DATE 23 APR 66
CHECKED 23 APR 66
APPROVAL 4/25/66
APPROVAL 4/25/66
APPROVAL 4/25/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 4/26/66

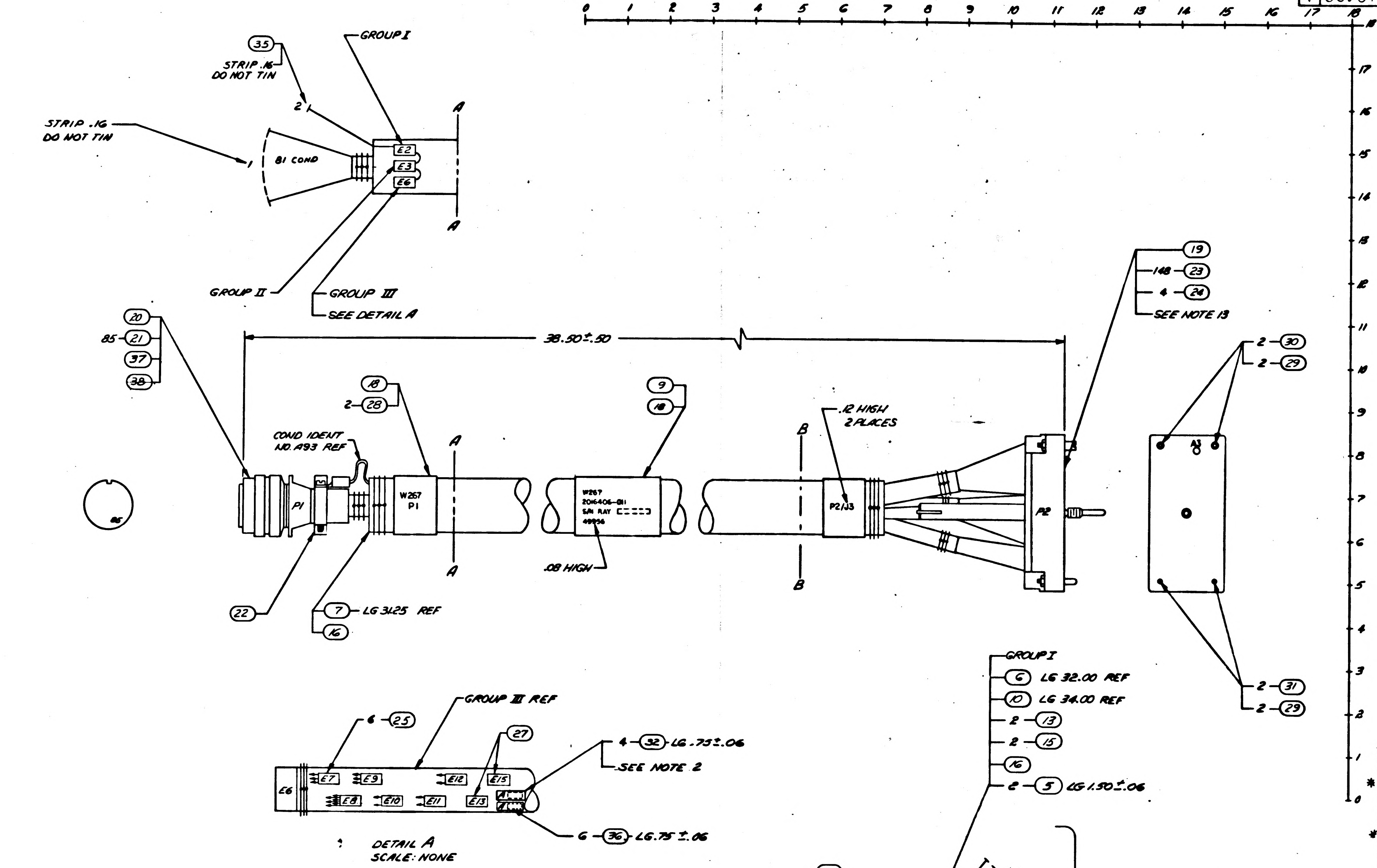
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

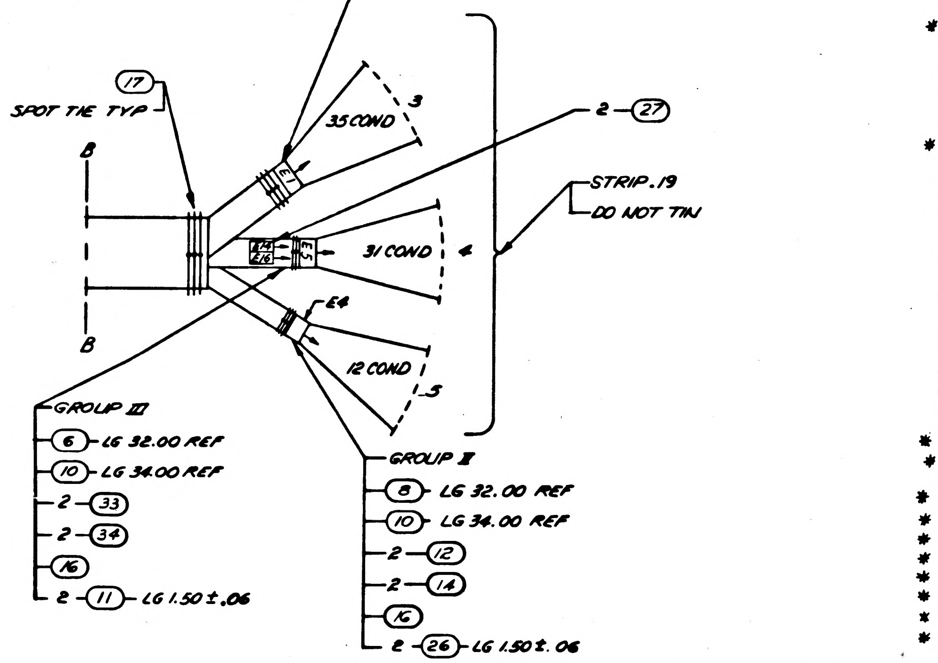
AGC/GSE INTERCONNECTION
LEM
G&N TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016405
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28115		
A	CHANGED PER TDRR 28373 DR. P Witz CHK APPD.		


35
STRIP .16
DO NOT TIN
2
GROUP I
STRIP .16
DO NOT TIN
1
81 COND
E2
E3
E6
A
A
GROUP II
GROUP III
SEE DETAIL A
19
148 – 23
4 – 24
SEE NOTE 13
20
85 – 21
37
38
38.50 ± .50
2 – 30
2 – 29
18
2 – 28
9
18
.12 HIGH
2 PLACES
COND IDENT
NO. A93 REF
W267
P1
W267
2016406-011
S/N RAY
49956
B
B
P2/J3
P2
.08 HIGH
22
7 – LG 31.25 REF
16
2 – 31
2 – 29
GROUP I
6 – LG 32.00 REF
10 – LG 34.00 REF
2 – 13
2 – 15
16
2 – 5 LG 1.50 ± .06
GROUP III REF
6 – 25
27
4 – 32 – LG .75 ± .06
SEE NOTE 2
E6
E7
E9
E12
E15
E8
E10
E11
E13
E14
6 – 36 – LG .75 ± .06
DETAIL A
SCALE: NONE


SPOT TIE TYP
17
B
B
35 COND
3
2 – 27
STRIP .19
DO NOT TIN
31 COND
4
E4
12 COND
5
GROUP III
6 – LG 32.00 REF
10 – LG 34.00 REF
2 – 33
2 – 34
16
2 – 11 – LG 1.50 ± .06
GROUP II
8 – LG 32.00 REF
10 – LG 34.00 REF
2 – 12
2 – 14
16
2 – 26 – LG 1.50 ± .06

NOTES

1. FABRICATE PER ND1002032 EXCEPT USE FIND 17
2. MARK CONDUCTOR IDENTIFICATION PER ND1002019
3. AR DENOTES AS REQUIRED
4. STRIP ALL LEADS .50 ± .06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED
5. CRIMP PER ND1002206
6. SERIALIZE PER ND1002023
7. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006256-001
8. CUT SLEEVING & BRAID LENGTHS AS SHOWN
9. MIL-W-16878/4 E22 WHT & BLK TWISTED PAIR, SHIELDED, JACKET TFE WHITE
10. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
11. MIL-I-23053 CLASS I, COLOR BLACK, I.D. .375 FOR FIND 26, I.D. .500 FOR FIND 5, I.D. .750 FOR FIND 11, COLOR WHITE I.D. .187 FOR FIND 32, COLOR WHITE I.D. .125 FOR FIND 36
12. QQ-B-575 BRAID SIZE 3/8 AWG 34
13. PINS K7, L7, M7 & N7 ARE FIND 24, ALL OTHERS ARE FIND 23 ON P2
14. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
15. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
	1	1020371-19	BUSHING, SLEEVE	38
	1	1020371-16	BUSHING, SLEEVE	37
*	0.4	SEE NOTE 11	INSULATION, TUBING	36
	1	MS25036-46	TERMINAL, LUG	35
	2	1000243-40	FERRULE, ELECTRICAL COND	34
	2	1000242-36	FERRULE, ELECTRICAL COND	33
*	0.3	SEE NOTE 11	INSULATION, TUBING	32
	2	1006672-002	GUIDE PIN	31
	2	1006672-006	GUIDE SOCKET	30
	4	1006672-005	NUT, STOP	29
	2	1006415-062	BAND MARKER, BLANK	28
	4	1010402-3	SLEEVE, SOLDER	27
*	0.3	SEE NOTE 11	INSULATION, TUBING	26
	6	1010402-1	SLEEVE, SOLDER	25
	4	1006491-011	CONTACT, ELECTRICAL	24
	148	1006491-009	CONTACT, ELECTRICAL	23
	1	1010933-105	CLAMP, CABLE	22
	85	1010770-2	CONTACT, CRIMP TYPE	21
	1	1006441-003	CONNECTOR, PLUG	20
	1	1006672-001	CONNECTOR, PLUG	19
	AR	1006253	ADHESIVE	18
	AR	1006458-004	TAPE, LACING	17
	AR	1006699	SOLVENT	16
	2	1000243-34	FERRULE, ELECTRICAL COND	15
	2	1000243-28	FERRULE, ELECTRICAL COND	14
	2	1000242-30	FERRULE, ELECTRICAL COND	13
	2	1000242-27	FERRULE, ELECTRICAL COND	12
*	0.3	SEE NOTE 11	INSULATION TUBING	11
*	8.5	SEE NOTE 12	BRAID, WIRE	10
	1	1006415-138	BAND, MARKER, BLANK	9
*	2.7	1006696-2	INSULATION SLEEVING	8
*	2.7	1006696-8	INSULATION SLEEVING	7
*	5.4	1006696-3	INSULATION SLEEVING	6
*	0.3	SEE NOTE 11	INSULATION TUBING	5
*	7.0	SEE NOTE 9	WIRE, ELECTRICAL	4
*	10.0	1014341-12	WIRE, ELECTRICAL	3
*	9.5	MIL-W-16878/4 E24	WIRE, ELECTRICAL BLACK	2
*	222	MIL-W-16878/4 E24	WIRE, ELECTRICAL WHITE	1
	-011	LIST OF MATERIALS		

* DENOTES LENGTH IN FEET

NEXT ASSY	USED ON
2014268	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.03 DECIMALS .XXX ANGLES
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 1 APR 66
CHECKED 11 APR 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W267

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016406
SCALE 1/1
WT
SHEET 1 OF 2

ASSEMBLY INFORMATION CHART

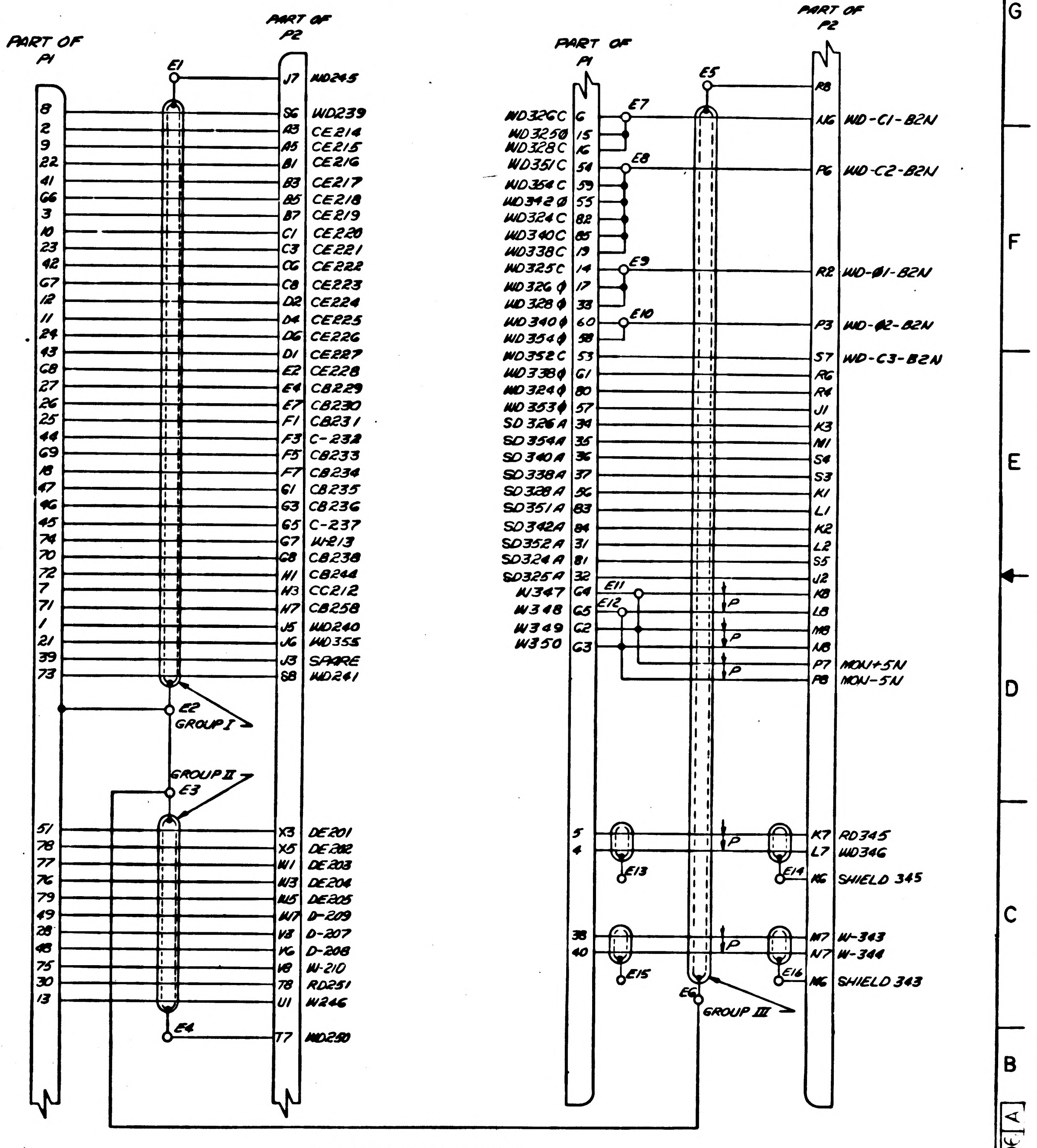
FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A1	1	P1-2	WHT	24	1	3	P2-A3	
	A2	↑	↑ 9	↑	↑	↑	↑	↑ A5	
	A3		22					B1	
	A4		41					B3	
	A5		66					B5	
	A6		3					B7	
	A7		10					C1	
	A8		23					C3	
	A9		42					C6	
	A10		67					C8	
	A11		12					D2	
	A12		11					D4	
	A13		24					D6	
	A14		43					D1	
	A15		68					E2	
	A16		27					E4	
	A17		26					E7	
	A18		25					F1	GROUP I
	A19		44					F3	
	A20		69					F5	
	A21		18					F7	
	A22		47					G1	
	A23		46					G3	
	A24		45					G5	
	A25		74					G7	
	A26		70					G8	
	A27		72					H1	
	A28		7					H3	
	A29		71					H7	
	A30		1					J5	
	A31		21					J6	
	A32		39					J3	
	A33	↓	↓ 73	↓		↓		S8	
	A34	1	P1-8	WHT	↓	1	↓	↓ S6	
	A35	△1	E1	BLK	24	2	3	P2-J7	
		△1	E1	SHLD			△1	E2	△2
	A36	1	P1-51	WHT	24	1	5	P2-X3	
	A37	↑	↑ 78	↑	↑	↑	↑	↑ X5	
	A38		77					W1	
	A39		76					W3	
	A40		79					W5	
	A41		49					W7	
	A42		28					V3	GROUP II
	A43		48					V6	
	A44		75					V8	
	A45	↓	↓ 30	↓		↓		T8	
	A46	1	P1-13	WHT	↓	1	↓	↓ U1	
	A47	△1	E4	BLK	24	2	5	P2-T7	△2
		△1	E3	SHIELD			△1	E4	△2
	A48	1	P1-6	WHT	24	1	△1	E7	
	A49	1	P1-15	↑	↑	↑	△1	E7	
	A50	1	P1-16				△1	E7	
	A51	△1	E7				4	P2-N6	
	A52	1	P1-54				△1	E8	
	A53	1	P1-59				△1	E8	GROUP III
	A54	1	P1-55				△1	E8	
	A55	△1	E8				4	P2-P6	
	A56	1	P1-82				△1	E8	
	A57	1	P1-85	↓	↓	↓	△1	E8	
	A58	1	P1-19	WHT	24	1	△1	E8	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A59	1	P1-53	WHT	24	1	4	P2-S7	
	A60	1	P1-14	↑	↑	↑	△1	E9	
	A61	1	P1-17				△1	E9	
	A62	1	P1-33				△1	E9	
	A63	△1	E9				4	P2-R2	
	~~A64~~	~~1~~	~~P1-55~~				△1	~~[illegible]~~	
	A65	1	P1-58				△1	E10	
	A66	1	P1-60				△1	E10	
	A67	△1	E10				4	P2-P3	
	A68	1	P1-61				↑	↑ R6	
	A69	↑	↑ 80					R4	
	A70		57					J1	
	A71		34					K3	
	A72		35					M1	
	A73		36					S4	
	A74		37					S3	
	A75		56					K1	GROUP III
	A76		83					L1	
	A77		84					K2	
	A78		31					L2	
	A79		81				↓	↓ S5	
	A80		32				4	P2-J2	
	A81		G4	↓		↓	△1	E11	
	A82		G2	WHT		1	↑	E11	
	A83	↓	↓ G5	BLK		2	↓	E12	
	A84	1	P1-G3	BLK		2	△1	E12	
	A85	△1	E11	WHT		3	4	P2-K8	
		↑	E12	BLK			4	↑ L8	
	A86		E11	WHT		3	4	M8	
			E12	BLK			4	N8	
	A87	↓	E11	WHT	↓	3	4	P7	
		△1	E12	BLK	24		4	P8	
	A88	1	P1-5	WHT	22	4	4	↓ K7	
		1	P1-4	BLK	22		4	P2-L7	
		△1	E13	SHIELD			△1	E14	
	A89	1	P1-38	WHT	22	4	4	P2-M7	
		1	P1-40	BLK	22		4	P2-N7	
		△1	E15	SHIELD			△1	E16	
	A90	△1	E14	BLK	24	2	4	P2-K6	
	A91	△1	E16	BLK	24	2	4	P2-M6	
	A92	△1	E5	BLK	24	2	4	P2-R8	△2
		△1	E5	SHIELD			△1	E6	△2
	A93	2	P1-SHELL	BLK	24	2	△1	E2	△2
	A94	△1	E2	BLK	24	2	△1	E3	△2
	A95	△1	E3	BLK	24	2	△1	E6	△2

△1 DENOTES INTERNAL CONNECTION WITHIN CABLE ASSEMBLY

△2 SEE CONDUCTOR IDENT A47, A92, A93, A94, A95 AND/OR SHIELDS OF GROUPS I, II & III



PART OF P1
PART OF P2
E1
J7 WD245
8 S6 WD239
2 A3 CE214
9 A5 CE215
22 B1 CE216
41 B3 CE217
66 B5 CE218
3 B7 CE219
10 C1 CE220
23 C3 CE221
42 C6 CE222
G7 C8 CE223
12 D2 CE224
11 D4 CE225
24 D6 CE226
43 D1 CE227
G8 E2 CE228
27 E4 CB229
26 E7 CB230
25 F1 CB231
44 F3 C-232
69 F5 CB233
18 F7 CB234
47 G1 CB235
46 G3 CB236
45 G5 C-237
74 G7 W-213
70 G8 CB238
72 H1 CB244
7 H3 CC212
71 H7 CB258
1 J5 WD240
21 J6 WD355
39 J3 SPARE
73 S8 WD241
E2
GROUP I
GROUP II
E3
51 X3 DE201
78 X5 DE202
77 W1 DE203
76 W3 DE204
79 W5 DE205
49 W7 D-209
28 V3 D-207
48 V6 D-208
75 V8 W-210
30 T8 RD251
13 U1 W246
E4
T7 WD250
PART OF P1
PART OF P2
E5
R8
WD326C 6
WD325ϕ 15
WD328C 16
WD351C 54
WD354C 59
WD342ϕ 55
WD324C 82
WD340C 85
WD338C 19
WD325C 14
WD326ϕ 17
WD328ϕ 33
WD340ϕ 60
WD354ϕ 58
WD352C 53
WD338ϕ G1
WD324ϕ 80
WD353ϕ 57
SD326A 34
SD354A 35
SD340A 36
SD338A 37
SD328A 56
SD351A 83
SD342A 84
SD352A 31
SD324A 81
SD325A 32
W347 G4
W348 G5
W349 G2
W350 G3
E7
E8
E9
E10
E11
E12
N6 WD-C1-B2N
P6 WD-C2-B2N
R2 WD-ϕ1-B2N
P3 WD-ϕ2-B2N
S7 WD-C3-B2N
R6
R4
J1
K3
M1
S4
S3
K1
L1
K2
L2
S5
J2
K8
L8
M8
N8
P7 MON+5N
P8 MON-5N
P
P
P
5
4
K7 RD345
L7 WD346
E13
E14
K6 SHIELD 345
38
40
M7 W-343
N7 W-344
E15
E16
M6 SHIELD 343
E6
GROUP III

ELECTRICAL SCHEMATIC

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28115		
A	CHANGED PER TDRR 28373 DR P. Bttk CHK C. [illegible] APPD [illegible]	[illegible]	[illegible]

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN Tom [illegible] DATE 4 APR 66
CHECKED C. [illegible] APR 66
APPROVAL [illegible]
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

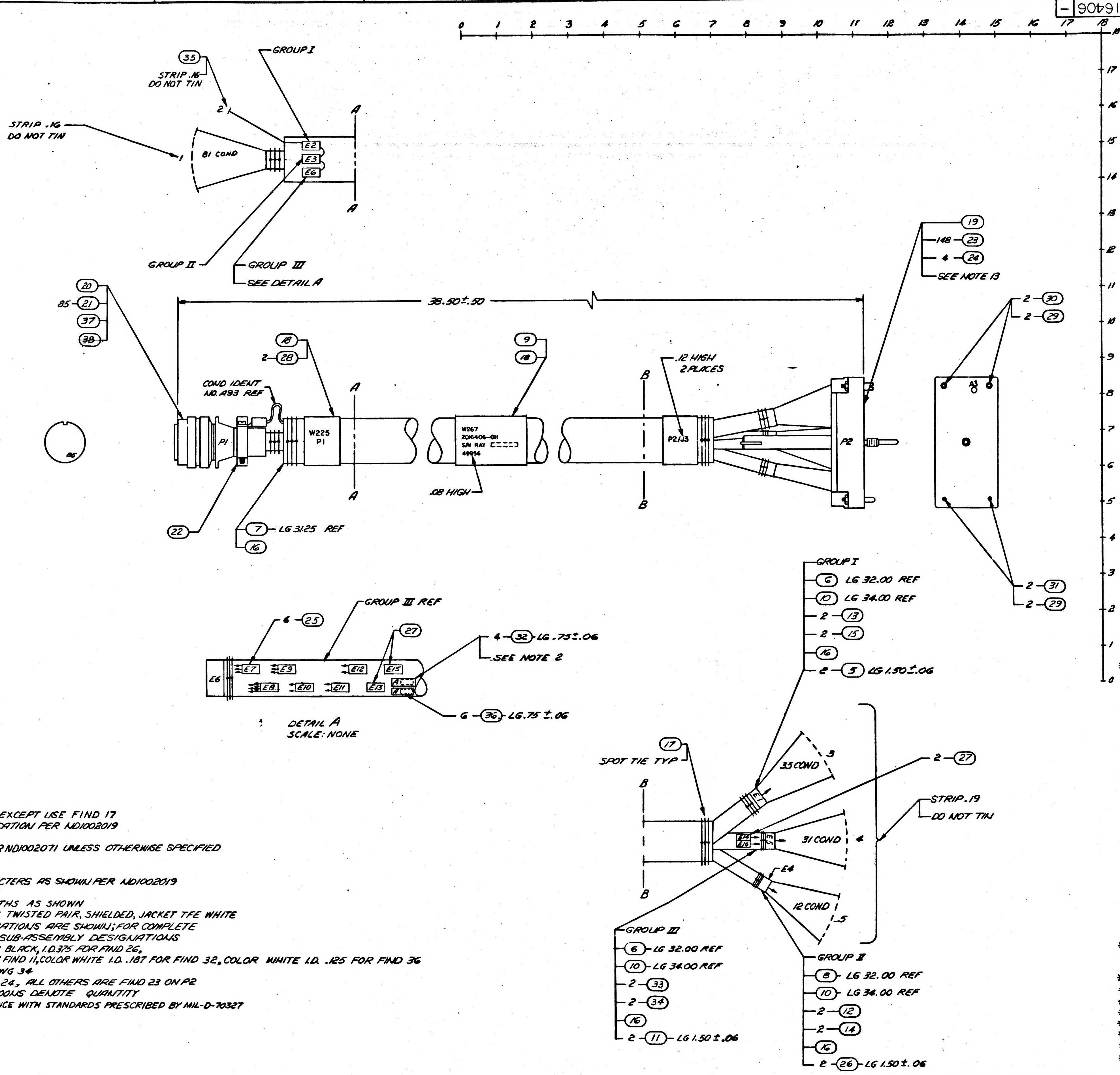
CABLE ASSEMBLY
W267

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 201640
SCALE NONE
WT
SHEET 2 OF 2

MASTER

2016406 | -

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28115		



35
STRIP .16 DO NOT TIN
2
GROUP I
STRIP .16 DO NOT TIN
1
81 COND
E2
E3
E6
A
A
GROUP II
GROUP III
SEE DETAIL A
20
85-21
37
38
38.50±.50
18
2-28
COND IDENT NO. A93 REF
P1
W225 P1
A
A
9
18
W267 2016406-011 S/N RAY 49956
.08 HIGH
B
B
.12 HIGH 2 PLACES
P2/J3
P2
19
148-23
4-24
SEE NOTE 13
2-30
2-29
A3
2-31
2-29
22
7 LG 31.25 REF
16
6-25
GROUP III REF
27
4-32 LG .75±.06
SEE NOTE 2
6-36 LG .75±.06
E6
E7
E8
E9
E10
E11
E12
E13
E15
DETAIL A
SCALE: NONE
GROUP I
6 LG 32.00 REF
10 LG 34.00 REF
2-13
2-15
16
2-5 LG 1.50±.06
17
SPOT TIE TYP
B
B
35 COND
3
31 COND
4
E4
12 COND
5
2-27
STRIP .19
DO NOT TIN
GROUP III
6 LG 32.00 REF
10 LG 34.00 REF
2-33
2-34
16
2-11 LG 1.50±.06
GROUP II
8 LG 32.00 REF
10 LG 34.00 REF
2-12
2-14
16
2-26 LG 1.50±.06

NOTES

1. FABRICATE PER ND1002032 EXCEPT USE FIND 17
2. MARK CONDUCTOR IDENTIFICATION PER ND1002019
3. AR DENOTES AS REQUIRED
4. STRIP ALL LEADS .50±.06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED
5. CRIMP PER ND1002206
6. SERIALIZE PER ND1002023
7. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006256-001
8. CUT SLEEVING & BRAID LENGTHS AS SHOWN
9. MIL-W-16878/4 E22 WHT & BLK TWISTED PAIR, SHIELDED, JACKET TFE WHITE
10. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
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12. QQ-B-575 BRAID SIZE 3/8 AWG 34
13. PINS K7, L7, M7 & N7 ARE FIND 24, ALL OTHERS ARE FIND 23 ON P2
14. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
15. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
	1	1020371-19	BUSHING, SLEEVE	38
	1	1020371-16	BUSHING, SLEEVE	37
*	0.4	SEE NOTE 11	INSULATION, TUBING	36
	1	MS25036-46	TERMINAL, LUG	35
	2	1000243-40	FERRULE, ELECTRICAL COND	34
	2	1000242-36	FERRULE, ELECTRICAL COND	33
*	0.3	SEE NOTE 11	INSULATION, TUBING	32
	2	1006672-002	GUIDE PIN	31
	2	1006672-006	GUIDE SOCKET	30
	4	1006672-005	NUT, STOP	29
	2	1006415-062	BAND MARKER, BLANK	28
	4	1010402-3	SLEEVE, SOLDER	27
*	0.3	SEE NOTE 11	INSULATION, TUBING	26
	6	1010402-1	SLEEVE, SOLDER	25
	4	1006491-011	CONTACT, ELECTRICAL	24
	148	1006491-009	CONTACT, ELECTRICAL	23
	1	1010933-105	CLAMP, CABLE	22
	85	1010770-2	CONTACT, CRIMP TYPE	21
	1	1006441-003	CONNECTOR, PLUG	20
	1	1006672-001	CONNECTOR, PLUG	19
	AR	1006253	ADHESIVE	18
	AR	1006458-004	TAPE, LACING	17
	AR	1006699	SOLVENT	16
	2	1000243-34	FERRULE, ELECTRICAL COND	15
	2	1000243-28	FERRULE, ELECTRICAL COND	14
	2	1000242-30	FERRULE, ELECTRICAL COND	13
	2	1000242-27	FERRULE, ELECTRICAL COND	12
*	0.3	SEE NOTE 11	INSULATION TUBING	11
*	8.5	SEE NOTE 12	BRAID, WIRE	10
	1	1006415-138	BAND, MARKER, BLANK	9
*	2.7	1006696-2	INSULATION SLEEVING	8
*	2.7	1006696-8	INSULATION SLEEVING	7
*	5.4	1006696-3	INSULATION SLEEVING	6
*	0.3	SEE NOTE 11	INSULATION TUBING	5
*	7.0	SEE NOTE 9	WIRE, ELECTRICAL	4
*	10.0	1014341-12	WIRE, ELECTRICAL	3
*	9.5	MIL-W-16878/4 E24	WIRE, ELECTRICAL BLACK	2
*	222	MIL-W-16878/4 E24	WIRE, ELECTRICAL WHITE	1
	-011	LIST OF MATERIALS		

* DENOTES LENGTH IN FEET

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ±.03 DECIMALS ANGLES
~~DO NOT SCALE DRAWING~~
MATERIAL

NEXT ASSY	USED ON
2014268	

APPLICATION

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN Tom Killam DATE 11 APR 66
CHECKED C. Ammmsen 11 APR 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W267

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016406
SCALE 1/1
WT
SHEET 1 OF 2

MASTER

2016406 | -

–	2016406

REVISIONS

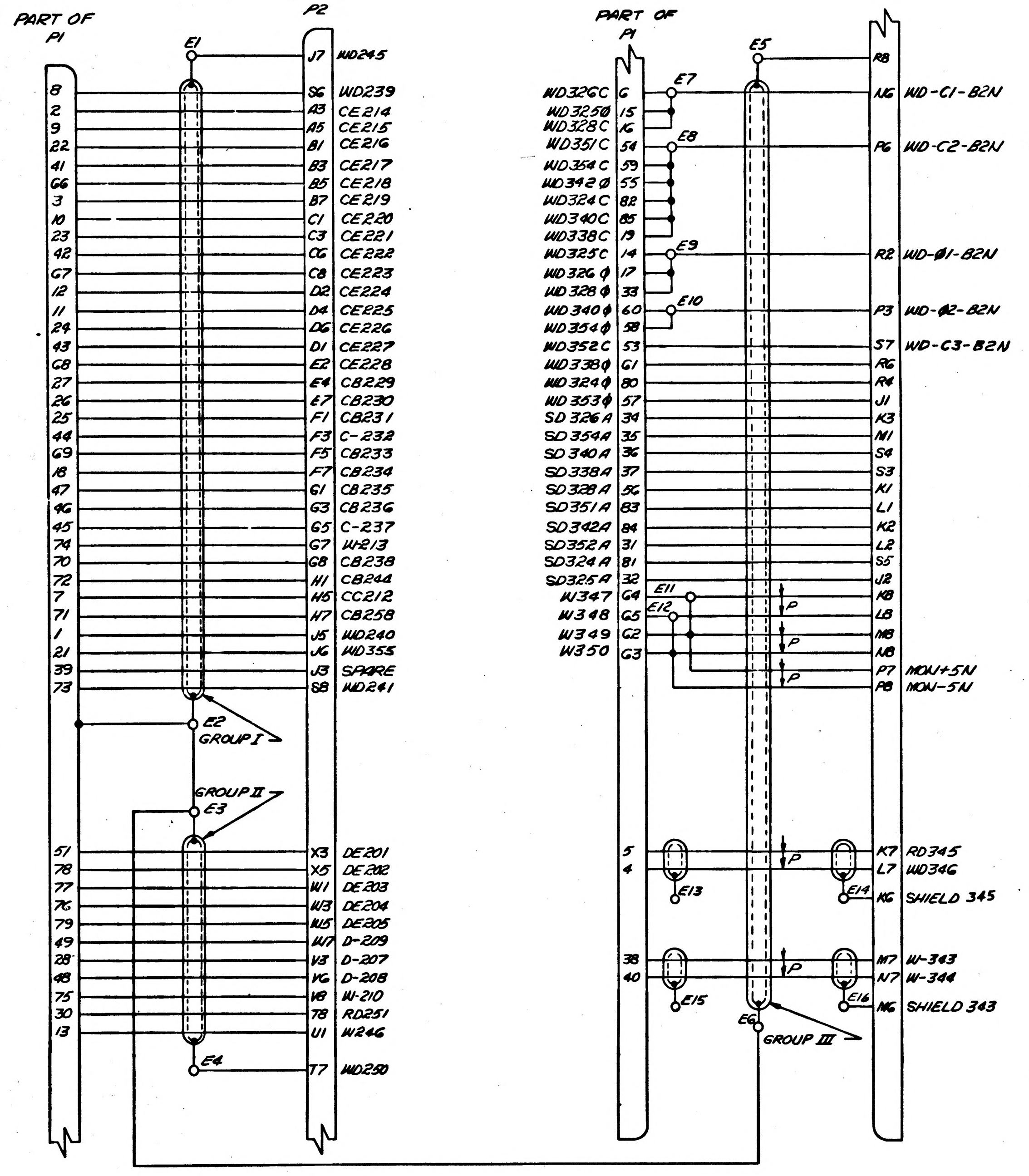
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28115		

ASSEMBLY INFORMATION CHART

	FROM			DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A1	1	P1-2	WHT	24	1	3	P2-A3	
	A2	↑	↑ 9	↑	↑	↑	↑	↑ A5	
	A3		22					B1	
	A4		41					B3	
	A5		66					B5	
	A6		3					B7	
	A7		10					C1	
	A8		23					C3	
	A9		42					C6	
	A10		67					C8	
	A11		12					D2	
	A12		11					D4	
	A13		24					D6	
	A14		43					D1	
	A15		68					E2	
	A16		27					E4	
	A17		26					E7	GROUP I
	A18		25					F1	
	A19		44					F3	
	A20		69					F5	
	A21		18					F7	
	A22		47					G1	
	A23		46					G3	
	A24		45					G5	
	A25		74					G7	
	A26		70					G8	
	A27		72					H1	
	A28		7					H5	
	A29		71					H7	
	A30		1					J5	
	A31		21					J6	
	A32		39					J3	
	A33	↓	↓ 73	↓		↓		S8	
	A34	1	P1-8	WHT	↓	1	↓	↓ S6	
	A35	△1	E1	BLK	24	2	3	P2-J7	
		△1	E1	SHLD			△1	E2	△2
	A36	1	P1-51	WHT	24	1	5	P2-X3	
	A37	↑	↑ 78	↑	↑	↑	↑	↑ X5	
	A38		77					W1	
	A39		76					W3	
	A40		79					W5	
	A41		49					W7	
	A42		28					V3	GROUP II
	A43		48					V6	
	A44		75					V8	
	A45	↓	↓ 30	↓		↓		T8	
	A46	1	P1-13	WHT	↓	1	↓	↓ U1	
	A47	△1	E4	BLK	24	2	5	P2-T7	△2
		△1	E3	SHIELD			△1	E4	△2
	A48	1	P1-6	WHT	24	1	△1	E7	
	A49	1	P1-15	↑	↑	↑	△1	E7	
	A50	1	P1-16				△1	E7	
	A51	△1	E7				4	P2-N6	
	A52	1	P1-54				△1	E8	GROUP III
	A53	1	P1-59				△1	E8	
	A54	1	P1-55				△1	E8	
	A55	△1	E8				4	P2-P6	
	A56	1	P1-82				△1	E8	
	A57	1	P1-85	↓	↓	↓	△1	E8	
	A58	1	P1-19	WHT	24	1	△1	E8	

ASSEMBLY INFORMATION CHART

	FROM			DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A59	1	P1-53	WHT	24	1	4	P2-S7	
	A60	1	P1-14	↑	↑	↑	△1	E9	
	A61	1	P1-17				△1	E9	
	A62	1	P1-33				△1	E9	
	A63	△1	E9				4	P2-R2	
	~~A64~~	~~1~~	~~P1-55~~				△1	~~E11~~	
	A65	1	P1-58				△1	E10	
	A66	1	P1-60				△1	E10	
	A67	△1	E10				4	P2-P3	
	A68	1	P1-61				↑	↑ R6	
	A69	↑	↑ 80					R4	
	A70		57					J1	
	A71		34					K3	
	A72		35					M1	
	A73		36					S4	
	A74		37					S3	GROUP III
	A75		56					K1	
	A76		83					L1	
	A77		84					K2	
	A78		31					L2	
	A79		81				↓	↓ S5	
	A80		32				4	P2-U2	
	A81		64	↓		↓	△1	E11	
	A82		62	WHT		1	↑	E11	
	A83	↓	↓ 65	BLK		2	↓	E12	
	A84	1	P1-63	BLK		2	△1	E12	
	A85	△1	E11	WHT		3	4	P2-K8	
		↑	E12	BLK			4	↑ L8	
	A86		E11	WHT		3	4	M8	
			E12	BLK			4	N8	
	A87	↓	E11	WHT	↓	3	4	P7	
		△1	E12	BLK	24		4	P8	
	A88	1	P1-5	WHT	22	4	4	↓ K7	
		1	P1-4	BLK	22		4	P2-L7	
		△1	E13	SHIELD			△1	E14	
	A89	1	P1-38	WHT	22	4	4	P2-M7	
		1	P1-40	BLK	22		4	P2-N7	
		△1	E15	SHIELD			△1	E16	
	A90	△1	E14	BLK	24	2	4	P2-K6	
	A91	△1	E16	BLK	24	2	4	P2-M6	
	A92	△1	E5	BLK	24	2	4	P2-R8	△2
		△1	E5	SHIELD			△1	E6	△2
	A93	2	P1-SHELL	BLK	24	2	△1	E2	△2
	A94	△1	E2	BLK	24	2	△1	E3	△2
	A95	△1	E3	BLK	24	2	△1	E6	△2


PART OF P1
PART OF P2
E1
J7 WD245
8 — S6 WD239
2 — A3 CE214
9 — A5 CE215
22 — B1 CE216
41 — B3 CE217
66 — B5 CE218
3 — B7 CE219
10 — C1 CE220
23 — C3 CE221
42 — C6 CE222
67 — C8 CE223
12 — D2 CE224
11 — D4 CE225
24 — D6 CE226
43 — D1 CE227
68 — E2 CE228
27 — E4 CB229
26 — E7 CB230
25 — F1 CB231
44 — F3 C-232
69 — F5 CB233
18 — F7 CB234
47 — G1 CB235
46 — G3 CB236
45 — G5 C-237
74 — G7 W-213
70 — G8 CB238
72 — H1 CB244
7 — H5 CC212
71 — H7 CB258
1 — J5 WD240
21 — J6 WD355
39 — J3 SPARE
73 — S8 WD241
E2
GROUP I
GROUP II
E3
51 — X3 DE201
78 — X5 DE202
77 — W1 DE203
76 — W3 DE204
79 — W5 DE205
49 — W7 D-209
28 — V3 D-207
48 — V6 D-208
75 — V8 W-210
30 — T8 RD251
13 — U1 W246
E4
T7 WD250
PART OF P1
PART OF P2
E5
R8
E7
WD326C 6 — N6 WD-C1-B2N
WD3250 15
WD328C 16
E8
WD351C 54 — P6 WD-C2-B2N
WD354C 59
WD3420 55
WD324C 82
WD340C 85
WD338C 19
E9
WD325C 14 — R2 WD-01-B2N
WD326 0 17
WD328 0 33
E10
WD340 0 60 — P3 WD-02-B2N
WD354 0 58
WD352C 53 — S7 WD-C3-B2N
WD338 0 61 — R6
WD324 0 80 — R4
WD353 0 57 — J1
SD326A 34 — K3
SD354A 35 — M1
SD340A 36 — S4
SD338A 37 — S3
SD328A 56 — K1
SD351A 83 — L1
SD342A 84 — K2
SD352A 31 — L2
SD324A 81 — S5
SD325A 32 — J2
E11
E12
W347 G4 — K8
W348 G5 — L8
W349 G2 — M8
W350 G3 — N8
P
P
P
P7 MON+5N
P8 MON-5N
5 — K7 RD345
4 — L7 WD346
E13
E14
K6 SHIELD 345
38 — M7 W-343
40 — N7 W-344
E15
E16
M6 SHIELD 343
P
P
E6
GROUP III

ELECTRICAL SCHEMATIC

△1 DENOTES INTERNAL CONNECTION WITHIN CABLE ASSEMBLY

△2 SEE CONDUCTOR IDENT A47, A92, A93, A94, A95 AND/OR SHIELDS OF GROUPS I, II & III

MASTER

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES
.XX .XXX
± ± ±

~~DO NOT SCALE DRAWING~~

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 11 APR 66
CHECKED 11 APR 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
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MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

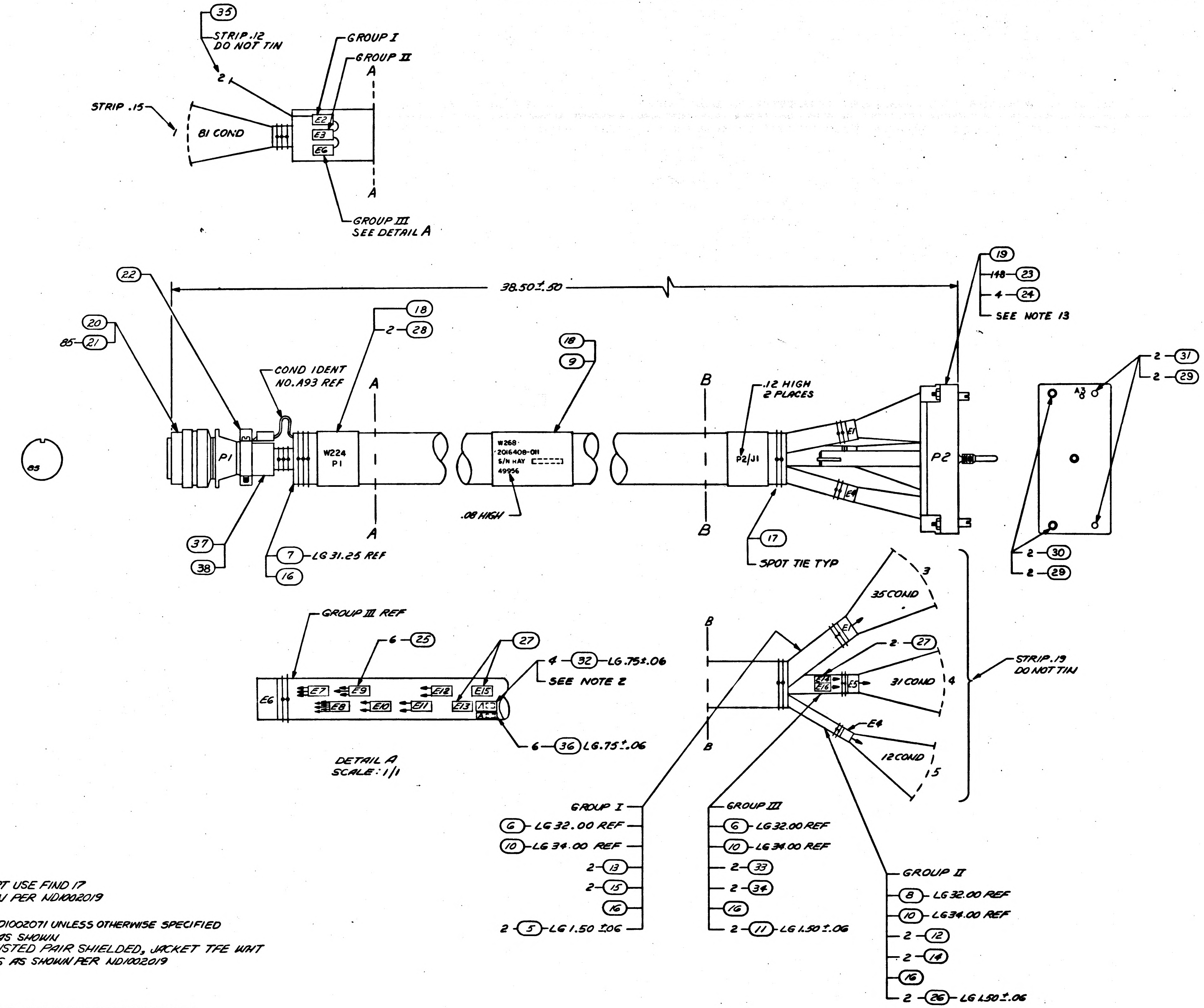
CABLE ASSEMBLY
W267

CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	J	2016406

SCALE NONE WT SHEET 2 OF 2

2016406	–

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28115		


35
STRIP .12
DO NOT TIN
2
GROUP I
GROUP II
A
STRIP .15
81 COND
E2
E3
E6
A
GROUP III
SEE DETAIL A
22
20
85-21
38.50±.50
18
2-28
COND IDENT
NO. A93 REF
A
A
P1
W224
P1
85
37
38
7-LG 31.25 REF
16
18
9
W268
2016408-011
S/N RAY
49956
.08 HIGH
B
B
.12 HIGH
2 PLACES
P2/J1
E1
E4
P2
17
SPOT TIE TYP
19
148-23
4-24
SEE NOTE 13
2-31
2-29
A3
2-30
2-29
GROUP III REF
6-25
27
4-32-LG .75±.06
SEE NOTE 2
E6
E7
E9
E8
E10
E11
E12
E13
E15
6-36 LG .75±.06
DETAIL A
SCALE: 1/1
B
B
3
35 COND
2-27
E14
E16
E5
31 COND
4
E4
12 COND
5
STRIP .19
DO NOT TIN
GROUP I
6-LG 32.00 REF
10-LG 34.00 REF
2-13
2-15
16
2-5-LG 1.50 ±.06
GROUP III
6-LG 32.00 REF
10-LG 34.00 REF
2-33
2-34
16
2-11-LG 1.50 ±.06
GROUP II
8-LG 32.00 REF
10-LG 34.00 REF
2-12
2-14
16
2-26-LG 1.50 ±.06

NOTES:

1. FABRICATE PER ND1002032 EXCEPT USE FIND 17
2. MARK CONDUCTOR IDENTIFICATION PER ND1002019
3. AR DENOTES AS REQUIRED
4. STRIP ALL LEADS .50±.06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED
5. CUT SLEEVING & BRAID LENGTHS AS SHOWN
6. MIL-W-16878/4 E22 BLK & WHT TWISTED PAIR SHIELDED, JACKET TFE WHT
7. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006256-001
8. CRIMP PER ND1002206
9. SERIALIZE PER ND1002023
10. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
11. MIL-I-23053 CLASS I COLOR BLACK, I.D. .375 FOR FIND 26 I.D. .500 FOR FIND 5, I.D. .750 FOR FIND 11, COLOR WHITE I.D. .187 FOR FIND 32, COLOR WHITE ID .125 FOR FIND 36
12. QQ-B-575 BRAID SIZE 3/8 AWG 34
13. PINS K7, L7, M7 & N7 ARE FIND 24 ALL OTHERS ARE FIND 23 ON P2
14. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
15. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	1	1020371-19	BUSHING, SLEEVE	38
	1	1020371-16	BUSHING, SLEEVE	37
	0.4	SEE NOTE 11	SLEEVING, TUBING	36
	1	MS25036-46	TERMINAL, LUG	35
	2	1000243-40	FERRULE, ELECTRICAL COND	34
	2	1000242-36	FERRULE, ELECTRICAL COND	33
*	0.3	SEE NOTE 11	INSULATION TUBING	32
	2	1006672-002	GUIDE PIN	31
	2	1006672-006	GUIDE SOCKET	30
	4	1006672-005	NUT, STOP	29
	2	1006415 062	BAND MARKER, BLANK	28
	4	1010402-3	SLEEVE, SOLDER	27
*	0.3	SEE NOTE 11	INSULATION TUBING	26
	6	1010402-1	SLEEVE, SOLDER	25
	4	1006491-011	CONTACT, ELECTRICAL	24
	148	1006491-009	CONTACT, ELECTRICAL	23
	1	1010933-105	CLAMP, CABLE	22
	85	1010770-2	CONTACT, CRIMP TYPE	21
	1	1010929-003	CONNECTOR, PLUG	20
	1	1006672-001	CONNECTOR, PLUG	19
	AR	1006253	ADHESIVE	18
	AR	1006458-004	TAPE, LACING	17
	AR	1006699	SOLVENT	16
	2	1000243-34	FERRULE, ELECTRICAL COND	15
	2	1000243-28	FERRULE, ELECTRICAL COND	14
	2	1000242-30	FERRULE, ELECTRICAL COND	13
	2	1000242-27	FERRULE, ELECTRICAL COND	12
*	0.3	SEE NOTE 11	INSULATION TUBING	11
*	8.5	SEE NOTE 12	BRAID, WIRE	10
	1	1006415-138	BANDMARKER, BLANK	9
*	2.7	1006696-2	INSULATION SLEEVING	8
*	2.7	1006696-8	INSULATION SLEEVING	7
*	5.4	1006696-3	INSULATION SLEEVING	6
*	0.3	SEE NOTE 11	INSULATION TUBING	5
*	7.0	SEE NOTE 6	WIRE, ELECTRICAL	4
*	10.0	1014341-12	WIRE, ELECTRICAL	3
*	9.5	MIL-W-16878/4 E24	WIRE, ELECTRICAL BLACK	2
*	22.2	MIL-W-16878/4 E24	WIRE, ELECTRICAL WHITE	1
	-011	LIST OF MATERIALS		

* DENOTES LENGTH IN FEET

2014268	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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CABLE ASSEMBLY
W268

CODE IDENT NO. 49956 | SIZE J | NASA DRAWING NO. 2016408
SCALE 1/1 | WT | SHEET 1 OF 2

MASTER

REVISIONS			
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FROM				DESCRIPTION			TO		
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	A1	1	P1-2	WHT	24	1	3	P2-A3	
	A2		9					A5	
	A3		22					B1	
	A4		41					B3	
	A5		66					B5	
	A6		3					B7	
	A7		10					C1	
	A8		23					C3	
	A9		42					C6	
	A10		67					C8	
	A11		12					D2	
	A12		11					D4	
	A13		24					D6	
	A14		43					D1	
	A15		68					E2	
	A16		27					E4	
	A17		26					E7	GROUP I
	A18		25					F1	
	A19		44					F3	
	A20		69					F5	
	A21		18					F7	
	A22		47					G1	
	A23		46					G3	
	A24		45					G5	
	A25		74					G7	
	A26		70					G8	
	A27		72					H1	
	A28		7					H5	
	A29		71					H7	
	A30		1					J5	
	A31		21					J6	
	A32		39					J3	
	A33		73					P2-S8	
	A34	1	P1-8	WHT		1		P2-S6	
	A35	△1	E1	BLK	24	2	3	P2-J7	
		△1	E1	SHIELD			△1	E2	△2
	A36	1	P1-51	WHT	24	1	5	P2-X3	
	A37		78					X5	
	A38		77					W1	
	A39		76					W3	
	A40		79					W5	
	A41		49					W7	
	A42		28					V3	GROUP II
	A43		48					V6	
	A44		75					V8	
	A45		30					T8	
	A46	1	P1-13	WHT		1		U1	
	A47	△1	E4	BLK	24	2	5	P2-T7	△2
		△1	E3	SHIELD			△1	E4	△2
	A48	1	P1-6	WHT	24	1	△1	E7	
	A49	1	P1-15				△1	E7	
	A50	1	P1-16				△1	E7	
	A51	△1	E7				4	P2-N6	
	A52	1	P1-54				△1	E8	
	A53	1	P1-59				△1	E8	GROUP III
	A54	1	P1-55				△1	E8	
	A55	△1	E8				4	P2-P6	
	A56	1	P1-82				△1	E8	
	A57	1	P1-85				△1	E8	
	A58	1	P1-19	WHT	24	1	△1	E8	

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	A63	△1	E9				4	P2-R2	
	A65	1	P1-58				△1	E10	
	A66	1	P1-60				△1	E10	
	A67	△1	E10				4	P2-P3	
	A68	1	P1-61				4	P2-R6	
	A69		80					R4	
	A70		57					J1	
	A71		34					K3	
	A72		35					M1	
	A73		36					S4	
	A74		37					S3	GROUP III
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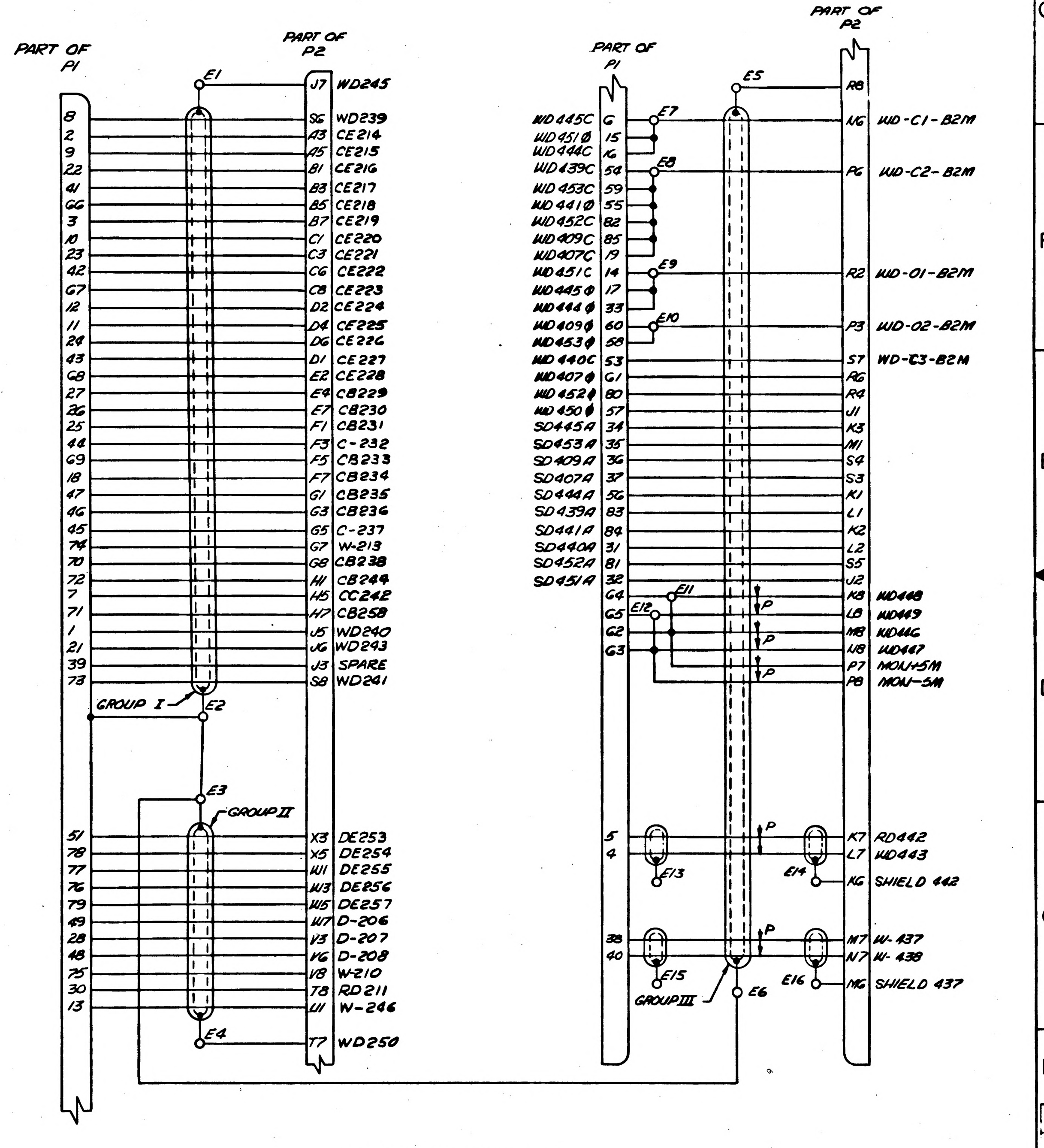
	A77		84					K2	
	A78		31					L2	
	A79		81					S5	
	A80		32				4	P2-J2	
	A81		64				△1	E11	
	A82		62	WHT		1		E11	
	A83		65	BLK		2		E12	
	A84	1	P1-63	BLK		2	△1	E12	
	A85	△1	E11	WHT		3	4	P2-K8	
			E12	BLK				P2-L8	
	A86		E11	WHT		3		P2-M8	
			E12	BLK				P2-N8	
	A87		E11	WHT		3		P2-P7	
		△1	E12	BLK	24			P2-P8	
	A88	1	P1-5	WHT	22	4		P2-K7	
		1	P1-4	BLK	22		4	P2-L7	
		△1	E13	SHIELD			△1	E14	
	A89	1	P1-38	WHT	22	4	4	P2-M7	
		1	P1-40	BLK	22		4	P2-N7	
		△1	E15	SHIELD			△1	E16	
	A90		E14	BLK	24	2	4	P2-K6	
	A91		E16	BLK	24	2	4	P2-M6	
	A92		E5	BLK	24	2	4	P2-R8	△2
		△1	E5	SHIELD			△1	E6	△2
	A93	2	P1-SHELL	BLK	24	2	△1	E2	△2
	A94	△1	E2	BLK	24	2	△1	E3	△2
	A95	△1	E3	BLK	24	2	△1	E6	△2


PART OF P1
PART OF P2
E1
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8 S6 WD239
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9 A5 CE215
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66 B5 CE218
3 B7 CE219
10 C1 CE220
23 C3 CE221
42 C6 CE222
67 C8 CE223
12 D2 CE224
11 D4 CE225
24 D6 CE226
43 D1 CE227
68 E2 CE228
27 E4 CB229
26 E7 CB230
25 F1 CB231
44 F3 C-232
69 F5 CB233
18 F7 CB234
47 G1 CB235
46 G3 CB236
45 G5 C-237
74 G7 W-213
70 G8 CB238
72 H1 CB244
7 H5 CC242
71 H7 CB258
1 J5 WD240
21 J6 WD243
39 J3 SPARE
73 S8 WD241
GROUP I
E2
E3
GROUP II
51 X3 DE253
78 X5 DE254
77 W1 DE255
76 W3 DE256
79 W5 DE257
49 W7 D-206
28 V3 D-207
48 V6 D-208
75 V8 W-210
30 T8 RD211
13 U1 W-246
E4
T7 WD250
PART OF P1
PART OF P2
E5
R8
WD445C G
WD451Ø 15
WD444C 16
WD439C 54
WD453C 59
WD441Ø 55
WD452C 82
WD409C 85
WD407C 19
WD451C 14
WD445Ø 17
WD444Ø 33
WD409Ø 60
WD453Ø 58
WD440C 53
WD407Ø 61
WD452Ø 80
WD450Ø 57
SD445A 34
SD453A 35
SD409A 36
SD407A 37
SD444A 56
SD439A 83
SD441A 84
SD440A 31
SD452A 81
SD451A 32
E7
E8
E9
E10
N6 WD-C1-B2M
P6 WD-C2-B2M
R2 WD-01-B2M
P3 WD-02-B2M
S7 WD-C3-B2M
R6
R4
J1
K3
M1
S4
S3
K1
L1
K2
L2
S5
J2
G4
G5
G2
G3
E11
E12
P
K8 WD448
L8 WD449
M8 WD446
N8 WD447
P7 MON+5M
P8 MON-5M
5
4
E13
E14
K7 RD442
L7 WD443
K6 SHIELD 442
38
40
E15
E16
GROUP III
E6
M7 W-437
N7 W-438
M6 SHIELD 437

ELECTRICAL SCHEMATIC

△1 DENOTES INTERNAL CONNECTION WITHIN CABLE ASSEMBLY

△2 SEE COND IDENT A47, A92, A93, A94, A95 AND/OR SHIELDS OF GROUPS I, II & III

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX DECIMALS .XXX ANGLES
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN Tom Allison DATE 5 APR 66
CHECKED 11 APR 66
APPROVAL 4/14/66
APPROVAL 4/14/66
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 9/13/66

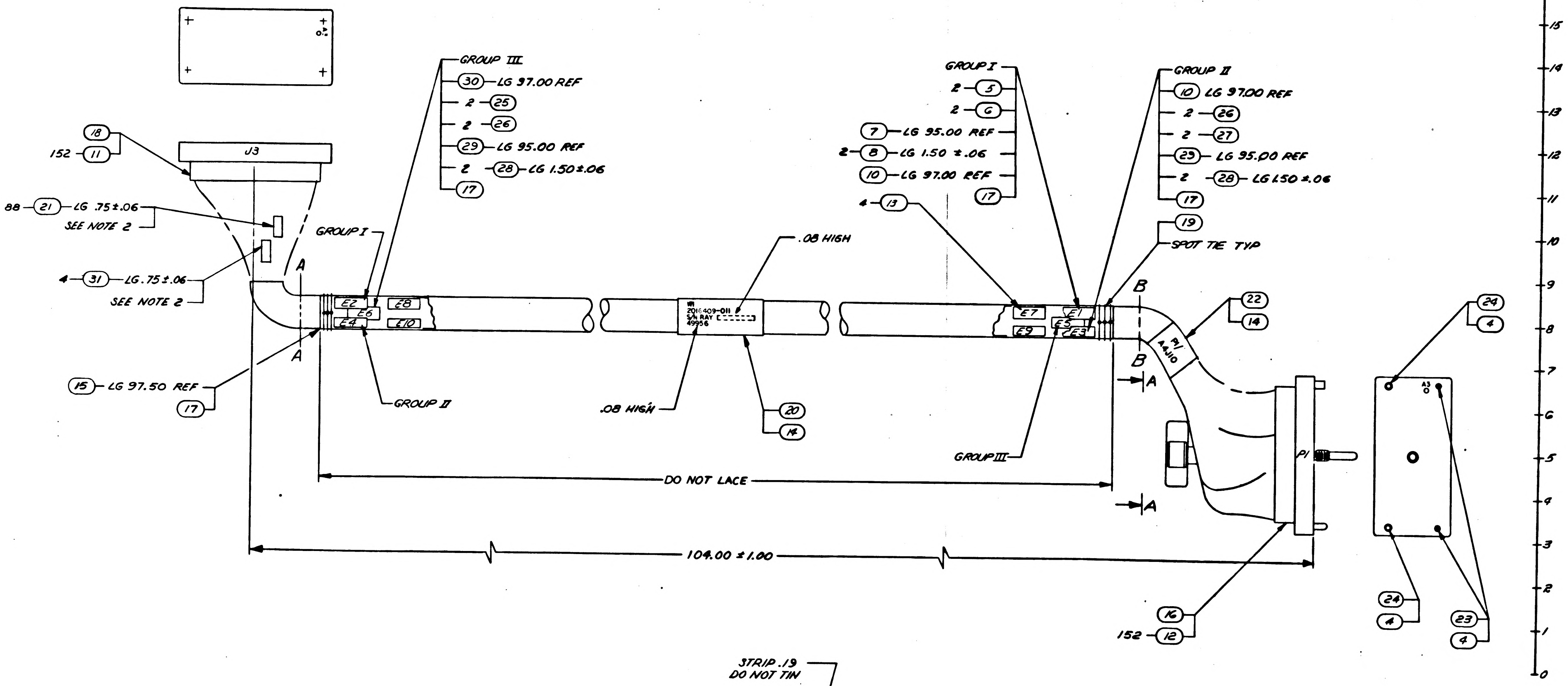
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W268

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016408
SCALE NONE
WT
SHEET 2 OF 2

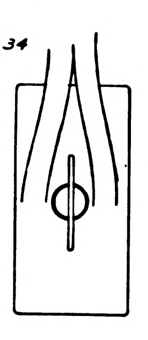
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28107		
A	CHANGED PER TDRR 28344 DR. CHK. APPR.		

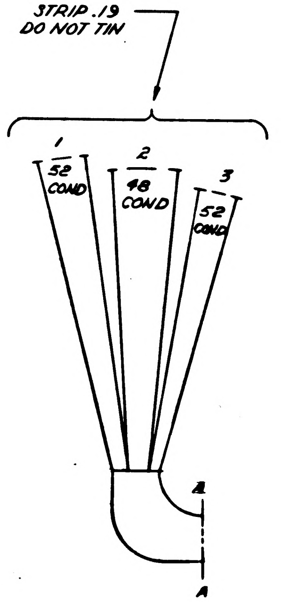
2016409 A



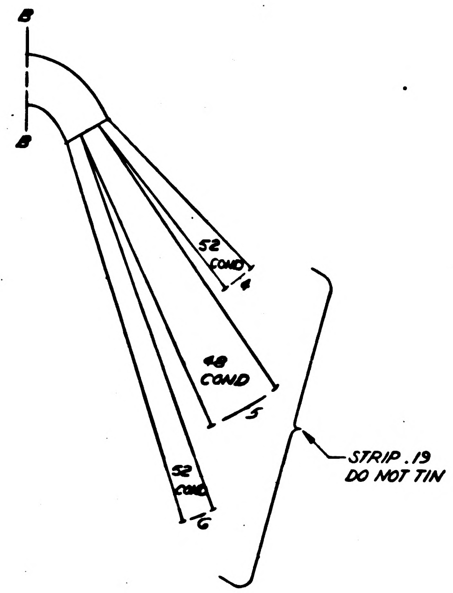
GROUP III
30 LG 97.00 REF
2 25
2 26
29 LG 95.00 REF
2 28 LG 1.50 ±.06
17
18
152 11
J3
88 21 LG .75±.06
SEE NOTE 2
GROUP I
4 31 LG .75±.06
SEE NOTE 2
A
A
15 LG 97.50 REF
17
E2 E6 E8 E4 E10
GROUP II
.08 HIGH
2016409-011
S/N RAY E
49956
.08 HIGH
20
14
GROUP I
2 5
2 6
7 LG 95.00 REF
2 8 LG 1.50 ±.06
10 LG 97.00 REF
17
4 13
GROUP II
10 LG 97.00 REF
2 26
2 27
29 LG 95.00 REF
2 28 LG 1.50 ±.06
17
19
SPOT TIE TYP
E7 E1 E9 E5 E3
B
B
GROUP III
22
14
P1
A4J10
A
A
P1
DO NOT LACE
104.00 ±1.00
152 12
16
24
4
24
4
23
4
A3

NOTES
1. FABRICATE PER ND1002032 EXCEPT USE FIND NO.19
2. MARK CONDUCTOR IDENTIFICATION PER ND1002019
3. LACE ENTIRE HARNESS CONFIGURATION UNLESS OTHERWISE SPECIFIED
4. CRIMP PER ND1002206
5. SERIALIZE PER ND1002023
6. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006256-001
7. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
8. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH SUBASSEMBLY DESIGNATION
9. MIL-I-23053 CLASS I, COLOR BLK, ID .750 FOR FIND NO. 28 ID 1.000 FOR FIND NO. 8
10. QQ-B-575 FOR FIND NO. 10 BRAIDSIZE .50 AWG 34, FOR FIND NO. 30 BRAID SIZE .375 AWG 34
11. AR DENOTES AS REQUIRED
12. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
13. MIL-I-23053 CLASS I, COLOR WHT, ID .125 FOR FIND 21, ID .187 FOR FIND 31
14. MIL-W-16878/4 E22 WHT SHLD'D JACKET TFE WHT
15. CUT SLEEVING LENGTH AS SHOWN
16. STRIP ALL LEADS .50 ±.06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED


VIEW A-A



STRIP .19
DO NOT TIN
1
52 COND
2
48 COND
3
52 COND
A
A



B
B
52 COND
4
48 COND
5
52 COND
6
STRIP .19
DO NOT TIN

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
*	.3	SEE NOTE 13	SLEEVING, INSUL SHRINK	31
*	8.3	SEE NOTE 10	SHIELD, BRAID	30
*	16.0	1006696-4	SLEEVING, INSULATION	29
*	0.5	SEE NOTE 9	SLEEVING, INSULATION	28
	2	1000243-36	FERRULE, INNER	27
	4	1000242-33	FERRULE, OUTER	26
	2	1000243-37	FERRULE, INNER	25
	2	1006672-006	GUIDE SOCKET	24
	2	1006672-002	GUIDE PIN	23
	1	1006415-065	BAND MARKER, CABLE	22
*	2.8	SEE NOTE 13	SLEEVING, INSUL. SHRINK	21
	1	1006415-141	BAND MARKER, CABLE	20
	AR	1006458-004	TAPE, LACING	19
	1	1006671-001	CONNECTOR, RECEPTACLE	18
	AR	1006699	SOLVENT	17
	1	1006672-001	CONNECTOR, PLUG	16
*	8.3	1006696-9	SLEEVING, INSULATION	15
	AR	1006253	ADHESIVE	14
	4	1010402-2	SLEEVE, SOLDER	13
	152	1006491-011	CONTACT, ELECT. MALE, CRIMP	12
	152	1006491-012	CONTACT, ELECT. FEMALE, CRIMP	11
*	16.2	SEE NOTE 10	SHIELD, BRAID	10
*	6.0	MIL-W-16878/4 E22	WIRE, ELECT BLK	9
*	0.3	SEE NOTE 9	SLEEVING, INSUL. SHRINK	8
*	8.0	1006696-5	SLEEVING, INSULATION	7
	2	1000242-38	FERRULE, OUTER	6
	2	1000243-38	FERRULE, INNER	5
	4	1006672-005	NUT, STOP	4
*	19.0	SEE NOTE 14	WIRE, ELEC. TW. PR. BLK & WHT, SHLD.	3
*	4050	1014341-11	WIRE, ELEC. TW. PR. BLK & WHT	2
*	5050	MIL-W-16878/4 E22	WIRE, ELECTRICAL, WHT	1
	-011	LIST OF MATERIALS		

* INDICATES LENGTH IN FEET

2014084	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.03 DECIMALS .XXX ± ANGLES ±
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 2 APR 66
CHECKED 11 APR 66
APPROVAL 15 APR 66
APPROVAL 4/15/66
APPROVAL
NASA APPROVAL
MIT APPROVAL 7/4/66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W1
OPERATION CONSOLE

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016409
SCALE 1/1
WT
SHEET 1 OF 3

2016409 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR		
A	CHANGED PER TDRR 28399 DR. P.B. CHK. CAP APPD.	6/3/66	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A1	3	J3-A3	WHT	22	2	4	P1-A3	
			A4	BLK				A4	
	A2		A5	WHT				A5	
			A6	BLK				A6	
	A3		B1	WHT				B1	
			B2	BLK				B2	
	A4		B3	WHT				B3	
			B4	BLK				B4	
	A5		B5	WHT				B5	
			B6	BLK				B6	
	A6		B7	WHT				B7	
			B8	BLK				B8	
	A7		C1	WHT				C1	
			C2	BLK				C2	
	A8		C3	WHT		2		C3	
			C4	BLK	22			C4	
	A9		C5	WHT	22	1		C5	
	A10		C6	WHT	22	2		C6	
			C7	BLK				C7	
	A11		C8	WHT				C8	
			D8	BLK				D8	
	A12		D2	WHT				D2	
			D3	BLK				D3	
	A13		D4	WHT				D4	
			D5	BLK				D5	
	A14		D6	WHT				D6	
			D7	BLK				D7	
	A15		D1	WHT				D1	
			E1	BLK				E1	
	A16		E2	WHT				E2	
			E3	BLK				E3	
	A17		E4	WHT		2		E4	
			E5	BLK	22			E5	
	A18		E6	WHT	22	1		E6	
GROUP I	A19		E7	WHT	22	2		E7	
			E8	BLK				E8	
	A20		F1	WHT				F1	
			F2	BLK				F2	
	A21		F3	WHT				F3	
			F4	BLK				F4	
	A22		F5	WHT				F5	
			F6	BLK				F6	
	A23		F7	WHT				F7	
			F8	BLK				F8	
	A24		G1	WHT				G1	
			G2	BLK				G2	
	A25		G3	WHT				G3	
			G4	BLK				G4	
	A26		G5	WHT		2		G5	
			G6	BLK	22			G6	
	A27		G7	WHT	22	1		G7	
	A28	3	G8	WHT	22	2	4	G8	
		2	H8	BLK			5	H8	
	A29		H1	WHT				H1	
			H2	BLK				H2	
	A30		H3	WHT				H3	
			H4	BLK				H4	
	A31		H5	WHT				H5	
			H6	BLK				H6	
	A32		H7	WHT		2		H7	
		2	J8	BLK	22		5	J8	
	A33	1	S6	WHT	22	1	6	S6	
	A34	1	S8	WHT	22	1	6	S8	
	A35	2	J3	WHT	22	2	5	J3	
			J4	BLK	22			J4	
	A36		J5	WHT	22	1		J5	
	A37	2	J3J6	WHT	22	1	5	P1-J6	
		⚠	E2	SHLD			⚠	E1	
	A38	2	J3-J7	BLK	22	9	⚠	E2	
	A39	⚠	E1	BLK	22	9	5	P1-J7	
	A40	1	J3-X3	WHT	22	2	6	P1-X3	
			X4	BLK				X4	
	A41		X5	WHT				X5	
			X6	BLK				X6	
	A42		W1	WHT				W1	
			W2	BLK				W2	
GROUP II	A43		W3	WHT				W3	
			W4	BLK				W4	
	A44		W5	WHT				W5	
			W6	BLK				W6	
	A45		W7	WHT				W7	
			W8	BLK				W8	
	A46		V3	WHT		2		V3	
			V4	BLK	22			V4	
	A47	1	J3-V5	WHT	22	1	6	P1-V5	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A48	1	J3-V6	WHT	22	2	6	P1-V6	
			V7	BLK				V7	
	A49		V8	WHT				V8	
			U8	BLK				U8	
	A50		U1	WHT				U1	
			U2	BLK	22	2		U2	
	A51		U7	WHT	22	1		U7	
	A52		T1	WHT	22	1		T1	
GROUP II	A53		T4	WHT	22	2		T4	
			T5	BLK				T5	
	A54		T6	WHT	22	1		T6	
	A55		T8					T8	
	A56		U3					U3	
	A57		U4					U4	
	A58		U5					U5	
	A59		U6					U6	
	A60		R7					R7	
	A61		V1					V1	
	A62		J3-V2	WHT	22	1	6	P1-V2	
		⚠	E4	SHLD			⚠	E3	
	A63	1	J3-T7	BLK	22	9	⚠	E4	
	A64	⚠	E3	BLK	22	9	6	P1-T7	
	A65	2	J3-K7	WHT	22	3	5	P1-K7	
		2	J3-L7	BLK	22		5	P1-L7	
		⚠	E8	SHLD			⚠	E7	
	A66	2	J3-K6	BLK	22	9	⚠	E8	
	A67	⚠	E7	BLK	22	9	5	P1-K6	
	A68	2	J3-M7	WHT	22	3	5	P1-M7	
		2	J3-N7	BLK	22		5	P1-N7	
		⚠	E10	SHLD			⚠	E9	
	A69	2	J3-M6	BLK	22	9	⚠	E10	
	A70	⚠	E9	BLK	22	9	5	P1-M6	
	A71	2	J3-P1	WHT	22	1	5	P1-P1	
	A72		P2					P2	
	A73		P3					P3	
	A74		P4					P4	
	A75		P5					P5	
	A76		P6	WHT	22	1		P6	
	A77		P7	WHT	22	2		P7	
		2	P8	BLK			5	P8	
	A78	1	S1	WHT	22	1	6	S1	
	A79		S2					S2	
	A80		S3					S3	
	A81		S4					S4	
	A82		S5					S5	
	A83	1	S7				6	S7	
	A84	2	J1				5	J1	
	A85		J2					J2	
	A86		K1					K1	
	A87		K2					K2	
	A88		K3	WHT	22	1		K3	
GROUP III	A89		K8	WHT	22	2		K8	
			L8	BLK				L8	
	A90		L1	WHT	22	1		L1	
	A91		L2					L2	
	A92		M1					M1	
	A93		M2					M2	
	A94		M3	WHT	22	1		M3	
	A95		M8	WHT	22	2		M8	
			N8	BLK				N8	
	A96		N1	WHT	22	1		N1	
	A97		N2					N2	
	A98		N3					N3	
	A99		N4					N4	
	A100		N5					N5	
	A101	2	N6				5	N6	
	A102	1	R1				6	R1	
	A103		R2					R2	
	A104		R3					R3	
	A105		R4					R4	
	A106		R5					R5	
	A107		R6					R6	
	A109		T2					T2	
	A110	1	J3-T3	WHT	22	1	6	P1-T3	
		⚠	E6	SHLD			⚠	E5	
	A111	1	J3-R8	BLK	22	9	⚠	E6	
	A112	⚠	E5	BLK	22	9	6	P1-R8	

⚠ DENOTES INTERNAL CONNECTION

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING

MATERIAL

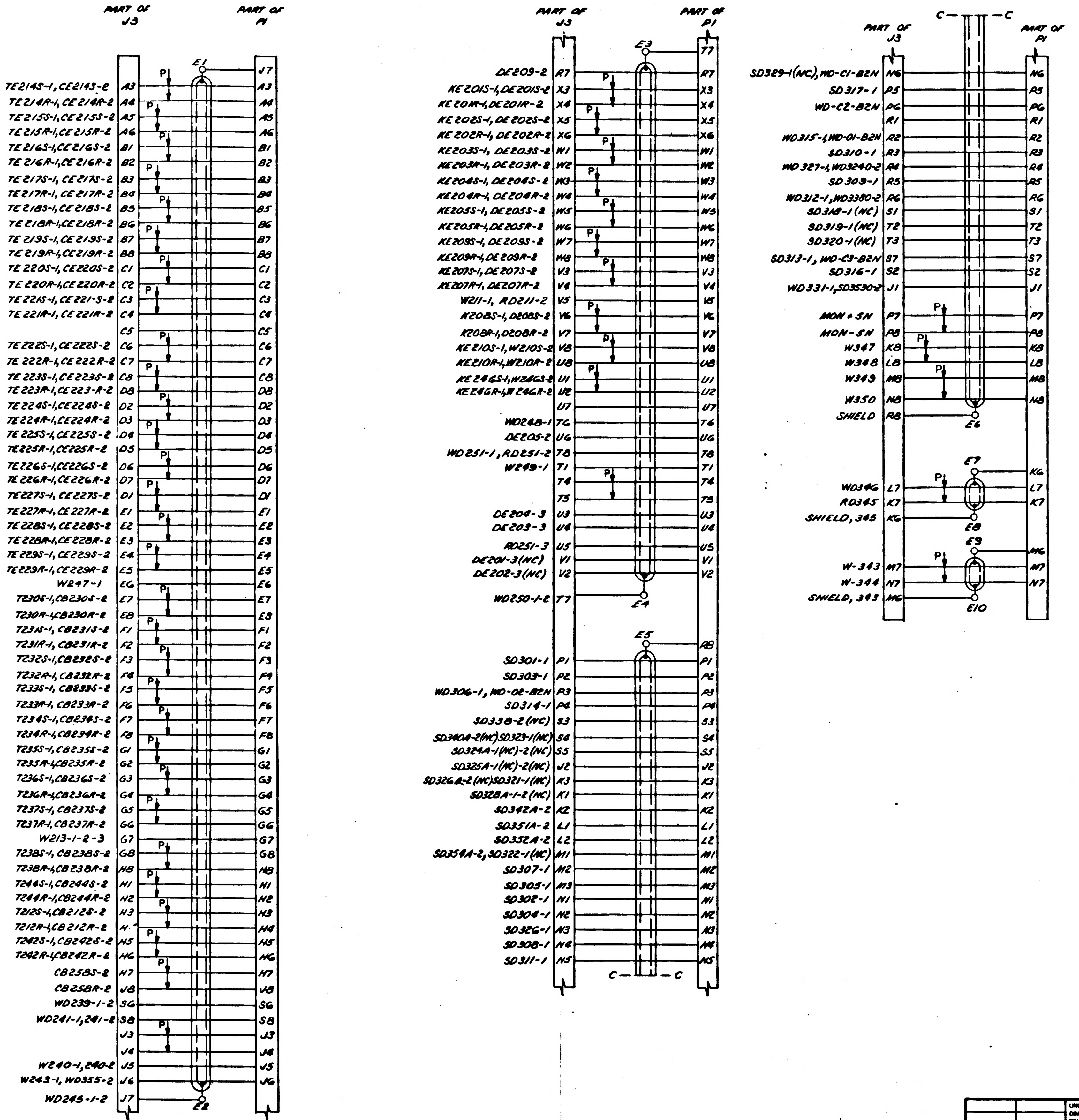
RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 2 APR 66
CHECKED 9 APR 66
APPROVAL P. Fran 15 APR 66
APPROVAL 4/15/66
APPROVAL
NASA APPROVAL
MIT APPROVAL 4/15/66
MIT APPROVAL 4/25/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W1
OPERATION CONSOLE

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016409
SCALE NONE
WT
SHEET 2 OF 3

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR		
A	CHANGED PER TDRR 28399 DR. CHK APPD	5/13/66	


PART OF J3
PART OF P1
E1
J7
TE214S-1, CE214S-2 A3
TE214R-1, CE214R-2 A4
TE215S-1, CE215S-2 A5
TE215R-1, CE215R-2 A6
TE216S-1, CE216S-2 B1
TE216R-1, CE216R-2 B2
TE217S-1, CE217S-2 B3
TE217R-1, CE217R-2 B4
TE218S-1, CE218S-2 B5
TE218R-1, CE218R-2 B6
TE219S-1, CE219S-2 B7
TE219R-1, CE219R-2 B8
TE220S-1, CE220S-2 C1
TE220R-1, CE220R-2 C2
TE221S-1, CE221-S-2 C3
TE221R-1, CE221R-2 C4
C5
TE222S-1, CE222S-2 C6
TE222R-1, CE222R-2 C7
TE223S-1, CE223S-2 C8
TE223R-1, CE223-R-2 D8
TE224S-1, CE224S-2 D2
TE224R-1, CE224R-2 D3
TE225S-1, CE225S-2 D4
TE225R-1, CE225R-2 D5
TE226S-1, CE226S-2 D6
TE226R-1, CE226R-2 D7
TE227S-1, CE227S-2 D1
TE227R-1, CE227R-2 E1
TE228S-1, CE228S-2 E2
TE228R-1, CE228R-2 E3
TE229S-1, CE229S-2 E4
TE229R-1, CE229R-2 E5
W247-1 E6
T230S-1, CB230S-2 E7
T230R-1, CB230R-2 E8
T231S-1, CB231S-2 F1
T231R-1, CB231R-2 F2
T232S-1, CB232S-2 F3
T232R-1, CB232R-2 F4
T233S-1, CB233S-2 F5
T233R-1, CB233R-2 F6
T234S-1, CB234S-2 F7
T234R-1, CB234R-2 F8
T235S-1, CB235S-2 G1
T235R-1, CB235R-2 G2
T236S-1, CB236S-2 G3
T236R-1, CB236R-2 G4
T237S-1, CB237S-2 G5
T237R-1, CB237R-2 G6
W213-1-2-3 G7
T238S-1, CB238S-2 G8
T238R-1, CB238R-2 H8
T244S-1, CB244S-2 H1
T244R-1, CB244R-2 H2
T212S-1, CB212S-2 H3
T212R-1, CB212R-2 H4
T242S-1, CB242S-2 H5
T242R-1, CB242R-2 H6
CB258S-2 H7
CB258R-2 J8
WD239-1-2 S6
WD241-1, 241-2 S8
J3
J4
W240-1, 240-2 J5
W243-1, WD355-2 J6
WD245-1-2 J7
E2
P
PART OF J3
PART OF P1
E3
T7
DE209-2 R7
KE201S-1, DE201S-2 X3
KE201R-1, DE201R-2 X4
KE202S-1, DE202S-2 X5
KE202R-1, DE202R-2 X6
KE203S-1, DE203S-2 W1
KE203R-1, DE203R-2 W2
KE204S-1, DE204S-2 W3
KE204R-1, DE204R-2 W4
KE205S-1, DE205S-2 W5
KE205R-1, DE205R-2 W6
KE209S-1, DE209S-2 W7
KE209R-1, DE209R-2 W8
KE207S-1, DE207S-2 V3
KE207R-1, DE207R-2 V4
W211-1, RD211-2 V5
K208S-1, D208S-2 V6
K208R-1, D208R-2 V7
KE210S-1, W210S-2 V8
KE210R-1, W210R-2 U8
KE246S-1, W246S-2 U1
KE246R-1, W246R-2 U2
U7
WD248-1 T6
DE205-2 U6
WD251-1, RD251-2 T8
W249-1 T1
T4
T5
DE204-3 U3
DE203-3 U4
RD251-3 U5
DE201-3(NC) V1
DE202-3(NC) V2
WD250-1-2 T7
E4
E5
R8
SD301-1 P1
SD303-1 P2
WD306-1, WD-02-B2N P3
SD314-1 P4
SD338-2(NC) S3
SD340A-2(NC)SD323-1(NC) S4
SD324A-1(NC)-2(NC) S5
SD325A-1(NC)-2(NC) J2
SD326A-2(NC)SD321-1(NC) K3
SD328A-1-2(NC) K1
SD342A-2 K2
SD351A-2 L1
SD352A-2 L2
SD354A-2, SD322-1(NC) M1
SD307-1 M2
SD305-1 M3
SD302-1 N1
SD304-1 N2
SD326-1 N3
SD308-1 N4
SD311-1 N5
C — C
C — C
PART OF J3
PART OF P1
SD329-1(NC), WD-C1-B2N N6
SD317-1 P5
WD-C2-B2N P6
R1
WD315-1, WD-01-B2N R2
SD310-1 R3
WD327-1, WD3240-2 R4
SD309-1 R5
WD312-1, WD3380-2 R6
SD318-1(NC) S1
SD319-1(NC) T2
SD320-1(NC) T3
SD313-1, WD-C3-B2N S7
SD316-1 S2
WD331-1, SD3530-2 J1
MON + SN P7
MON - SN P8
W347 K8
W348 L8
W349 M8
W350 N8
SHIELD R8
E6
E7
K6
WD346 L7
RD345 K7
SHIELD, 345 K6
E8
E9
M6
W-343 M7
W-344 N7
SHIELD, 343 M6
E10

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES
.XX .XXX
± ±

DO NOT SCALE DRAWING

MATERIAL

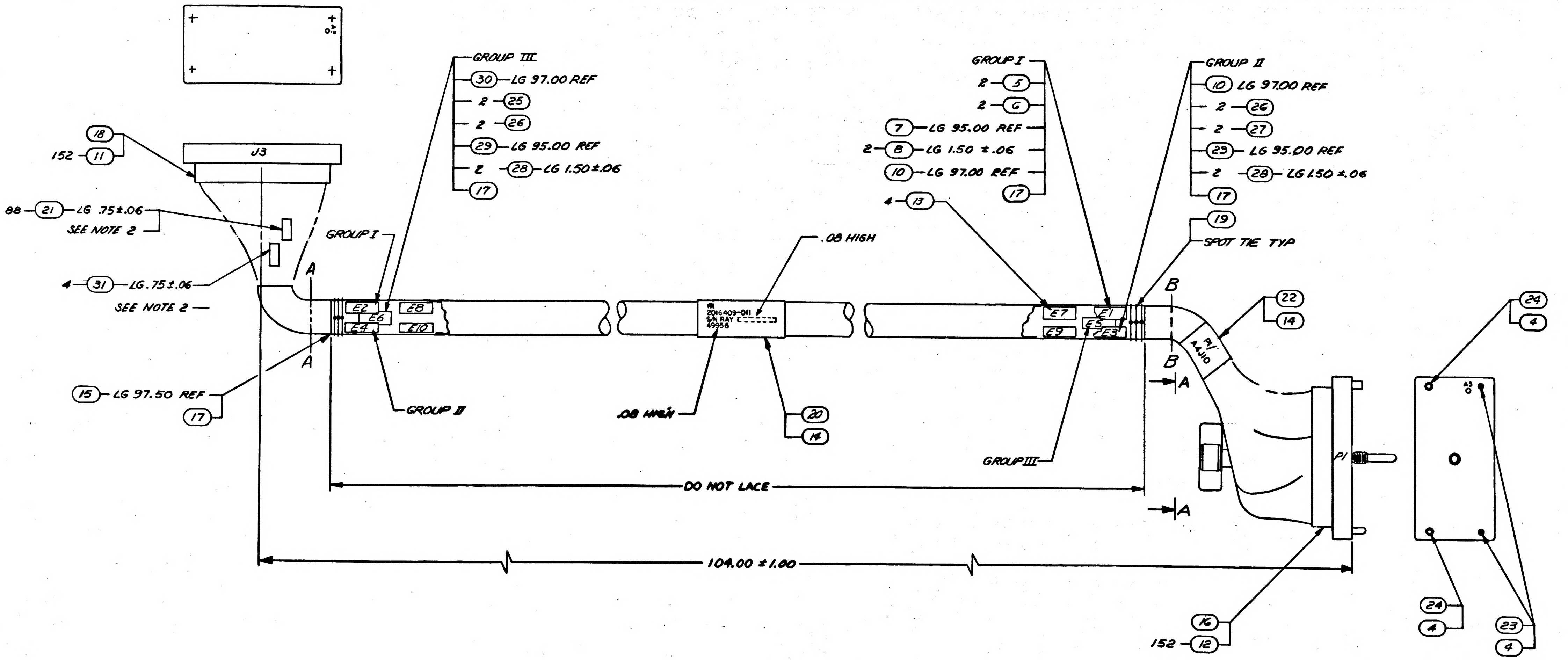
RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 2 APR 66
CHECKED 2 APR 66
APPROVAL 15 APR 66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

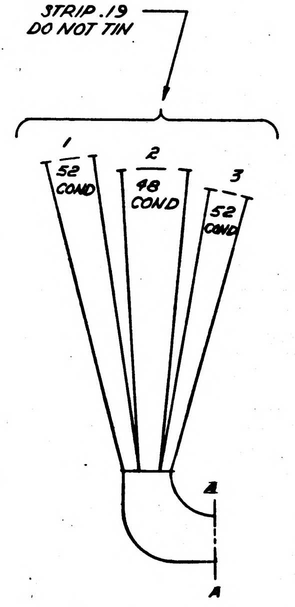
CABLF ASSEMBLY
W1
OPERATION CONSOLE

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016409
SCALE NONE
WT
SHEET 3 OF 3

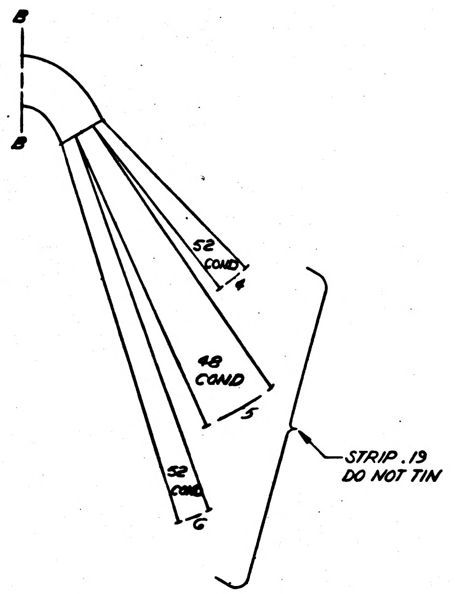
SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
-	CLASS A RELEASED PER TDRR 28107		



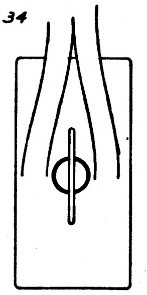
J3
152 - 11
18
88 - 21 - LG .75±.06
SEE NOTE 2
4 - 31 - LG .75±.06
SEE NOTE 2
15 - LG 97.50 REF
17
A
A
GROUP I
GROUP II
GROUP III
30 - LG 97.00 REF
2 - 25
2 - 26
29 - LG 95.00 REF
2 - 28 - LG 1.50±.06
17
E2
E4
E6
E8
E10
.08 HIGH
.08 HIGH
W1
2016409-011
S/N RAY
49956
20
14
GROUP I
2 - 5
2 - 6
7 - LG 95.00 REF
2 - 8 - LG 1.50 ±.06
10 - LG 97.00 REF
17
4 - 13
GROUP II
10 LG 97.00 REF
2 - 26
2 - 27
29 - LG 95.00 REF
2 - 28 - LG 1.50±.06
17
19
SPOT TIE TYP
GROUP III
E7
E9
E1
E5
E3
B
B
P1/A4J10
22
14
A
A
P1
24
4
A3
24
4
23
4
16
152 - 12
DO NOT LACE
104.00 ±1.00



STRIP .19
DO NOT TIN
1
52 COND
2
48 COND
3
52 COND
A
A



B
B
52 COND
4
48 COND
5
52 COND
6
STRIP .19
DO NOT TIN



VIEW A-A

NOTES
1. FABRICATE PER ND1002032 EXCEPT USE FIND NO.19
2. MARK CONDUCTOR IDENTIFICATION PER ND1002019
3. LACE ENTIRE HARNESS CONFIGURATION UNLESS OTHERWISE SPECIFIED
4. CRIMP PER ND1002206
5. SERIALIZE PER ND1002023
6. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLACK INK 1006256-001
7. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
8. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH SUBASSEMBLY DESIGNATION
9. MIL-I-23053 CLASS I, COLOR BLK, ID .750 FOR FIND NO. 28 ID 1.000 FOR FIND NO. 8
10. QQ-B-575 FOR FIND NO. 10 BRAIDSIZE .50 AWG 34, FOR FIND NO. 30 BRAID SIZE .375 AWG 34
11. AR DENOTES AS REQUIRED
12. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
13. MIL-I-23053 CLASS I, COLOR WHT, ID .125 FOR FIND 21, ID .187 FOR FIND 31
14. MIL-W-16878/4 E22 WHT SHLD'D JACKET TFE WHT
15. CUT SLEEVING LENGTH AS SHOWN
16. STRIP ALL LEADS .50±.06 & TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
*	.3	SEE NOTE 12	SLEEVING, INSUL SHRINK	31
*	8.3	SEE NOTE 9	SHIELD, BRAID	30
*	16.0	1006696-4	SLEEVING, INSULATION	29
*	0.5	SEE NOTE 8	SLEEVING, INSULATION	28
	2	1000243-36	FERRULE, INNER	27
	4	1000242-33	FERRULE, OUTER	26
	2	1000243-37	FERRULE, INNER	25
	2	1006672-006	GUIDE SOCKET	24
	2	1006672-002	GUIDE PIN	23
	1	1006415-065	BAND MARKER, CABLE	22
*	2.8	SEE NOTE 12	SLEEVING, INSUL. SHRINK	21
	1	1006415-141	BAND MARKER, CABLE	20
	AR	1006458-004	TAPE, LACING	19
	1	1006671-001	CONNECTOR, RECEPTACLE	18
	AR	1006699	SOLVENT	17
	1	1006672-001	CONNECTOR, PLUG	16
*	8.3	1006696-9	SLEEVING, INSULATION	15
	AR	1006253	ADHESIVE	14
	4	1010402-2	SLEEVE, SOLDER	13
	152	1006491-011	CONTACT, ELECT. MALE, CRIMP	12
	152	1006491-012	CONTACT, ELECT. FEMALE, CRIMP	11
*	16.2	SEE NOTE 9	SHIELD, BRAID	10
*	6.0	MIL-W-16878/4 E22	WIRE, ELECT BLK	9
*	0.3	SEE NOTE 8	SLEEVING, INSUL. SHRINK	8
*	8.0	1006696-5	SLEEVING, INSULATION	7
	2	1000242-38	FERRULE, OUTER	6
	2	1000243-38	FERRULE, INNER	5
	4	1006672-005	NUT, STOP	4
*	19.0	SEE NOTE 13	WIRE, ELEC. TW. PR. BLK & WHT SHLD.	3
*	405.0	1014341-11	WIRE, ELEC. TW. PR. BLK & WHT	2
*	505.0	MIL-W-16878/4 E22	WIRE, ELECTRICAL, WHT	1
	-011	LIST OF MATERIALS		

* INDICATES LENGTH IN FEET

2014024	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.03 DECIMALS .XXX ± ANGLES ±
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 2 APR 66
CHECKED 11 APR 66
APPROVAL 15 APR 66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 7-15-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W1
OPERATION CONSOLE

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016409
SCALE 1/1
WT
SHEET 1 OF 3

MASTER

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR		

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
GROUP I	A1	3	J3-A3	WHT	22	2	4	P1-A3	
			A4	BLK				A4	
	A2		A5	WHT				A5	
			A6	BLK				A6	
	A3		B1	WHT				B1	
			B2	BLK				B2	
	A4		B3	WHT				B3	
			B4	BLK				B4	
	A5		B5	WHT				B5	
			B6	BLK				B6	
	A6		B7	WHT				B7	
			B8	BLK				B8	
	A7		C1	WHT				C1	
			C2	BLK				C2	
	A8		C3	WHT		2		C3	
			C4	BLK	22			C4	
	A9		C5	WHT	22	1		C5	
	A10		C6	WHT	22	2		C6	
			C7	BLK				C7	
	A11		C8	WHT				C8	
			D8	BLK				D8	
	A12		D2	WHT				D2	
			D3	BLK				D3	
	A13		D4	WHT				D4	
			D5	BLK				D5	
	A14		D6	WHT				D6	
			D7	BLK				D7	
	A15		D1	WHT				D1	
			E1	BLK				E1	
	A16		E2	WHT				E2	
			E3	BLK				E3	
	A17		E4	WHT		2		E4	
			E5	BLK	22			E5	
	A18		E6	WHT	22	1		E6	
	A19		E7	WHT	22	2		E7	
			E8	BLK				E8	
	A20		F1	WHT				F1	
			F2	BLK				F2	
	A21		F3	WHT				F3	
			F4	BLK				F4	
	A22		F5	WHT				F5	
			F6	BLK				F6	
	A23		F7	WHT				F7	
			F8	BLK				F8	
	A24		G1	WHT				G1	
			G2	BLK				G2	
	A25		G3	WHT				G3	
			G4	BLK				G4	
	A26		G5	WHT		2		G5	
			G6	BLK	22			G6	
	A27		G7	WHT	22	1		G7	
	A28	3	G8	WHT	22	2	4	G8	
		2	H8	BLK			5	H8	
	A29		H1	WHT				H1	
			H2	BLK				H2	
	A30		H3	WHT				H3	
			H4	BLK				H4	
	A31		H5	WHT				H5	
			H6	BLK				H6	
	A32		H7	WHT		2		H7	
		2	J8	BLK	22		5	J8	
	A33	1	S6	WHT	22	1	6	S6	
	A34	1	S8	WHT	22	1	6	S8	
	A35	2	J3	WHT	22	2	5	J3	
			J4	BLK	22			J4	
	A36		J5	WHT	22	1		J5	
	A37	2	J3J6	WHT	22	1	5	P1-J6	
		△	E2	SHLD			△	E1	
	A38	2	J3-J7	BLK	22	9	△	E2	
	A39	△	E1	BLK	22	9	5	P1-J7	
GROUP II	A40	1	J3-X3	WHT	22	2	6	P1-X3	
			X4	BLK				X4	
	A41		X5	WHT				X5	
			X6	BLK				X6	
	A42		W1	WHT				W1	
			W2	BLK				W2	
	A43		W3	WHT				W3	
			W4	BLK				W4	
	A44		W5	WHT				W5	
			W6	BLK				W6	
	A45		W7	WHT				W7	
			W8	BLK				W8	
	A46		V3	WHT		2		V3	
			V4	BLK	22			V4	
	A47	1	J3-V5	WHT	22	1	6	P1-V5	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
GROUP II	A48	1	J3-V6	WHT	22	2	6	P1-V6	
			V7	BLK				V7	
	A49		V8	WHT				V8	
			U8	BLK				U8	
	A50		U1	WHT				U1	
			U2	BLK	22	2		U2	
	A51		U7	WHT	22	1		U7	
	A52		T1	WHT	22	1		T1	
	A53		T4	WHT	22	2		T4	
			T5	BLK				T5	
	A54		T6	WHT	22	1		T6	
	A55		T8					T8	
	A56		U3					U3	
	A57		U4					U4	
	A58		U5					U5	
	A59		U6					U6	
	A60		R7					R7	
	A61		V1					V1	
	A62		J3-V2	WHT	22	1	6	P1-V2	
		△	E4	SHLD			△	E3	
	A63	1	J3-T7	BLK	22	9	△	E4	
	A64	△	E3	BLK	22	9	6	P1-T7	
	A65	2	J3-K7	WHT	22	3	5	P1-K7	
		2	J3-L7	BLK	22		5	P1-L7	
		△	E8	SHLD			△	E7	
	A66	2	J3-K6	BLK	22	9	△	E8	
	A67	△	E7	BLK	22	9	5	P1-K6	
	A68	2	J3-M7	WHT	22	3	5	P1-M7	
		2	J3-N7	BLK	22		5	P1-N7	
		△	E10	SHLD			△	E9	
	A69	2	J3-M6	BLK	22	9	△	E10	
	A70	△	E9	BLK	22	9	5	P1-M6	
GROUP III	A71	2	J3-P1	WHT	22	1	5	P1-P1	
	A72		P2					P2	
	A73		P3					P3	
	A74		P4					P4	
	A75		P5					P5	
	A76		P6	WHT	22	1		P6	
	A77		P7	WHT	22	2		P7	
		2	P8	BLK			5	P8	
	A78	1	S1	WHT	22	1	6	S1	
	A79		S2					S2	
	A80		S3					S3	
	A81		S4					S4	
	A82		S5					S5	
	A83	1	S7				6	S7	
	A84	2	J1				5	J1	
	A85		J2					J2	
	A86		K1					K1	
	A87		K2					K2	
	A88		K3	WHT	22	1		K3	
	A89		K8	WHT	22	2		K8	
			L8	BLK				L8	
	A90		L1	WHT	22	1		L1	
	A91		L2					L2	
	A92		M1					M1	
	A93		M2					M2	
	A94		M3	WHT	22	1		M3	
	A95		M8	WHT	22	2		M8	
			N8	BLK				N8	
	A96		N1	WHT	22	1		N1	
	A97		N2					N2	
	A98		N3					N3	
	A99		N4					N4	
	A100		N5					N5	
	A101	2	N6				5	N6	
	A102	1	R1				6	R1	
	A103		R2					R2	
	A104		R3					R3	
	A105		R4					R4	
	A106		R5					R5	
	A107		R6					R6	
	A109		T2					T2	
	A110	1	J3-T3	WHT	22	1	6	P1-T3	
		△	E6	SHLD			△	E5	
	A111	1	J3-R8	BLK	22	9	△	E6	
	A112	△	E5	BLK	22	9	6	P1-R8	

△ DENOTES INTERNAL CONNECTION

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 2 APR 66
CHECKED 9 APR 66
APPROVAL P. Mazz 15 APR 66
APPROVAL D. D 4/15/66
APPROVAL
NASA APPROVAL
MIT APPROVAL 4/15/66
MIT APPROVAL 4/15/66

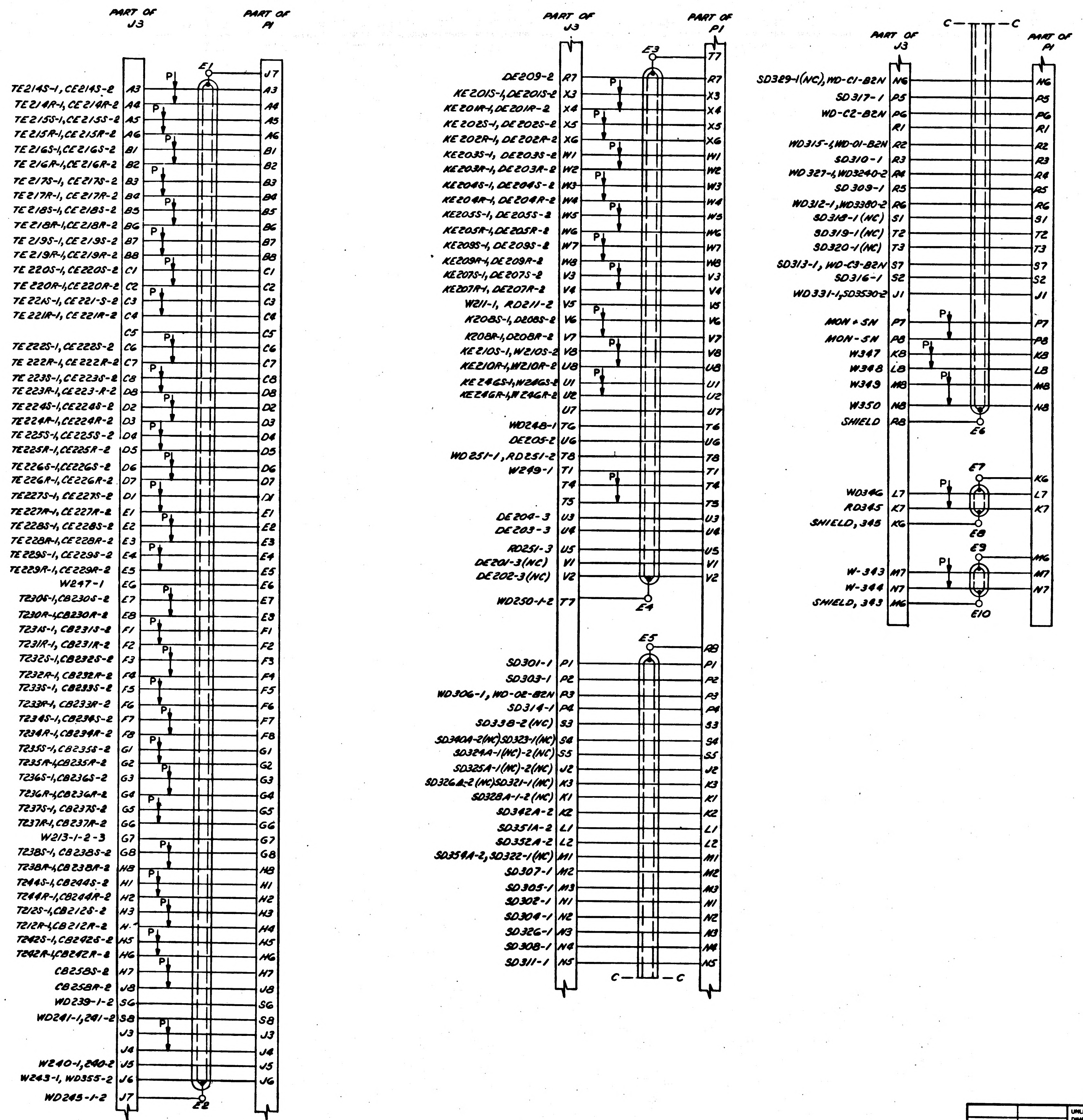
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CABLE ASSEMBLY
W1
OPERATION CONSOLE

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016409
SCALE NONE
WT
SHEET 2 OF 3

2016409 -

SYM	DESCRIPTION	DATE	APPR
-	CLASS A RELEASED PER TDRR		



PART OF J3
PART OF P1
E1
J7
TE214S-1, CE214S-2 A3 A3
TE214R-1, CE214R-2 A4 A4
TE215S-1, CE215S-2 A5 A5
TE215R-1, CE215R-2 A6 A6
TE216S-1, CE216S-2 B1 B1
TE216R-1, CE216R-2 B2 B2
TE217S-1, CE217S-2 B3 B3
TE217R-1, CE217R-2 B4 B4
TE218S-1, CE218S-2 B5 B5
TE218R-1, CE218R-2 B6 B6
TE219S-1, CE219S-2 B7 B7
TE219R-1, CE219R-2 B8 B8
TE220S-1, CE220S-2 C1 C1
TE220R-1, CE220R-2 C2 C2
TE221S-1, CE221-S-2 C3 C3
TE221R-1, CE221R-2 C4 C4
C5 C5
TE222S-1, CE222S-2 C6 C6
TE222R-1, CE222R-2 C7 C7
TE223S-1, CE223S-2 C8 C8
TE223R-1, CE223-R-2 D8 D8
TE224S-1, CE224S-2 D2 D2
TE224R-1, CE224R-2 D3 D3
TE225S-1, CE225S-2 D4 D4
TE225R-1, CE225R-2 D5 D5
TE226S-1, CE226S-2 D6 D6
TE226R-1, CE226R-2 D7 D7
TE227S-1, CE227S-2 D1 D1
TE227R-1, CE227R-2 E1 E1
TE228S-1, CE228S-2 E2 E2
TE228R-1, CE228R-2 E3 E3
TE229S-1, CE229S-2 E4 E4
TE229R-1, CE229R-2 E5 E5
W247-1 E6 E6
T230S-1, CB230S-2 E7 E7
T230R-1, CB230R-2 E8 E8
T231S-1, CB231S-2 F1 F1
T231R-1, CB231R-2 F2 F2
T232S-1, CB232S-2 F3 F3
T232R-1, CB232R-2 F4 F4
T233S-1, CB233S-2 F5 F5
T233R-1, CB233R-2 F6 F6
T234S-1, CB234S-2 F7 F7
T234R-1, CB234R-2 F8 F8
T235S-1, CB235S-2 G1 G1
T235R-1, CB235R-2 G2 G2
T236S-1, CB236S-2 G3 G3
T236R-1, CB236R-2 G4 G4
T237S-1, CB237S-2 G5 G5
T237R-1, CB237R-2 G6 G6
W213-1-2-3 G7 G7
T238S-1, CB238S-2 G8 G8
T238R-1, CB238R-2 H8 H8
T244S-1, CB244S-2 H1 H1
T244R-1, CB244R-2 H2 H2
T212S-1, CB212S-2 H3 H3
T212R-1, CB212R-2 H4 H4
T242S-1, CB242S-2 H5 H5
T242R-1, CB242R-2 H6 H6
CB258S-2 H7 H7
CB258R-2 J8 J8
WD239-1-2 S6 S6
WD241-1, 241-2 S8 S8
J3 J3
J4 J4
W240-1, 240-2 J5 J5
W243-1, WD355-2 J6 J6
WD245-1-2 J7
E2
P
PART OF J3
PART OF P1
E3
T7
DE209-2 R7 R7
KE201S-1, DE201S-2 X3 X3
KE201R-1, DE201R-2 X4 X4
KE202S-1, DE202S-2 X5 X5
KE202R-1, DE202R-2 X6 X6
KE203S-1, DE203S-2 W1 W1
KE203R-1, DE203R-2 W2 W2
KE204S-1, DE204S-2 W3 W3
KE204R-1, DE204R-2 W4 W4
KE205S-1, DE205S-2 W5 W5
KE205R-1, DE205R-2 W6 W6
KE209S-1, DE209S-2 W7 W7
KE209R-1, DE209R-2 W8 W8
KE207S-1, DE207S-2 V3 V3
KE207R-1, DE207R-2 V4 V4
W211-1, RD211-2 V5 V5
K208S-1, D208S-2 V6 V6
K208R-1, D208R-2 V7 V7
KE210S-1, W210S-2 V8 V8
KE210R-1, W210R-2 U8 U8
KE246S-1, W246S-2 U1 U1
KE246R-1, W246R-2 U2 U2
U7 U7
WD248-1 T6 T6
DE205-2 U6 U6
WD251-1, RD251-2 T8 T8
W249-1 T1 T1
T4 T4
T5 T5
DE204-3 U3 U3
DE203-3 U4 U4
RD251-3 U5 U5
DE201-3(NC) V1 V1
DE202-3(NC) V2 V2
WD250-1-2 T7
E4
E5
R8
SD301-1 P1 P1
SD303-1 P2 P2
WD306-1, WD-02-B2N P3 P3
SD314-1 P4 P4
SD338-2(NC) S3 S3
SD340A-2(NC)SD323-1(NC) S4 S4
SD324A-1(NC)-2(NC) S5 S5
SD325A-1(NC)-2(NC) J2 J2
SD326A-2(NC)SD321-1(NC) K3 K3
SD328A-1-2(NC) K1 K1
SD342A-2 K2 K2
SD351A-2 L1 L1
SD352A-2 L2 L2
SD354A-2, SD322-1(NC) M1 M1
SD307-1 M2 M2
SD305-1 M3 M3
SD302-1 N1 N1
SD304-1 N2 N2
SD326-1 N3 N3
SD308-1 N4 N4
SD311-1 N5 N5
C — — C
C — — C
PART OF J3
PART OF P1
SD329-1(NC), WD-C1-B2N N6 N6
SD317-1 P5 P5
WD-C2-B2N P6 P6
R1 R1
WD315-1, WD-01-B2N R2 R2
SD310-1 R3 R3
WD327-1, WD3240-2 R4 R4
SD309-1 R5 R5
WD312-1, WD3380-2 R6 R6
SD318-1(NC) S1 S1
SD319-1(NC) T2 T2
SD320-1(NC) T3 T3
SD313-1, WD-C3-B2N S7 S7
SD316-1 S2 S2
WD331-1, SD3530-2 J1 J1
MON + SN P7 P7
MON - SN P8 P8
W347 K8 K8
W348 L8 L8
W349 M8 M8
W350 N8 N8
SHIELD R8
E6
E7
K6
WD346 L7 L7
RD345 K7 K7
SHIELD, 345 K6
E8
E9
M6
W-343 M7 M7
W-344 N7 N7
SHIELD, 343 M6
E10

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	F. NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX DECIMALS .XXX ANGLES
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 2 APR 66
CHECKED 3 APR 66
APPROVAL 15 APR 66
APPROVAL 4/13/66
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

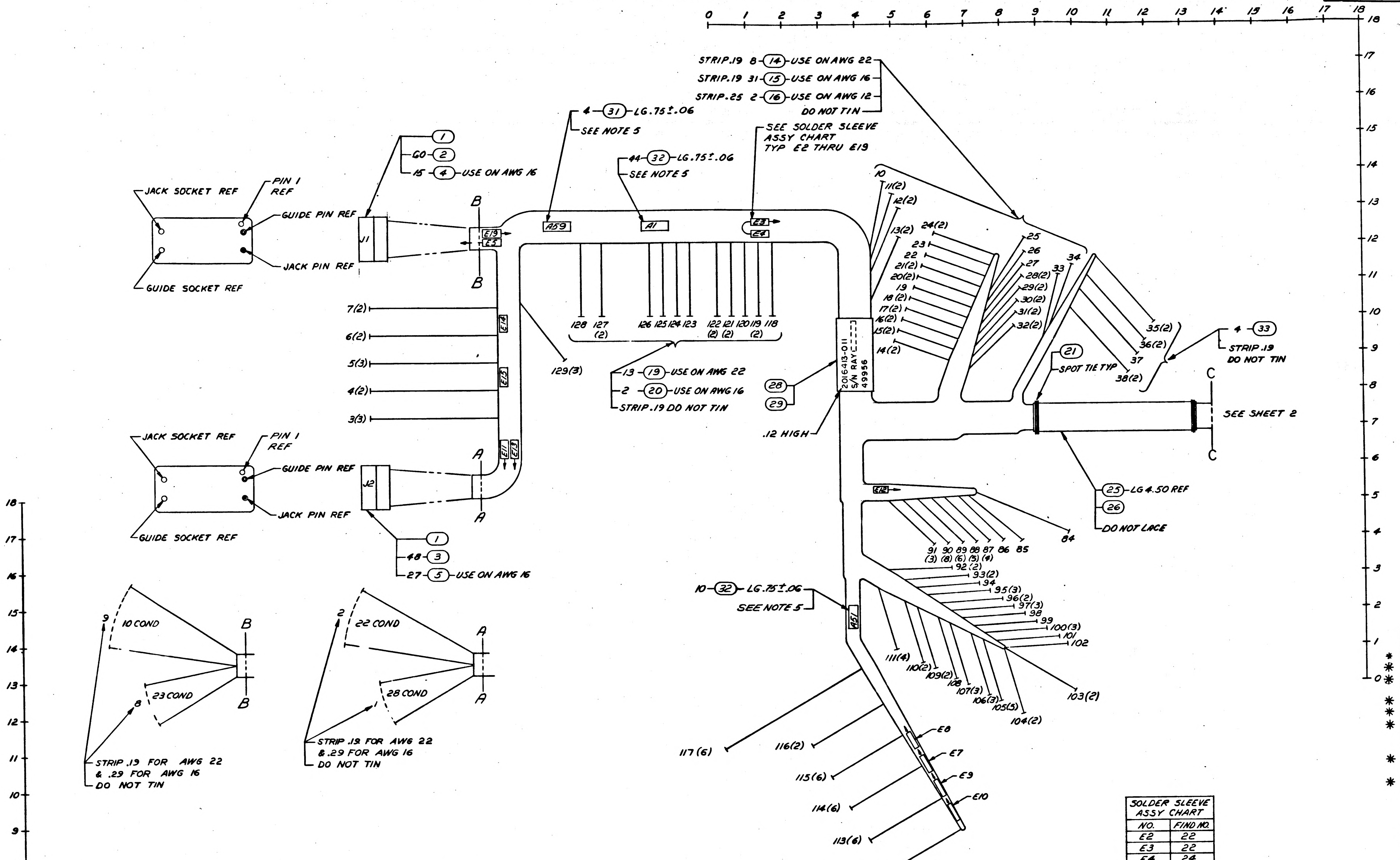
CABLE ASSEMBLY
W1
OPERATION CONSOLE

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016409
SCALE NONE
WT
SHEET 3 OF 3

MASTER

2016409 -

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR [illegible]		


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
JACK SOCKET REF
PIN 1 REF
GUIDE PIN REF
JACK PIN REF
GUIDE SOCKET REF
J1
J2
1
60-2
15-4-USE ON AWG 16
4-31-LG.75±.06
SEE NOTE 5
44-32-LG.75±.06
SEE NOTE 5
STRIP.19 8-14-USE ON AWG 22
STRIP.19 31-15-USE ON AWG 16
STRIP.25 2-16-USE ON AWG 12
DO NOT TIN
SEE SOLDER SLEEVE ASSY CHART TYP E2 THRU E19
B
E19
E5
A59
A1
E3
E4
7(2)
6(2)
5(3)
4(2)
3(3)
E14
E15
E11
E13
A
128 127 (2)
126 125 124 123
122 (2) 121 (2) 120 119 (2) 118
129(3)
13-19-USE ON AWG 22
2-20-USE ON AWG 16
STRIP.19 DO NOT TIN
28
29
2016413-011 S/N RAY 49956
.12 HIGH
10
11(2)
12(2)
13(2)
24(2)
23
22
21(2)
20(2)
19
18(2)
17(2)
16(2)
15(2)
14(2)
25
26
27
28(2)
29(2)
30(2)
31(2)
32(2)
33
34
35(2)
36(2)
37
38(2)
4-33
STRIP .19 DO NOT TIN
21
SPOT TIE TYP
C
SEE SHEET 2
25-LG 4.50 REF
26
DO NOT LACE
1
48-3
27-5-USE ON AWG 16
E12
91 (3) 90 (8) 89 (6) 88 (5) 87 (4) 86 85
84
92(2)
93(2)
94
95(3)
96(2)
97(3)
98
99
100(3)
101
102
103(2)
104(2)
105(5)
106(3)
107(3)
108
109(2)
110(2)
111(4)
10-32-LG.75±.06
SEE NOTE 5
A51
E8
E7
E9
E10
117(6)
116(2)
115(6)
114(6)
113(6)
112(6)
9
10 COND
8
23 COND
STRIP .19 FOR AWG 22 & .29 FOR AWG 16
DO NOT TIN
2
22 COND
28 COND
STRIP .19 FOR AWG 22 & .29 FOR AWG 16
DO NOT TIN

NOTES
1. FABRICATE PER ND 1002032 EXCEPT USE FIND NO. 21
2. STRIP ALL LEADS .50 ±.06 & TIN PER ND 1002071 UNLESS OTHERWISE SPECIFIED
3. NUMBERS ENCLOSED IN PARENTHESES INDICATE NUMBER OF CONDUCTORS
4. CRIMP PER ND 1002206
5. MARK CONDUCTOR IDENTIFICATION PER ND 1002019
6. SERIALIZE PER ND 1002023
7. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND 1002019 USING BLACK INK 1006256-001
8. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
9. LACE ENTIRE HARNESS CONFIGURATION UNLESS OTHERWISE SPECIFIED
10. AR DENOTES AS REQUIRED
11. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
12. MIL-W-16878/4 E22 WHT, RED, BLACK, TWISTED SHIELDED, JACKET TFE WHITE
13. MIL-W-16878/4 E22 WHT SHIELDED JACKET TFE WHITE
14. MIL-W-16878/4 E22 WHT & BLK, TWISTED SHIELDED, JACKET TFE WHITE
15. MIL-I-23053 CLASS 1 COLOR WHITE, I.D. .250
16. MIL-I-23053 CLASS 1, COLOR WHITE, ID .187
17. MIL-I-23053 CLASS 1, COLOR WHITE, ID .125

SOLDER SLEEVE ASSY CHART	
NO.	FIND NO.
E2	22
E3	22
E4	24
E5	23
E6	23
E7	22
E8	22
E9	22
E10	22
E11	22
E12	23
E13	22
E14	22
E15	22
E16	23
E17	24
E18	24
E19	24

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	☒	2016394	SCHEMATIC	REF
*	2.0	MIL-W-16878/4 E18	WIRE, ELEC WHT	36
*	1.3	MIL-W-16878/4E20	WIRE, ELEC BLK	35
*	8.0	MIL-W-16878/4E20	WIRE, ELEC WHT	34
	11	MS25036-49	LUG, TERMINAL	33
*	3.4	SEE NOTE 17	SLEEVING, INSULATION	32
*	0.3	SEE NOTE 16	SLEEVING, INSULATION	31
*	0.3	SEE NOTE 15	SLEEVING, INSULATION	30
	AR	1006253	ADHESIVE	29
	1	1006415-135	MARKER, CABLE	28
*	7.0	MIL-W-16878/4 E12	WIRE, ELEC WHITE	27
	AR	1006699	SOLVENT	26
*	4.5	1006696-5	SLEEVING, INSULATION	25
	4	1010402-3	SLEEVE, SOLDER	24
	4	1010402-2	SLEEVE, SOLDER	23
	10	1010402-1	SLEEVE, SOLDER	22
	AR	1006458-004	LACING, TAPE	21
	2	MS25036-6	LUG, TERMINAL	20
	13	MS25036-1	LUG, TERMINAL	19
	2	MS25036-57	LUG, TERMINAL	18
	6	MS25036-50	LUG, TERMINAL	17
	2	MS17143-21	LUG, TERMINAL	16
	31	MS17143-20	LUG, TERMINAL	15
	8	MS17143-19	LUG, TERMINAL	14
*	75	MIL-W-16878/4 E22	WIRE, ELEC BLK	13
*	60	SEE NOTE 14	WIRE, ELEC	12
*	20.0	SEE NOTE 12	WIRE, ELEC	11
*	40.0	SEE NOTE 13	WIRE, ELEC	10
*	108	1014341-11	WIRE, ELEC	9
*	38.7	MIL-W-16878/4 E16	WIRE, ELEC BLACK	8
*	110	MIL-W-16878/4 E22	WIRE, ELEC WHT	7
*	107.	MIL-W-16878/4 E16	WIRE, ELEC WHT	6
	27	1006491-014	CONTACT, ELECTRICAL	5
	15	1006491-013	CONTACT, ELECTRICAL	4
	48	1006491-012	CONTACT, ELECTRICAL	3
	60	1006491-011	CONTACT, ELECTRICAL	2
	2	1006494-002	CONNECTOR	1
	-011	LIST OF MATERIALS		

* DENOTES LENGTH IN FEET

2014297	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.03 DECIMALS .XXX ± ANGLES ±
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN DATE 14 APR 66
CHECKED 15 APR 66
APPROVAL P. Fragin 15 APR 66
APPROVAL 4/15/66
APPROVAL 4/15/66
NASA APPROVAL
MIT APPROVAL 4 APR 66
MIT APPROVAL 4/15/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS, BRANCHED
POWER CONTROL ASSY
OPERATION CONSOLE

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016413
SCALE 1/1
WT
SHEET 1 OF 3

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

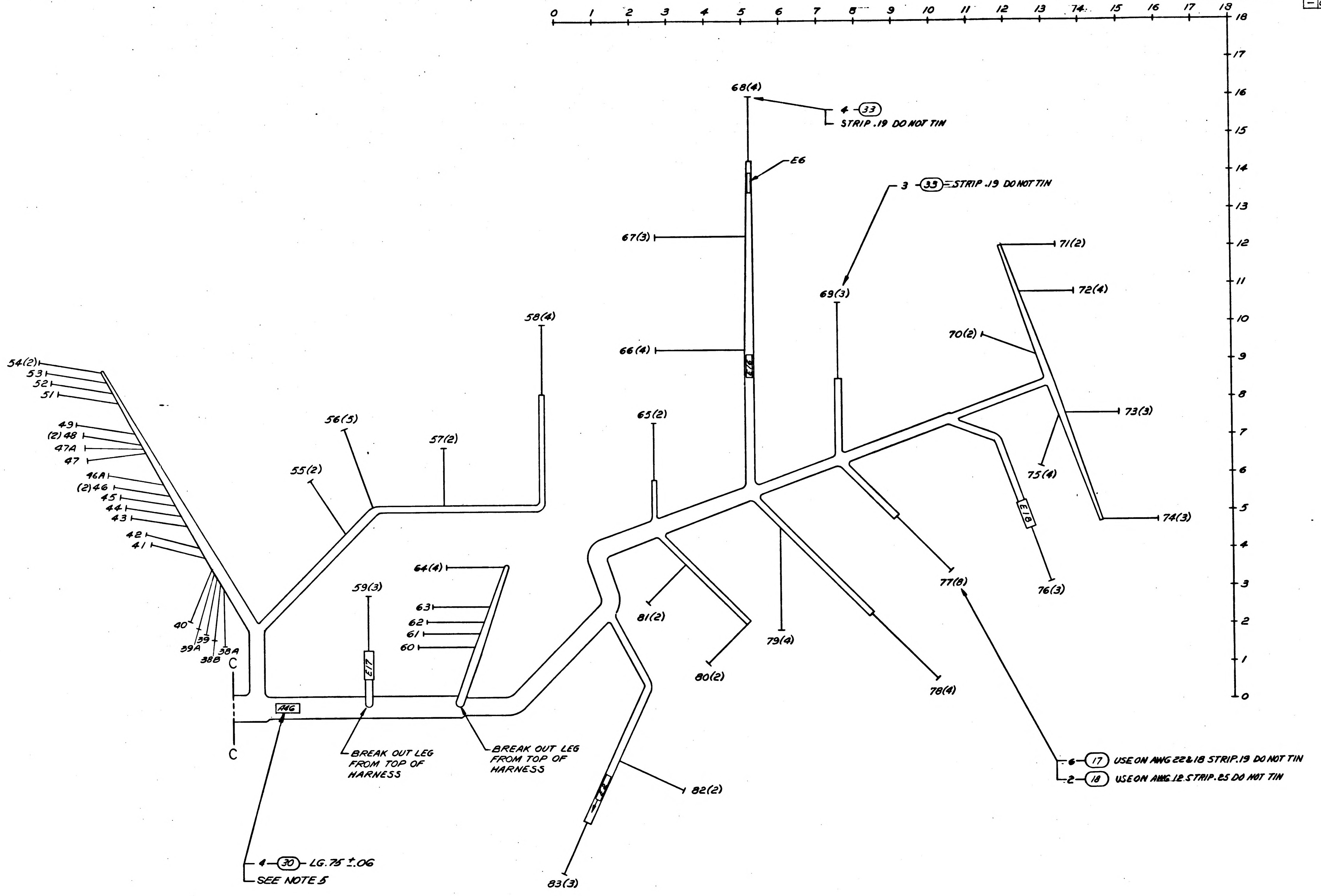
MASTER

2016413

—	2016413

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TORR 38		



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
68(4)
4 -(33)
STRIP .19 DO NOT TIN
E6
3 -(33)=STRIP .19 DO NOT TIN
67(3)
69(3)
71(2)
72(4)
70(2)
66(4)
E16
58(4)
73(3)
65(2)
75(4)
57(2)
56(5)
55(2)
E18
74(3)
54(2)
53
52
51
49
(2) 48
47A
47
46A
(2) 46
45
44
43
42
41
40
39A
39
38B
38A
64(4)
63
62
61
60
59(3)
E17
81(2)
80(2)
79(4)
77(8)
76(3)
78(4)
C
C
A46
BREAK OUT LEG FROM TOP OF HARNESS
BREAK OUT LEG FROM TOP OF HARNESS
6 -(17) USE ON AWG 22 & 18 STRIP .19 DO NOT TIN
2 -(18) USE ON AWG 12 STRIP .25 DO NOT TIN
82(2)
E19
83(3)
4 -(30)- LG .75 ±.06
SEE NOTE 5

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN R. Dubois DATE 14 APR 66
CHECKED R.P. Clouthier 14 APR 66
APPROVAL 15 APR 66
APPROVAL 4/15/66
APPROVAL K. S. 4/15/66
NASA APPROVAL
MIT APPROVAL McMurdy 4-14-66
MIT APPROVAL 4/15/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS, BRANCHED
POWER CONTROL ASSY
OPERATION CONSOLE

SIZE	CODE IDENT NO.	NASA DRAWING NO.
J	49956	2016413
SCALE 1/1	WT	SHEET 2 OF 3

2016413 -

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 2213		

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A1	104	A1-1	WHT	22	9	72	S8-3NO	
		105	↑ -2	BLK	↑		72	S8-4NO	
	A2	106	↓ -10	WHT		9	71	S10-3NO	
		107	A1-14	BLK			71	S10-4NO	
	A3	120	A3-3	WHT		7	83	R4-CW	
	A4	109	A1-6	WHT	↓	7	38	DS2-1	
	A5	110	↑ -7	WHT	22	7	74	S2-4NO	
	A6	105	-11	WHT	16	6	23	TB1B-3	TWIST
	A7	111	-12	BLK	↑	8	22	TB1B-4	
	A8	105	-11	WHT		6	46	S15B-10	TWIST
	A9	111	-12	BLK		8	54	S15A-10	
	A10	100	-15	BLK	↓	8	58	S17-2C	TWIST
	A11	92	-16	WHT	16	6	58	S16-1C	
	A12	103	-17	WHT	22	7	8	J1-57	
	A13	100	-19	↑	22	7	57	R5-1	
	A14	99	-18		22	7	8	J1-75	
	A15	98	-21		16	6	5	F2-2	
	A16	97	-22		↑	6	1	J2-44	
	A17	97	-22			6	1	J2-50	
	A18	96	-23			6	3	F3-2	
	A19	95	-24		↓	6	1	J2-48	
	A20	95	-24		16	6	1	J2-54	
	A21	94	-25		22	7	56	S18B-ARM	
	A22	93	-26		22	7	8	J1-76	
	A23	93	-26	↓	22	7	55	S18A-ARM	
	A24	87	-28	WHT	16	6	8	J1-74	TWIST
	A25	89	-30	BLK	↑	8	8	J1-72	
	A26	87	-28	WHT		6	42	S15B-5	TWIST
	A27	89	-30	BLK		8	38A	S15A-5	
	A28	88	-29	WHT	↓	6	8	J1-73	
	A29	90	-31	WHT	16	6	65	R3-3	
	A30	90	-32	BLK	22	13	△	E7	
	A31	90	-32	BLK	↑	13	△	E8	
	A32	90	-32	BLK		13	△	E12	
	A33	91	-33	WHT		7	8	J1-64	
	A34	84	-34	↑		7	8	J1-54	
	A35	86	-38			7	36	DS2-3	
	A36	87	-39	↓		7	35	DS2-4	
	A37	88	↓ -40	WHT	↓	12	66	S14A-ARM	
		89	A1-41	BLK	22		67	S14B-3	
		△	E12	SHLD			△	E16	
	A38	90	A1-42	BLK	22	13	△	E6	
	A39	90	↑ -42	BLK	22	13	△	E9	
	A40	90	-42	BLK	22	13	△	E10	
	A41	91	-43	WHT	16	6	8	J1-53	TWIST
	A42	91	↓ -44	BLK	16	8	8	J1-52	
	A43	103	A1R1-3	WHT	22	7	56	S18A-7	
	A44	64	A2-1	WHT	↑	7	118	A3-1	
	A45	64	↑ -2	BLK		13	119	A3-2	
	A46	59	-4	WHT		11	121	A3-4	
		59	↓ -5	BLK	↓		122	A3-5	
		59	A2-6	RED	22		122	A3-6	
		△	E17	SHLD			△	E4	
	A47	62	A2-7	WHT	22	7	123	A3-7	
	A48	61	↑ -8	↑	↑	7	124	A3-8	
	A49	60	↓ -9			7	125	A3-9	
	A50	63	A2-10	↓	↓	7	126	A3-10	
	A51	121	A3-4	WHT	22	10	83	R4-CCW	
		△	E3	SHLD			△	E2	
	A52	△	E2	BLK	22	13	83	R4-ARM	
	A53	△	E3	BLK	22	13	△	E4	
	A54	△	E3	BLK	22	13	119	A3-2	
	A55	127	A3-13	BLK	16	8	13	TB1A-7	TWIST
	A56	127	A3-14	WHT	16	6	13	TB1A-6	
	A57	128	A3-15	WHT	22	7	9	J1-8	
	A58	9	J1-1	BLK	22	13	△	E5	
	A59	9	J1-2	WHT	22	12	68	T1-2	
		9	J1-3	BLK	22		68	T1-1	
		△	E5	SHLD			△	E6	
	A60	129	E1	BLK	16	8	10	TB1A-2	
	A61	9	J1-10	BLK	22	9	20	TB1B-6	
		↑	↑ -11	WHT	22		26	TB2A-6	
	A62		-12	BLK	16	8	129	E1	
	A63		-13	WHT	22	11	76	DS1(+)	
		↓	↓ -14	BLK	22		76	S1-2	
		9	J1-15	RED	22		76	DS1(-)	
		△	E19	SHLD			△	E18	
	A64	8	J1-51	WHT	22	7	2	J2-30	
	A65	↑	↑ -60	WHT	22	7	73	S6-3NO	
	A66		-62	WHT	16	6	18	TB1B-8	TWIST
	A67		-63	BLK	16	8	28	TB2A-8	
	A68		-65	WHT	16	6	18	TB1B-8	TWIST
	A69		-66	BLK	16	8	28	TB2A-8	
	A70		-67	WHT	16	6	65	R3-1	
	A71	↓	↓ -70	BLK	22	9	43	S15B-7	
		8	J1-71	WHT	22		51	S15A-7	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A72	8	J1-77	WHT	16	6	11	TB1A-3	TWIST
	A73	8	J1-78	BLK	16	8	12	TB1A-4	
	A74	8	J1-79	WHT	16	6	11	TB1A-3	TWIST
	A75	8	J1-80	BLK	16	8	12	TB1A-4	
	A76	2	J2-1	WHT	22	9	52	S15A-8	
		↑	↑ -4	BLK	22		44	S15B-8	
	A77		-2	WHT	16	6	32	TB2A-12	TWIST
	A78		-3	BLK	↑	8	14	TB1B-12	
	A79		-5	WHT		6	31	TB2A-11	TWIST
	A80		-8	BLK		8	15	TB1B-11	
	A81		-7	WHT		6	32	TB2A-12	TWIST
	A82		-11	BLK		8	14	TB1B-12	
	A83		-10	WHT		6	30	TB2A-10	TWIST
	A84		-21	BLK		8	16	TB1B-10	
	A85		-12	BLK		8	15	TB1B-11	TWIST
	A86		-13	WHT		6	31	TB2A-11	
	A87		-14	WHT		6	30	TB2A-10	TWIST
	A88		-17	BLK		8	16	TB1B-10	
	A89		-15	WHT	↓	6	29	TB2A-9	TWIST
	A90		-18	BLK	16	8	17	TB1B-9	
	A91		-16	WHT	22	9	53	S15A-9	
			-23	BLK	22		45	S15B-9	
	A92		-22	BLK	16	8	17	TB1B-9	TWIST
	A93	↓	-25	WHT	16	6	29	TB2A-9	
	A94	2	-24	WHT	22	7	38	DS2-1	
	A95	1	-43	WHT	16	6	5	F2-1	
	A96	↑	-45	WHT	22	9	48	S15A-3	
			-46	BLK	22		40	S15B-3	
	A97		-47	WHT	16	6	3	F3-1	
	A98		-49	WHT	16	6	5	F2-1	
	A99		-51	WHT	16	6	3	F3-1	
	A100		-52	WHT	22	9	41	S15B-4	
			-53	BLK	22		49	S15A-4	
	A101		-62	BLK	16	8	24	TB1B-2	
	A102		-63	WHT	22	9	81	R2-3	
			-64	BLK	22		81	R2-1	
	A103		-65	BLK	16	8	24	TB1B-2	
	A104		-66	WHT	22	9	80	R1-3	
			-67	BLK	22		80	R1-1	
	A105	↓	↓ -76	BLK	22	13	△	E13	
	A106	1	J2-77	WHT	22	10	113	K2-4	
		△	E13	SHLD			△	E8	
	A107	1	J2-78	WHT	16	6	6	F4-1	
	A108	1	J2-79	BLK	22	13	△	E11	
	A109	1	J2-80	WHT	22	6	4	F5-1	
	A110	1	J2-82	WHT	22	10	112	K1-4	
		△	E11	SHLD			△	E9	
	A111	82	J3	WHT	22	9	38B	S15A-11	
		82	J4	BLK	↑		46A	S15B-11	
	A112	7	F1-1	BLK		9	19	TB1B-7	
		7	F1-2	WHT			27	TB2A-7	
	A113	6	F4-2	WHT		10	113	K2-5	
		△	E14	SHLD	↓		△	E7	
	A114	4	F5-2	WHT	22	10	112	K1-5	
		△	E15	SHLD			△	E10	
	A115	69	M1-140V	WHT	22	7	66	S14A-2	TWIST
	A116	69	M1-70V	↑	22	7	66	S14A-3	
	A117	69	M1-COM		22	7	67	S14B-ARM	
	A118	77	M2-(+)		12	27	34	TB2B-8	
	A119	↑	↑ -(-)		22	7	78	S12A-ARM	
	A120		-10A		22	7	78	S12A-2	
	A121		-5A		22	7	78	S12A-3	
	A122	↓	↓ -1A		12	27	33	TB2B-9	
	A123	77	M2-1A	↓	22	7	79	S13-4	
	A124	70	M3-1	WHT	22	9	20	TB1B-6	
		70	M3-2	BLK	↑		21	TB1B-5	
	A125	37	DS2-2	WHT		7	56	S18B-1	
	A126	36	DS2-3	WHT		7	56	S18A-5	
	A127	35	DS2-4	WHT		7	55	S18A-1	
	A128	129	E1	BLK		13	△	E19	
	A129	57	R5-3	WHT		7	56	S18A-9	
	A130	74	S2-1C	BLK		9	54	S15A-10	
		74	S3-2C	WHT			46	S15B-10	
	A131	73	S6-4NO	BLK		9	21	TB1B-5	
		73	S6-4C	WHT			25	TB2A-5	
	A132	75	S7-1C	WHT		9	58	S16-1C	
		75	S7-2C	BLK			58	S17-2C	
	A133	75	S7-1C	WHT		9	72	S8-3C	
		75	S7-2C	BLK			72	S8-4C	
	A134	78	S12A-4	WHT		7	79	S13-3	
	A135	66	S14A-ARM	WHT	↓	9	68	T1-3	
		67	S14B-2	BLK	22		68	T1-2	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	A136	100	A1-15	WHT	16	6	117	K6-5	
	A137	92	A1-16	BLK	16	8	117	K6-1	
	A138	111	A1-12	BLK	16	8	117	K6-6	
	A139	105	A1-11	WHT	16	6	117	K6-2	
	A140	110	A1-7	WHT	22	7	117	K6-3	
	A141	111	A1-8	WHT	22	7	117	K6-7	
	A142	64	A2-2	BLK	22	9	40	S15B-ARM	
		64	A2-16	WHT	22		48	S15A-ARM	
	A143	108	A1-5	WHT	22	7	116	K5-2	
	A144	109	A1-6	WHT	22	7	116	K5-7	
	A145	101	A1-13	WHT	22	7	112	K1-7	
	A146	102	A1-9	WHT	22	7	112	K1-2	
	A147	88	A1-40	WHT	22	9	112	K1-3	
		89	A1-41	BLK			112	K1-6	
	A148	89	A1-41	BLK	22	9	113	K2-6	
		88	A1-40	WHT			113	K2-3	
	A149	106	A1-3	WHT	22	7	113	K2-2	
	A150	107	A1-4	BLK	22	13	113	K2-7	
	A151	96	A1-23	WHT	20	34	114	K3-4	
	A152	95	A1-24	WHT	20	34	114	K3-5	
	A153	90	A1-31	WHT	20	34	114	K3-6	
	A154	88	A1-29	WHT	20	34	114	K3-3	
	A155	104	A1-1	WHT	22	7	114	K3-2	
	A156	105	A1-2	BLK	22	13	114	K3-7	
	A157	89	A1-30	BLK	20	35	115	K4-6	
	A158	87	A1-28	WHT	20	34	115	K4-3	
	A159	106	A1-3	WHT	22	7	115	K4-2	
	A160	107	A1-4	BLK	22	13	115	K4-7	
	A161	85	A1-21	WHT	20	34	115	K4-4	
	A162	97	A1-22	WHT	20	34	115	K4-5	
	A163	79	S13-2	WHT	18	36	77	M2-1A	
	A164	79	S13-1	WHT	18	36	77	M2-5A	
	A165	1	J2-37	WHT	22	9	47A	S15A-2	
		1	J2-40	BLK	↑		39A	S15B-2	
	A166	1	J2-31	WHT	↓	9	47	S15A-1	
		1	J2-38	BLK	22		39	S15B-1	

△ DENOTES INTERNAL CONNECTION

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±
DECIMALS .XXX ±
ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 15 APR 66
CHECKED 15 APR 66
APPROVAL 15 APR 66
APPROVAL 4/15/66
APPROVAL
NASA
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS, BRANCHED
POWER CONTROL ASSY
OPERATION CONSOLE

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016413

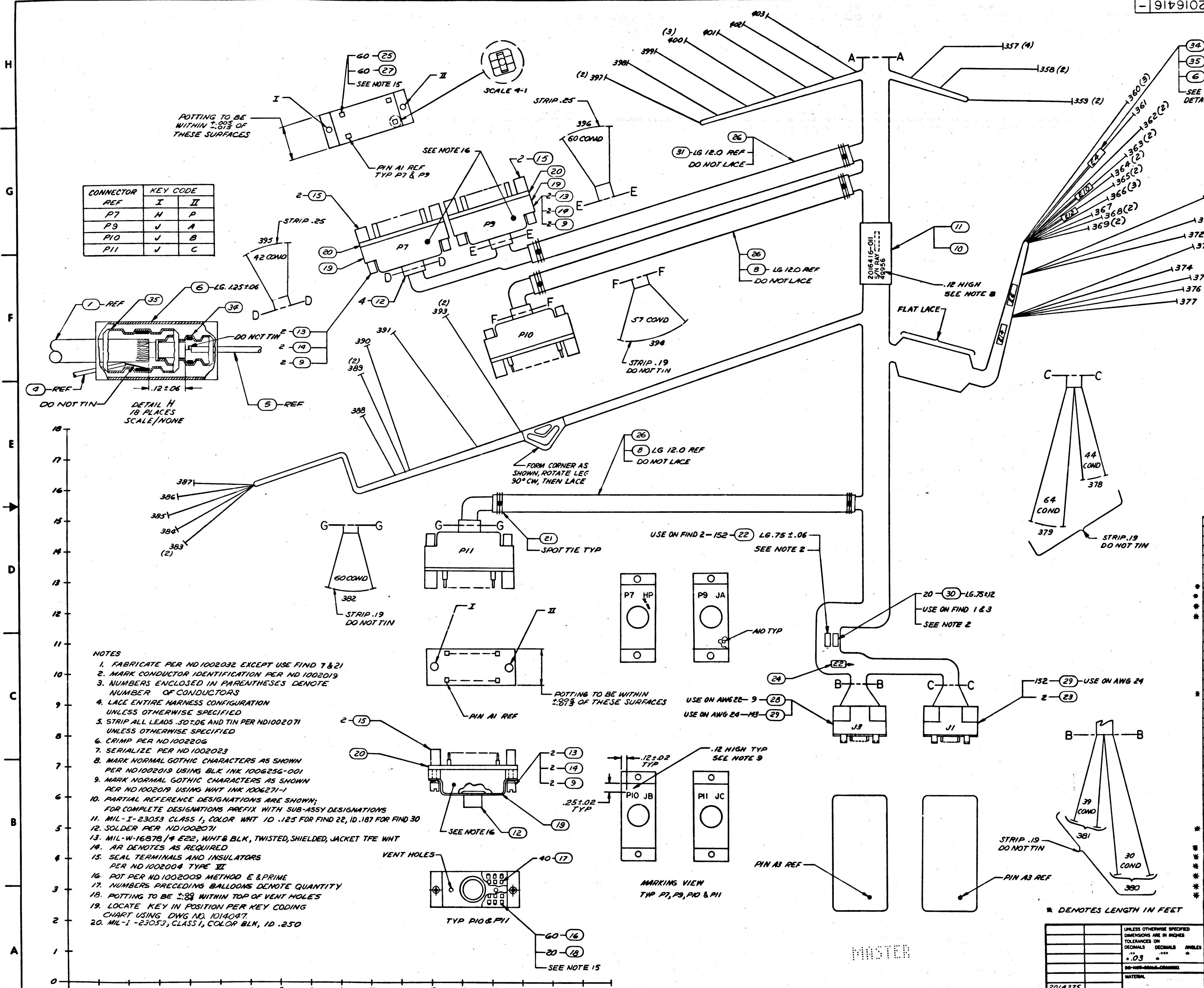
SCALE NONE | WT | SHEET 3 OF 3

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016413 -

2016413 -

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28119		


2016416 -
A — A
357 (4)
358 (2)
359 (2)
403
402
401
400
(3)
399
398
(2) 397
396
60 COND
STRIP .25
E — E
(26)
(31) LG 12.0 REF
DO NOT LACE
(34) RL
(35) REF
(6) REF
SEE DETAIL H
360 (3)
361
362 (2)
363 (2)
364 (2)
365 (2)
366 (3)
367
368 (2)
369 (2)
370
371
372
373 (2)
374
375
376
377
G0 (25)
G0 (27)
SEE NOTE 15
I
II
SCALE 4-1
POTTING TO BE WITHIN ±.005/.015 OF THESE SURFACES
PIN A1 REF TYP P7 & P9
SEE NOTE 16
2 (15)
(20)
(19)
2 (13)
2 (14)
2 (9)
P7
P9
D — D
395
42 COND
STRIP .25
4 (12)
(26)
(8) LG 12.0 REF
DO NOT LACE
2016416-011 SER (RAY) 49956
.12 HIGH SEE NOTE 8
(11)
(10)
FLAT LACE
F — F
P10
57 COND
394
STRIP .19 DO NOT TIN
(1) REF
(35)
(6) LG. 1.25 ±.06
(34)
DO NOT TIN
(4) REF
.12 ±.06
(5) REF
DO NOT TIN
DETAIL H 18 PLACES SCALE/NONE
393 (2)
391
390
389 (2)
388
387
386
385
384
383 (2)
FORM CORNER AS SHOWN, ROTATE LEC 90° CW, THEN LACE
(26)
(8) LG 12.0 REF
DO NOT LACE
C — C
44 COND
378
64 COND
379
STRIP .19 DO NOT TIN
G — G
60 COND
382
STRIP .19 DO NOT TIN
P11
(21) SPOT TIE TYP
USE ON FIND 2-152 (22) LG .75 ±.06
SEE NOTE 2
20 (30) LG .75 ±.12
USE ON FIND 1 & 3
SEE NOTE 2
P7 HP
P9 JA
.10 TYP
(24)
E2
B — B
C — C
USE ON AWG 22 — 9 (28)
USE ON AWG 24 — 113 (29)
J3
J1
152 (29) USE ON AWG 24
2 (23)
B — B
39 COND
381
30 COND
380
STRIP .19 DO NOT TIN
I
II
POTTING TO BE WITHIN ±.005/.015 OF THESE SURFACES
PIN A1 REF
2 (15)
(20)
2 (13)
2 (14)
2 (9)
SEE NOTE 16
(12)
(19)
.12 ±.02 TYP
.12 HIGH TYP SEE NOTE 9
P10 JB
P11 JC
.25 ±.02 TYP
VENT HOLES
40 (17)
60 (16)
20 (18)
SEE NOTE 15
TYP P10 & P11
MARKING VIEW TYP P7, P9, P10 & P11
PIN A3 REF
PIN A3 REF
MASTER
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
2016416 -

CONNECTOR REF	KEY CODE I	KEY CODE II
P7	H	P
P9	J	A
P10	J	B
P11	J	C

NOTES

1. FABRICATE PER ND 1002032 EXCEPT USE FIND 7 & 21
2. MARK CONDUCTOR IDENTIFICATION PER ND 1002019
3. NUMBERS ENCLOSED IN PARENTHESES DENOTE NUMBER OF CONDUCTORS
4. LACE ENTIRE HARNESS CONFIGURATION UNLESS OTHERWISE SPECIFIED
5. STRIP ALL LEADS .50 ±.06 AND TIN PER ND1002071 UNLESS OTHERWISE SPECIFIED
6. CRIMP PER ND 1002206
7. SERIALIZE PER ND 1002023
8. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND1002019 USING BLK INK 1006256-001
9. MARK NORMAL GOTHIC CHARACTERS AS SHOWN PER ND 1002019 USING WHT INK 1006271-1
10. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSY DESIGNATIONS
11. MIL-I-23053 CLASS 1, COLOR WHT ID .125 FOR FIND 22, ID .187 FOR FIND 30
12. SOLDER PER ND1002071
13. MIL-W-16878/4 E22, WHT & BLK, TWISTED, SHIELDED, JACKET TFE WHT
14. AR DENOTES AS REQUIRED
15. SEAL TERMINALS AND INSULATORS PER ND 1002004 TYPE VI
16. POT PER ND 1002009 METHOD E & PRIME
17. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY
18. POTTING TO BE $^{+.00}_{-.04}$ WITHIN TOP OF VENT HOLES
19. LOCATE KEY IN POSITION PER KEY CODING CHART USING DWG NO. 1014047.
20. MIL-I-23053, CLASS 1, COLOR BLK, ID .250

☒	2014179	SCHEMATIC	REF
18	1010402-2	SLEEVE, SOLDER	35
18	1010402-1	SLEEVE, SOLDER	34
✱ 430.	MIL-W-16878/4 E24	WIRE ELEC BLACK	33
✱ 430	MIL-W-16878/4 E24	WIRE ELEC WHT	32
✱ 1.0	1006696-5	SLEEVING, INSULATION	31
✱ 1.4	SEE NOTE 11	SLEEVING, SHRINK	30
295	1006491-009	CONTACT, ELEC	29
9	1006491-011	CONTACT, ELEC	28
120	1010380	BUSHING, INSULATOR,	27
AR	1006699	SOLVENT	26
120	1010379-1	CONTACT, ELEC, FEMALE	25
2	1010402-3	SLEEVE, SOLDER, ELEC	24
2	1006671-001	CONNECTOR, ELEC	23
✱ 9.8	SEE NOTE 11	SLEEVING, SHRINK	22
AR	1006458-004	TAPE, LACING	21
4	1014021	CONNECTOR, PLATE	20
4	1014024-3	BRACKET	19
40	1014310	INSULATOR, CONTACT	18
80	1006987	INSULATOR, CONTACT	17
120	1006995-000	CONTACT, MALE, CRIMP	16
8	1014032	PIN, RECEPTACLE, INDEX	15
8	MS35337-79	WASHER, LOCK	14
8	1006998-1	SCREW, CAPTIVE	13
4	1020370-23	BUSHING	12
1	1006415-136	BAND MARKER, CABLE	11
AR	1006253	ADHESIVE	10
8	1006997	WASHER, FLAT	9
✱ 1.0	1006696-4	SLEEVING, INSULATION	8
AR	1006458-002	TAPE, LACING	7
✱ 2.0	SEE NOTE 20	SLEEVING SHRINK	6
✱ 130	MIL-W-16878/4 E22	WIRE, ELEC, WHT	5
✱ 25	MIL-W-16878/4 E22	WIRE, ELEC, BLK	4
✱ 10	SEE NOTE - 13	WIRE, ELEC	3
✱ 210	1014341-12	WIRE, ELEC, BLK & WHT	2
✱ 8	RG180B/U	WIRE, ELEC, COAX	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
-011	LIST OF MATERIALS		

✱ DENOTES LENGTH IN FEET

2014375	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.03
DECIMALS .XXX ★
ANGLES ★
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 12APR66
CHECKED 13 APR 66
APPROVAL P. Frazier
APPROVAL
APPROVAL 4/14/65
NASA APPROVAL
MIT APPROVAL 4/14/66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

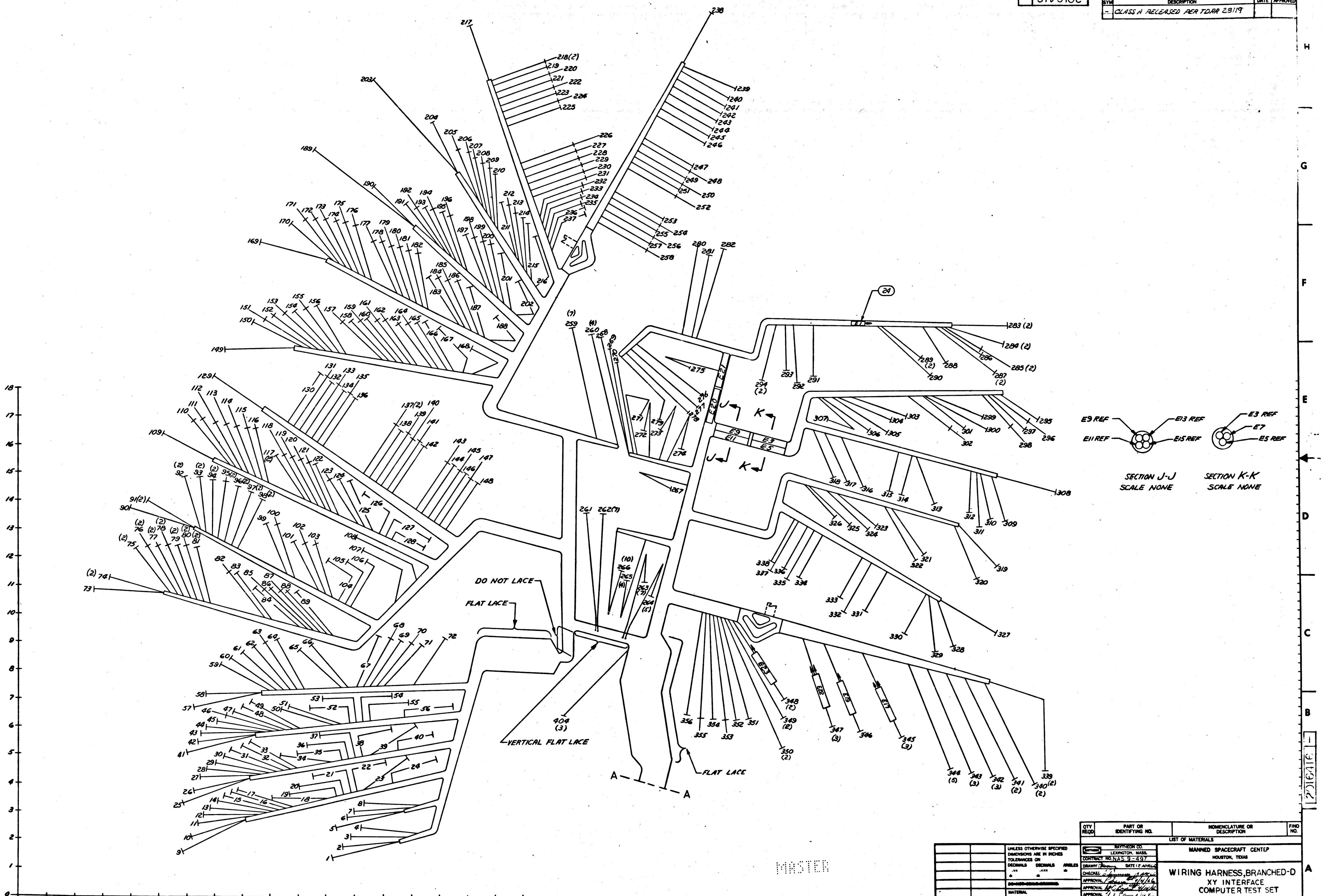
WIRING HARNESS BRANCHED-D
XY INTERFACE
COMPUTER TEST SET

SIZE J
CODE IDENT NO 49956
NASA DRAWING NO. 2016416
SCALE 1/1
WT
SHEET 1 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016416 –

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28119		


DO NOT LACE
FLAT LACE
VERTICAL FLAT LACE
FLAT LACE
A
A
J
K
J
K
E9 REF
E11 REF
E13 REF
E15 REF
E3 REF
E7
E5 REF
SECTION J-J
SCALE NONE
SECTION K-K
SCALE NONE
E2
E19
E17
E23
E20
E21
E9
E11
E3
E5
24
MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
~~DO NOT SCALE DRAWING~~
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN [illegible] DATE 12 APR 66
CHECKED [illegible] 13 APR 66
APPROVAL [illegible] 4/14/66
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible] 4/6/66

MANNED SPACECRAFT CENTEP
HOUSTON, TEXAS

WIRING HARNESS, BRANCHED-D
XY INTERFACE
COMPUTER TEST SET

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016416
SCALE 1/1 | WT | SHEET 2 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016416 –

2016416 -

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28119		

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	D1	379	J1-A3	WHT	24	2	381	J3-N3	
			-A4	BLK				-N4	
	D2		-A5	WHT				-N5	
			-A6	BLK				-N6	
	D3		-B1	WHT				-N1	
			-B2	BLK			381	J3-N2	
	D4		-B3	WHT			395	P7-C5	
			-B4	BLK				-C6	
	D5		-B5	WHT				-C7	
			-B6	BLK				-C8	
	D6		-C7	WHT		2		-C3	
			-C8	BLK			395	P7-C4	
	D7		-D1	WHT		32	63	S3A-6	TWIST
	D8		-D2	BLK		33	47	S3B-6	
	D9		-D3	WHT		32	31	S3C-6	
	D10		-D4	BLK		33	15	S3D-6	
	D11		-D5	WHT		32	64	S3A-7	
	D12		-D6	BLK		33	48	S3B-7	
	D13		-D7	WHT		32	32	S3C-7	
	D14		-D8	BLK		33	16	S3D-7	
	D15		-E1	WHT		32	65	S3A-8	
	D16		-E2	BLK		33	49	S3B-8	
	D17		-E3	WHT		32	33	S3C-8	
	D18		-E4	BLK		33	17	S3D-8	
	D19		-E5	WHT		32	36	S3C-11	
	D20		-E6	BLK		33	20	S3D-11	
	D21		-E7	WHT		32	68	S3A-11	
	D22	379	-E8	BLK		33	52	S3B-11	
	D23	378	-F1	WHT		32	37	S3C-12	
	D24		-F2	BLK		33	21	S3D-12	
	D25		-F3	WHT		32	69	S3A-12	
	D26		-F4	BLK		33	53	S3B-12	
	D27		-F5	WHT		32	34	S3C-9	
	D28		-F6	BLK		33	18	S3D-9	
	D29		-F7	WHT		32	66	S3A-9	
	D30		-F8	BLK		33	50	S3B-9	
	D31		-G1	WHT		32	35	S3C-10	
	D32		-G2	BLK		33	19	S3D-10	
	D33		-G3	WHT		32	67	S3A-10	TWIST
	D34		-G4	BLK		33	51	S3B-10	
	D35		-G5	WHT		2	395	P7-C17	
			-G6	BLK				-C18	
	D36		-G7	WHT		2		-B1	
			-G8	BLK				-B2	
	D37		-H1	WHT		2		-B3	
			-H2	BLK			395	P7-B4	
	D38		-M7	WHT		32	71	S3A-14	TWIST
	D39		-M8	BLK		33	55	S3B-14	
	D40		-R1	WHT		32	38	S3C-13	
	D41		-R2	BLK		33	22	S3D-13	
	D42		-R3	WHT		32	39	S3C-14	
	D43		-R4	BLK		33	23	S3D-14	
	D44		-R5	WHT		32	40	S3C-15	
	D45		-R6	BLK		33	24	S3D-15	
	D46		-P7	WHT		32	72	S3A-15	TWIST
	D47		-P8	BLK		33	56	S3B-15	
	D48		-P1	WHT		2	39	P7-A1	
			-P2	BLK				-A2	
	D49		-P3	WHT		2		-A3	
			-P4	BLK				-A4	
	D50		-P5	WHT		2		-A5	
			-P6	BLK			395	P7-A6	
	D51		-R7	WHT		32	70	S3A-13	TWIST
	D52		-R8	BLK		33	54	S3B-13	
	D53		-S1	WHT		2	395	P7-B11	
			-S2	BLK				-B12	
	D54		-S3	WHT				-B13	
			-S4	BLK				-B14	
	D55		-S5	WHT				-B15	
			-S6	BLK				-B16	
	D56		-S7	WHT		2		-B17	
		378	-S8	BLK			395	P7-B18	
	D57	379	-T1	WHT		32	30	S3C-5	TWIST
	D58		-T2	BLK		33	14	S3D-5	
	D59		-T3	WHT		2	395	P7-B5	
			-T4	BLK				-B6	
	D60		-T5	WHT		2		-B7	
			-T6	BLK				-B8	
	D61		-T7	WHT		2		-B9	
			-T8	BLK			395	P7-B10	
	D62		-U1	WHT		32	28	S3C-3	TWIST
	D63		-U2	BLK		33	12	S3D-3	
	D64		-U3	WHT		32	61	S3A-4	TWIST
	D65		-U4	BLK		33	45	S3B-4	
	D66		-U5	WHT		32	29	S3C-4	TWIST
	D67	379	J1-U6	BLK	24	33	13	S3D-4	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	D68	379	J1-U7	WHT	24	32	62	S3A-5	TWIST
	D69		-U8	BLK		33	46	S3B-5	
	D70		-V1	WHT		32	26	S3C-1	
	D71		-V2	BLK		33	10	S3D-1	
	D72		-V3	WHT		32	59	S3A-2	
	D73		-V4	BLK		33	43	S3B-2	
	D74		-V5	WHT		32	27	S3C-2	
	D75		-V6	BLK		33	11	S3D-2	
	D76		-V7	WHT		32	60	S3A-3	TWIST
	D77		-V8	BLK		33	44	S3B-3	
	D78		-W1	WHT		2	395	P7-C11	
			-W2	BLK				-C12	
	D79		-W3	WHT		2		-C13	
			-W4	BLK				-C14	
	D80		-W5	WHT		2		-C15	
			-W6	BLK			395	P7-C16	
	D81		-W7	WHT		32	58	S3A-1	TWIST
	D82		-W8	BLK		33	42	S3B-1	
	D83		-X3	WHT		2	396	P7-C9	
			-X4	BLK				P7-C10	
	D84		-X5	WHT				P7-C1	
		379	J1-X6	BLK			396	P7-C2	
	D85	381	J3-G1	WHT			382	P11-C5	
			-G2	BLK				-C6	
	D86		-G3	WHT				-C7	
			-G4	BLK				-C8	
	D87		-H1	WHT				-C13	
			-H2	BLK				-C14	
	D88		-H3	WHT				-C15	
			-H4	BLK				-C16	
	D89		-J1	WHT				-B1	
			-J2	BLK				-B2	
	D90		-J3	WHT				-B3	
			-J4	BLK				-B4	
	D91		-K1	WHT				-B7	
			-K2	BLK				-B8	
	D92		-K3	WHT				-B9	
			-K6	BLK				-B10	
	D93		-L1	WHT				-B13	
			-L2	BLK				-B14	
	D94		-M1	WHT				-B15	
			-M2	BLK				-B16	
	D95		-M3	WHT				-B17	
			-M6	BLK				-B18	
	D96		-N7	WHT				-B19	
		381	-N8	BLK				-B20	
	D97	380	-S1	WHT				-C9	
			-S2	BLK				-C10	
	D98		-S3	WHT				-C11	
			-S4	BLK				-C12	
	D99		-T1	WHT				-C17	
			-T2	BLK				-C18	
	D100		-T5	WHT				-C19	
		380	-T6	BLK				-C20	
	D101	381	-P5	WHT				-B11	
		381	-P6	BLK				-B12	
	D102	380	-V1	WHT				-A1	
			-V2	BLK				-A2	
	D103		-V3	WHT				-A3	
			-V4	BLK				-A4	
	D104		-V5	WHT				-A5	
			-V6	BLK				-A6	
	D105		-V7	WHT				-A7	
			-V8	BLK				-A8	
	D106		-W1	WHT				-A9	
			-W2	BLK				-A10	
	D107		-W3	WHT				-A11	
			-W4	BLK				-A12	
	D108		-W5	WHT				-A13	
			-W6	BLK				-A14	
	D109		-W7	WHT				-A15	
			-W8	BLK				-A16	
	D110		-X3	WHT				-C1	
			-X4	BLK				-C2	
	D111		-X5	WHT		2		-C3	
		380	-X6	BLK	24			-C4	
	D112	381	-P1	BLK	22	4		-A17	
	D113		-P2	WHT		5		-A18	
	D114		-P3					-A19	
	D115	381	-P4					-A20	
	D116	380	-T3					-B5	
	D117	380	J3-T4	WHT	22	5	382	P11-B6	
	D118	396	P9-A1	WHT	24	32	194	S1C-12	TWIST
	D119		-A2	BLK	24	33	208	S1D-12	
	D120		-A3	WHT	24	32	195	S1C-13	TWIST
	D121	396	P9-A4	BLK	24	33	209	S1D-13	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	D122	396	P9-A5	WHT	24	32	196	S1C-14	TWIST
	D123		-A6	BLK		33	210	S1D-14	
	D124		-A7	WHT		32	190	S1C-8	
	D125		-A8	BLK		33	204	S1D-8	
	D126		-A9	WHT		32	198	S1C-16	
	D127		-A10	BLK		33	212	S1D-16	
	D128		-A11	WHT		32	57	S3A-ARM	
	D129		-A12	BLK		33	41	S3B-ARM	
	D130		-A13	WHT		32	25	S3C-ARM	
	D131		-A14	BLK		33	9	S3D-ARM	
	D132		-A15	WHT		32	5	S3E-ARM	
	D133		-A16	BLK		33	1	S3F-ARM	
	D134		-A17	WHT		32	197	S1C-15	
	D135		-A18	BLK		33	211	S1D-15	
	D136		-A19	WHT		32	8	S3E-20	
	D137		-A20	BLK		33	4	S3F-20	
	D138		-B1	WHT		32	228	S1E-11	
	D139		-B2	BLK		33	249	S1F-11	
	D140		-B3	WHT		32	229	S1E-12	
	D141		-B4	BLK		33	250	S1F-12	
	D142		-B5	WHT		32	201	S1C-19	
	D143		-B6	BLK		33	215	S1D-19	
	D144		-B7	WHT		32	199	S1C-17	
	D145		-B8	BLK		33	213	S1D-17	
	D146		-B9	WHT		32	200	S1C-18	
	D147		-B10	BLK		33	214	S1D-18	
	D148		-B11	WHT		32	202	S1C-20	
	D149		-B12	BLK		33	216	S1D-20	
	D150		-B13	WHT		32	191	S1C-9	
	D151		-B14	BLK		33	205	S1D-9	
	D152		-B15	WHT		32	192	S1C-10	
	D153		-B16	BLK		33	206	S1D-10	
	D154		-B17	WHT		32	193	S1C-11	
	D155		-B18	BLK		33	207	S1D-11	
	D156		-B19	WHT		32	7	S3E-19	
	D157		-B20	BLK		33	3	S3F-19	
	D158		-C1	WHT		32	92	S2E-2	
	D159		-C2	BLK		33	75	S2F-2	
	D160		-C3	WHT		32	93	S2E-3	
	D161		-C4	BLK		33	76	S2F-3	
	D162		-C5	WHT		32	94	S2E-4	
	D163		-C6	BLK		33	77	S2F-4	
	D164		-C7	WHT		32	95	S2E-5	
	D165		-C8	BLK		33	78	S2F-5	
	D166		-C9	WHT		32	96	S2E-6	
	D167		-C10	BLK		33	79	S2F-6	
	D168		-C11	WHT		32	97	S2E-7	
	D169		-C12	BLK		33	80	S2F-7	
	D170		-C13	WHT		32	98	S2E-8	
	D171		-C14	BLK		33	81	S2F-8	
	D172		-C15	WHT		32	226	S1E-9	
	D173		-C16	BLK		33	247	S1F-9	
	D174		-C17	WHT		32	227	S1E-10	
	D175		-C18	BLK		33	248	S1F-10	
	D176		-C19	WHT		32	6	S3E-18	TWIST
	D177	396	P9-C20	BLK		33	2	S3F-18	
	D178	394	P10-A1	WHT		2	341	S21A-C	
			-A2	BLK			341	S21A-NO	
	D179		-A7	WHT		2	394	S24A-C	
			-A8	BLK			394	S24A-NO	
	D180		-A9	WHT		32	335	S17A-D-A	TWIST
	D181		-A10	BLK		33	337	S17A-A-A	
	D182		-A11	WHT		2	332	S17A-B-A	
			-A12	BLK			329	S17A-C-A	
	D183		-A13	WHT			321	S17B-B1	
			-A14	BLK			319	S17B-C1	
	~~D184~~		~~-A15~~	~~WHT~~			~~324~~	~~S17B-A-A~~	
			~~-A16~~	~~BLK~~			~~319~~	[illegible]	
	D185		-A17	WHT			326	S17B-A1	
			-A18	BLK			323	S17B-D1	
	D186		-B1	WHT			357	S35A-C	
			-B2	BLK			357	S35A-NO	
	D187		-B3	WHT		2	358	S36A-C	
			-B4	BLK	24		358	S36A-NO	
	D188		-A3	WHT	22	5	392	S22A-C	
	D189		-A4				392	S22A-NO	
	D190		-A5				343	S23A-C	
	D191		-A6				343	S23A-NO	
	D192		-A19				343	S23A-NC	
	D193		-B5				404	S14-4	
	D194		-B6				264	S11A-NO	
	D195		-B7				404	S14-1	
	D196	394	P10-B8	WHT	22	5	261	S10A-NO	

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 12 APR
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS, BRANCHED-D
X Y INTERFACE
COMPUTER TEST SET

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016416
SCALE NONE | WT | SHEET 3 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016416 -

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDAR 28119		

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	D197	394	P10-B9	BLK	24	2	340	S20A-C	
		↑	↑ B10	WHT	↑		340	S20A-NO	
	D198		B11	BLK		↑	339	S19A-C	
			B12	WHT			339	S19A-NO	
	D199		B15	WHT			262	S12A-C	
			B16	BLK			262	S12B-C	
	D200		C1	BLK			322	S17B-B-A	
			C2	WHT			320	S17B-C-A	
	D201		C3	WHT			349	J10	
			C4	BLK			349	J10-GRD	
	D202		C5	WHT			350	J11	
			C6	BLK			350	J11-GRD	
	D203		C15	WHT			357	S34A-C	
			C16	BLK		↓	357	S34A-NO	
	D204		C17	WHT	↓	2	263	S13C-NO	
			C18	BLK	24		263	S13B-NO	
	D205		B13	WHT	22	5	404	S14-3	
	D206		B14	↑	↑	↑	263	S13A-NO	
	D207		B17				262	S12C-C	
	D208		B18				262	S12C-NO	
	D209		B19				262	S12C-NC	
	D210		C7				397	S27A-NO	
	D211		C8				398	S28A-NO	
	D212		C9				399	S29A-NO	
	D213		C10				397	S27A-C	
	D214		C11				400	S30A-NO	
	D215		C12				401	S31A-NO	
	D216		C13				402	S32A-NO	
	D217	↓	↓ C14	↓	↓	↓	403	S33A-NO	
	D218	394	P10-C19	WHT	22	5	342	S22A-NC	
	D219	92	S2E-2	WHT	24	32	219	S1E-2	TWIST
	D220	75	S2F-2	BLK	↑	33	240	S1F-2	
	D221	93	S2E-3	WHT		32	220	S1E-3	↑
	D222	76	S2F-3	BLK		33	241	S1F-3	
	D223	94	S2E-4	WHT		32	221	S1E-4	
	D224	77	S2F-4	BLK		33	242	S1F-4	
	D225	95	S2E-5	WHT		32	222	S1E-5	
	D226	78	S2F-5	BLK		33	243	S1F-5	
	D227	96	S2E-6	WHT		32	223	S1E-6	
	D228	79	S2F-6	BLK		33	244	S1F-6	
	D229	97	S2E-7	WHT		32	224	S1E-7	
	D230	80	S2F-7	BLK		33	245	S1F-7	
	D231	98	S2E-8	WHT		32	225	S1E-8	
	D232	81	S2F-8	BLK		33	246	S1F-8	
	D233	99	S2E-13	WHT		32	230	S1E-13	
	D234	82	S2F-13	BLK		33	251	S1F-13	
	D235	100	S2E-14	WHT		32	231	S1E-14	
	D236	83	S2F-14	BLK		33	252	S1F-14	
	D237	101	S2E-15	WHT		32	232	S1E-15	
	D238	84	S2F-15	BLK		33	253	S1F-15	
	D239	102	S2E-16	WHT		32	233	S1E-16	
	D240	85	S2F-16	BLK		33	254	S1F-16	
	D241	103	S2E-17	WHT		32	234	S1E-17	
	D242	86	S2F-17	BLK		33	255	S1F-17	
	D243	104	S2E-18	WHT		32	235	S1E-18	
	D244	87	S2F-18	BLK		33	256	S1F-18	
	D245	105	S2E-19	WHT		32	236	S1E-19	
	D246	88	S2F-19	BLK		33	257	S1F-19	
	D247	106	S2E-20	WHT		32	237	S1E-20	
	D248	89	S2F-20	BLK		33	258	S1F-20	
	D249	130	S2A-2	WHT		32	150	S1A-2	
	D250	110	S2B-2	BLK		33	170	S1B-2	
	D251	131	S2A-3	WHT		32	151	S1A-3	
	D252	111	S2B-3	BLK		33	171	S1B-3	
	D253	132	S2A-4	WHT		32	152	S1A-4	
	D254	112	S2B-4	BLK		33	172	S1B-4	
	D255	133	S2A-5	WHT		32	153	S1A-5	
	D256	113	S2B-5	BLK		33	173	S1B-5	
	D257	134	S2A-6	WHT		32	154	S1A-6	
	D258	114	S2B-6	BLK		33	174	S1B-6	
	D259	135	S2A-7	WHT		32	155	S1A-7	
	D260	115	S2B-7	BLK		33	175	S1B-7	
	D261	136	S2A-8	WHT		32	156	S1A-8	
	D262	116	S2B-8	BLK		33	176	S1B-8	↓
	D263	137	S2A-9	WHT	↓	32	157	S1A-9	TWIST
	D264	117	S2B-9	BLK	24	33	177	S1B-9	
	D265	351	S18-1	WHT	22	5	383	R1-ARM	
	D266	352	↑ 2	↑	↑	↑	384	R2-ARM	
	D267	354	3				385	R3-ARM	
	D268	355	4				386	R4-ARM	
	D269	356	↓ 5				387	R5-ARM	
	D270	353	S18-ARM				390	A2-40	
	D271	391	A2-14				74	S2F-1	
	D272	74	S2F-1				91	S2E-1	
	D273	91	S2E-1	↓	↓	↓	218	S1E-1	
	D274	218	S1E-1	WHT	22	5	239	S1F-1	

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
	D275	138	S2A-10	WHT	24	32	158	S1A-10	TWIST
	D276	118	S2B-10	BLK	↑	33	178	S1B-10	
	D277	139	S2A-11	WHT		32	159	S1A-11	↑
	D278	119	S2B-11	BLK		33	179	S1B-11	
	D279	140	S2A-12	WHT		32	160	S1A-12	
	D280	120	S2B-12	BLK		33	180	S1B-12	
	D281	137	S2A-9	WHT		32	262	S12A-NO	
	D282	117	S2B-9	BLK		33	262	S12B-NO	
	D283	141	S2A-13	WHT		32	161	S1A-13	
	D284	121	S2B-13	BLK		33	181	S1B-13	
	D285	142	S2A-14	WHT		32	162	S1A-14	
	D286	122	S2B-14	BLK		33	182	S1B-14	
	D287	143	S2A-15	WHT		32	163	S1A-15	
	D288	123	S2B-15	BLK		33	183	S1B-15	
	D289	144	S2A-16	WHT		32	164	S1A-16	
	D290	124	S2B-16	BLK		33	184	S1B-16	
	D291	145	S2A-17	WHT		32	165	S1A-17	
	D292	125	S2B-17	BLK		33	185	S1B-17	
	D293	146	S2A-18	WHT		32	166	S1A-18	
	D294	126	S2B-18	BLK		33	186	S1B-18	
	D295	147	S2A-19	WHT		32	167	S1A-19	
	D296	127	S2B-19	BLK		33	187	S1B-19	
	D297	148	S2A-20	WHT		32	168	S1A-20	
	D298	128	S2B-20	BLK		33	188	S1B-20	
	D299	149	S1A-ARM	WHT		32	275	S4-A1	
	D300	169	S1B-ARM	BLK		33	276	S4-C1	
	D301	129	S2A-ARM	WHT		32	267	S7-A1	
	D302	109	S2B-ARM	BLK		33	270	S7-C1	↓
	D303	282	S4-A-A	WHT		32	334	S17A-D1	TWIST
	D304	277	S4-C-A	BLK		33	338	S17A-A1	
	D305	333	S17A-B3	WHT		2	259	S5B-C	
		330	S17A-C3	BLK			259	S5A-C	
	D306	260	S6B-C	WHT		2	294	S15A-A7	
		260	S6A-C	BLK			283	S15A-B1	
	D307	294	S15A-A7	WHT		32	317	S16A-A-A	TWIST
	D308	283	S15A-B1	BLK		33	305	S16B-A-A	
	D309	274	S7A-A	WHT		32	331	S17A-B1	TWIST
	D310	271	S7C-A	BLK		33	328	S17A-C1	
	D311	336	S17A-D3	WHT		2	265	S8B-C	
		327	S17A-A3	BLK			265	S8A-C	
	D312	266	S9B-C	WHT		32	288	S15A-B5	TWIST
	D313	266	S9A-C	BLK		33	284	S15A-B2	
	D314	293	S15A-A6	WHT		32	313	S16A-B-A	↑
	D315	284	S15A-B2	BLK		33	300	S16B-B-A	
	D316	318	S16A-A2	WHT		32	360	A3-8	
	D317	306	S16B-A2	BLK		33	360	↑ 7	
	D318	308	S16A-A3	WHT		32	364	16	
	D319	307	S16B-A3	BLK		33	364	15	
	D320	309	S16A-A4	WHT		32	368	24	
	D321	295	S16B-A4	BLK		33	368	23	
	D322	314	S16A-B2	WHT		32	362	12	
	D323	301	S16B-B2	BLK		33	362	11	
	D324	315	S16A-B3	WHT		32	366	↓ 20	
	D325	302	S16B-B3	BLK		33	366	A3-19	↓
	D326	316	S16A-C-A	WHT		32	289	S15A-B6	TWIST
	D327	303	S16B-C-A	BLK		33	285	S15A-B3	
	~~D328~~	~~259~~	~~S9A-NO~~	~~WHT~~		~~2~~	~~372~~	~~A3-28~~	
		~~259~~	~~S9B-NO~~	~~BLK~~			~~376~~	~~↑ 38~~	
	~~D329~~	~~260~~	~~S6A-NO~~	~~WHT~~			~~373~~	~~29~~	
		~~260~~	~~S6B-NO~~	~~BLK~~			~~377~~	~~39~~	
	~~D330~~	~~265~~	~~S8A-NO~~	~~WHT~~		~~2~~	~~370~~	~~26~~	
		~~265~~	~~S8B-NO~~	~~BLK~~			~~374~~	~~36~~	
	~~D331~~	~~266~~	~~S9A-NO~~	~~WHT~~	↓	~~2~~	~~371~~	~~↓ 27~~	
		↓	~~S9B-NO~~	~~BLK~~	~~24~~		~~375~~	~~A3-37~~	
	D332	266	S9D-NO	BLK	22	4	259	S5D-NO	
	D333	266	S9-3	WHT	↑	5	259	S5-3	
	D334	266	S9D-NC	↑		↑	259	S5D-NC	
	D335	304	S16B-C4				348	J9-GRD	
	D336	373	A3-30	↓	↓	↓	347	J8-GRD	
	D337	292	S15A-D-A	WHT	22	5	345	J6-GRD	
△	D338	△	E3	COAX		1	△	E4	△
		↑	E3-SHLD	SHLD			△	E4-SHLD	SEE D392
△	D339		E4	WHT	22	5	361	A3-9	
△	D340		E3	WHT	22	5	310	S16A-D2	
△	D341		E5	COAX		1	△	E6	△
			E5-SHLD	SHLD			△	E6-SHLD	SEE D393
△	D342		E5	WHT	22	5	312	S16A-D3	
△	D343		E6	WHT	22	5	367	A3-21	
△	D344		E7	COAX		1	△	E22	△
			E7-SHLD	SHLD			△	E22-SHLD	SEE D390&394
△	D345	↓	E7	WHT	22	5	311	S16A-D-A	
△	D346	△	E22	WHT	22	5	347	J8	

△ DENOTES EXTERNAL CONNECTION

~~△ STRIP .31, TIN .06~~

~~△ STRIP .44, TIN .06~~

~~△ STRIP .25, DO NOT TIN~~

ASSEMBLY INFORMATION CHART

FROM				DESCRIPTION			TO		
REMARKS	COND IDENT	STA NO.	DES	COLOR	AWG	FIND NO.	STA NO.	DES	REMARKS
△	D347	△	E9	COAX		1	△	E10	△
		↑	E9-SHLD	SHLD			△	E10-SHLD	SEE D395
△	D348		E9	WHT	22	5	296	S16B-D2	
△	D349		E10	WHT	22	5	363	A3-13	
△	D350		E11	COAX		1	△	E12	△
			E11-SHLD	SHLD			△	E12-SHLD	SEE D396
△	D351		E12	WHT	22	5	365	A3-17	
△	D352		E11	WHT	22	5	298	S16B-D3	
△	D353		E13	COAX		1	△	E14	△
			E13-SHLD	SHLD			△	E14-SHLD	SEE D397
△	D354		E14	WHT	22	5	369	A3-25	
△	D355		E13	WHT	22	5	299	S16B-D4	
△	D356		E15	COAX		1	△	E23	△
			E15-SHLD	SHLD			△	E23-SHLD	SEE D390
△	D357		E15	WHT	22	5	297	S16B-D-A	
△	D358		E23	WHT	22	5	348	J9	
△	D359		E21	COAX		1	△	E17	△
			E21-SHLD	SHLD			△	E17-SHLD	SEE D391&D398
△	D360		E21	WHT	22	5	291	S15A-A-A	
△	D361		E17	WHT	22	5	345	J6	
△	D362		E20	COAX		1	△	E19	△
			E20-SHLD	SHLD			△	E19-SHLD	SEE D391
△	D363	↓	E20	WHT	22	5	286	S15A-B-A	
△	D364	△	E19	WHT	22	5	346	J7	
	D365	266	S9D-NO	WHT	24	2	264	S11D-NO	
		266	S9D-NC	BLK	24		264	S11D-NC	
	D366	389	A2-42	WHT	24	2	400	S30-1	
		389	A2-43	BLK	24		400	S30D-NO	
	D367	388	A2-48	WHT	22	5	383	A1R1-CCW	
	~~D368~~	~~392~~	~~A2-18~~				~~400~~	~~S30-NC~~	
	D369	393	A2-2	WHT	22	5	290	S15B-B7	
	D370	393	A2-3	WHT	22	5	287	S15B-B4	
	D371	238	S1F-ARM	WHT	24	32	279	S4-C3	TWIST
	D372	217	S1E-ARM	BLK	↑	33	280	S4-A3	
	D373	90	S2E-ARM	WHT		32	272	S7-A3	↑
	D374	73	S2F-ARM	BLK		33	268	S7-C3	
	D375	203	S1D-ARM	WHT		32	278	S4-C2	
	D376	189	S1C-ARM	BLK		33	281	S4-A2	
	D377	107	S2D-ARM	WHT		32	269	S7-C2	
	D378	108	S2C-ARM	BLK		33	273	S7-A2	
	D379	263	S13D-NO	WHT		32	344	S24D-NO	
	D380	263	S13D-NC	BLK		33	359	S36D-NC	↓
	D381	263	S13D-NO	WHT	↓	32	359	S36D-NO	TWIST
	D382	263	S13D-NC	BLK	24	33	344	S24D-NC	
	D383	266	S9-1	WHT	22	5	264	S11-1	
	D384	289	S15A-B6	WHT	22	3	381	J3-K8	
		285	S15A-B3	BLK	22		381	J3-L8	
		△	E1	SHLD			△	E2	
	D385	△	E2	BLK	22	4	381	J3-J8	
	D386	△	E1	BLK	22	4	287	S15B-B3	
	D387	344	S24-3	WHT	22	5	264	S13-1	
	~~D388~~	~~147~~	~~S2A-19~~	~~WHT~~	~~24~~	~~32~~	~~263~~	~~S13B-C~~	~~TWIST~~
	~~D389~~	~~127~~	~~S2B-19~~	~~BLK~~	~~24~~	~~33~~	~~263~~	~~S13C-C~~	
△	D390	△	E22-SHLD	BLK	22	4	△	E23-SHLD	△
↑	D391	↑	E17-SHLD	↑	↑	↑	△	E19-SHLD	△
	D392		E4-SHLD				360	A3-6	
	D393		E6-SHLD				366	A3-18	
	D394		E22-SHLD				347	J8-GRD	
	D395		E10-SHLD				363	A3-10	
	D396		E12-SHLD				365	A13-14	
↓	D397	↓	E14-SHLD	↓	↓	↓	369	A3-22	
△	D398	△	E17-SHLD	BLK	22	4	345	J6-GRD	
	D399	394	P10-A15	WHT	24	32	325	S17B-A-A	TWIST
	D400	394	P10-A16	BLK	↑	33	324	S17B-D-A	
	D401	259	S5A-NO	WHT		32	372	A3-28	TWIST
	D402	259	S5B-NO	BLK		33	376	↑ -38	
	D403	260	S6A-NO	WHT		32	373	-29	TWIST
	D404	260	S6B-NO	BLK		33	377	-39	
	D405	265	S8A-NO	WHT		32	370	-26	TWIST
	D406	265	S8B-NO	BLK		33	374	-36	
	D407	266	S9A-NO	WHT	↓	32	371	↓ -27	TWIST
	D408	266	S9B-NO	BLK	24	33	375	A3-37	

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN DATE 12 APR 66
CHECKED C. [illegible] 13 APR 66
APPROVAL R. [illegible] 4/14/66
APPROVAL [illegible] 4/14/66
APPROVAL [illegible] 4/14/66
NASA APPROVAL
MIT APPROVAL 7/15 [illegible]
MIT APPROVAL [illegible] 9/19/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

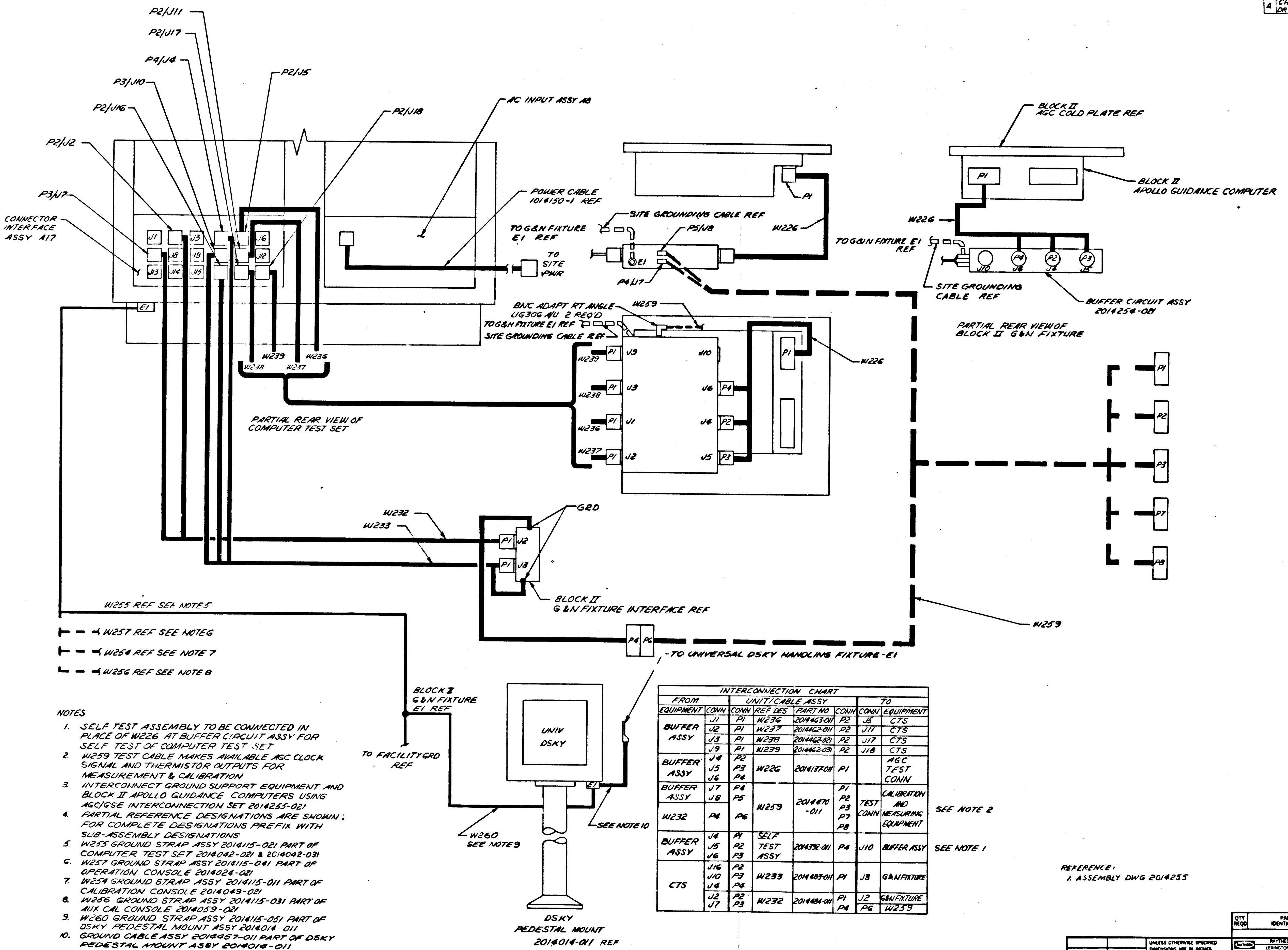
WIRING HARNESS, BRANCHED-D
XY INTERFACE
COMPUTER TEST SET

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016416
SCALE NONE | WT | SHEET 4 OF 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016417 A

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28279		
A	CHANGED PER TDRR 29326 DR CHK APPD		



P2/J11
P2/J17
P4/J4
P3/J10
P2/J5
P2/J16
P2/J18
AC INPUT ASSY A8
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
J1
J8
J3
J9
J6
J2
J14
J16
J13
E1
POWER CABLE 1014150-1 REF
TO SITE PWR
W238
W237
W239
W236
PARTIAL REAR VIEW OF COMPUTER TEST SET
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1 REF
P5/J8
P4/J7
P1
W226
BLOCK II AGC COLD PLATE REF
BLOCK II APOLLO GUIDANCE COMPUTER
TO G&N FIXTURE E1 REF
SITE GROUNDING CABLE REF
J10
J6
J4
J5
P4
P2
P3
BUFFER CIRCUIT ASSY 2014254-021
PARTIAL REAR VIEW OF BLOCK II G&N FIXTURE
BNC ADAPT RT ANGLE UG306 A/U 2 REQ'D
W259
TO G&N FIXTURE E1 REF
SITE GROUNDING CABLE REF
P1 J9
J10
P1 J3
P4 J6
P1 J1
P2 J4
P1 J2
P3 J5
P1
W226
P1
P2
P3
P7
P8
W232
W233
GRD
P1 J2
P1 J3
BLOCK II G&N FIXTURE INTERFACE REF
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
W259
P4
P6
TO UNIVERSAL DSKY HANDLING FIXTURE-E1
BLOCK II G&N FIXTURE E1 REF
TO FACILITY GRD REF
UNIV DSKY
E1
W260 SEE NOTE 9
SEE NOTE 10
DSKY PEDESTAL MOUNT 2014014-011 REF

NOTES

1. SELF TEST ASSEMBLY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 PART OF COMPUTER TEST SET 2014042-021 & 2014042-031
6. W257 GROUND STRAP ASSY 2014115-041 PART OF OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 PART OF CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 PART OF AUX CAL CONSOLE 2014059-021
9. W260 GROUND STRAP ASSY 2014115-051 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011
10. GROUND CABLE ASSY 2014457-011 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011

INTERCONNECTION CHART

FROM		UNIT/CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
BUFFER ASSY	J4 J5 J6	P2 P3 P4	W226	2014137-011	P1		AGC TEST CONN	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	TEST CONN	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	P4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259	

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON MASS.
CONTRACT NO. NAS 9-497
DRAWN
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II
G & N TEST

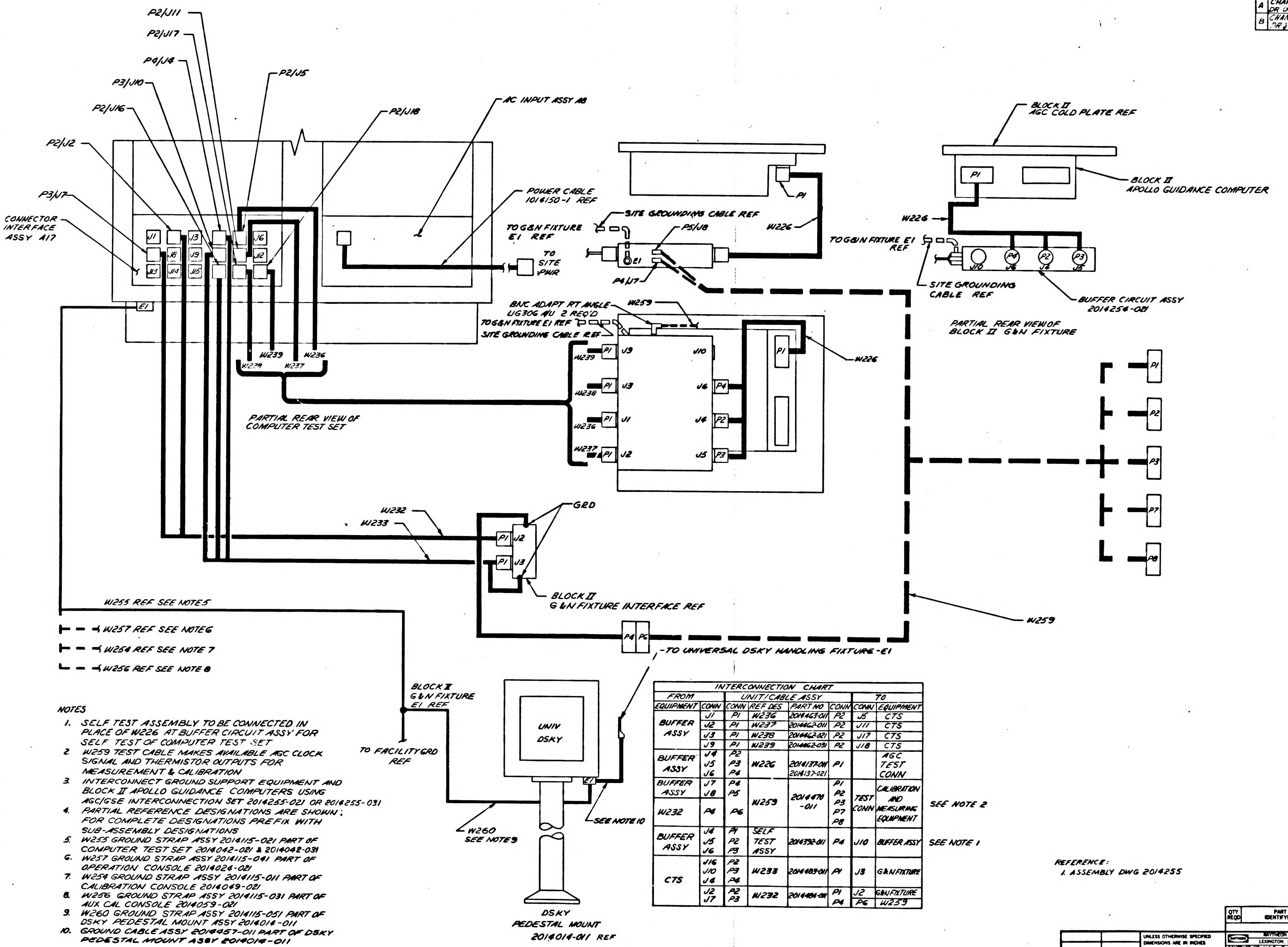
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016417
SCALE NONE WT SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

20164 7 A

2016417 B

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
-	CLASS A RELEASED PER TDRR 28799		
A	CHANGED PER TDRR 29326 DR [illegible] CHK [illegible] APPD [illegible]	[illegible]/66	[illegible]
B	CHANGED PER TDRR 30579 DR [illegible] CHK [illegible] APPD [illegible]	[illegible]/66	[illegible]


P2/J11
P2/J17
P4/J4
P3/J10
P2/J16
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
P2/J5
P2/J18
AC INPUT ASSY A8
POWER CABLE 1014150-1 REF
TO SITE PWR
J1
J3
J6
J8
J9
J12
J13
J14
J15
E1
W239
W236
W238
W237
PARTIAL REAR VIEW OF COMPUTER TEST SET
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1 REF
P5/J8
P4/J7
E1
P1
W226
BNC ADAPT RT ANGLE UG306 A/U 2 REQ'D
W259
TO G&N FIXTURE E1 REF
SITE GROUNDING CABLE REF
P1
J9
J10
W239
P1
J3
J6
P4
W238
P1
J1
J4
P2
W236
W237
P1
J2
J5
P3
W226
BLOCK II AGC COLD PLATE REF
P1
BLOCK II APOLLO GUIDANCE COMPUTER
W226
TO G&N FIXTURE E1 REF
J10
P4
J6
P2
J4
P3
J5
SITE GROUNDING CABLE REF
BUFFER CIRCUIT ASSY 2014254-021
PARTIAL REAR VIEW OF BLOCK II G&N FIXTURE
P1
P2
P3
P7
P8
W232
W233
GRD
P1
J2
P1
J3
BLOCK II G&N FIXTURE INTERFACE REF
W259
P4
P6
-TO UNIVERSAL DSKY HANDLING FIXTURE-E1
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
BLOCK II G&N FIXTURE E1 REF
TO FACILITY GRD REF
UNIV DSKY
E1
W260 SEE NOTE 9
SEE NOTE 10
DSKY PEDESTAL MOUNT 2014014-011 REF

INTERCONNECTION CHART								
FROM		UNIT/CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
BUFFER ASSY	J4 J5 J6	P2 P3 P4	W226	2014137-011 2014137-021	P1		AGC TEST CONN	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	TEST CONN	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	P4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1	J2	G&N FIXTURE	
					P4	P6	W259	

NOTES

1. SELF TEST ASSEMBLY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021 OR 2014255-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 PART OF COMPUTER TEST SET 2014042-021 & 2014042-031
6. W257 GROUND STRAP ASSY 2014115-041 PART OF OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 PART OF CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 PART OF AUX CAL CONSOLE 2014059-021
9. W260 GROUND STRAP ASSY 2014115-051 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011
10. GROUND CABLE ASSY 2014457-011 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN [illegible] DATE [illegible]
CHECKED [illegible]
APPROVAL [illegible]
APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II
G & N TEST

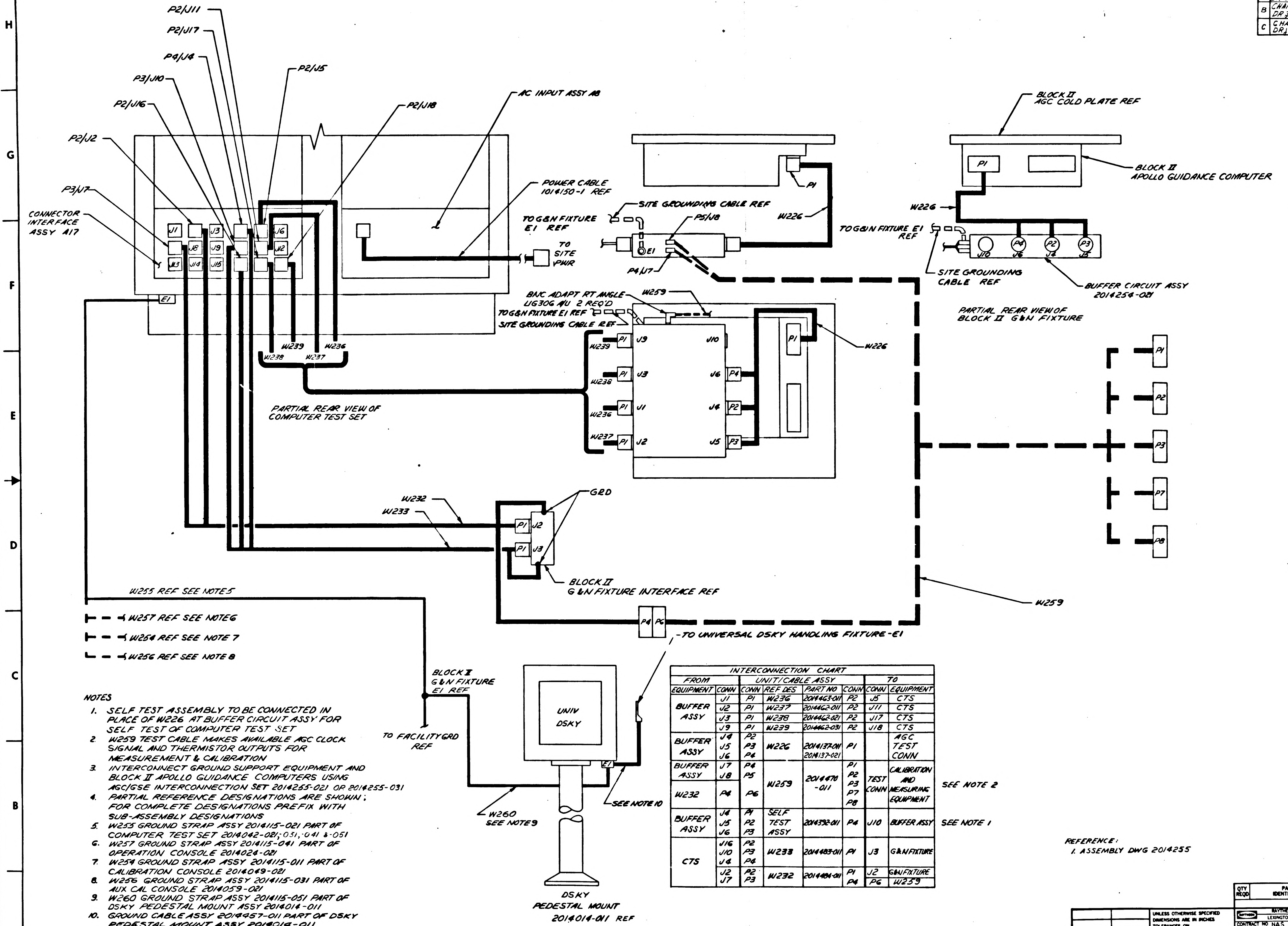
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016417
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016417 B

2016417 C

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28299		
A	CHANGED PER TDRR 29326 DR Okaywood CHK APPD		
B	CHANGED PER TDRR 30573 DR J P Leonard CHK APPD		
C	CHANGED PER TDRR 31287 DR J Giordano CHK APPD		


P2/J11
P2/J17
P4/J4
P3/J10
P2/J5
P2/J16
P2/J18
AC INPUT ASSY A8
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
J1
J3
J6
J8
J9
J12
J13
J14
J15
E1
POWER CABLE 1014150-1 REF
TO SITE PWR
W239
W236
W238
W237
PARTIAL REAR VIEW OF COMPUTER TEST SET
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1 REF
P5/J8
P4/J7
P1
W226
BNC ADAPT RT ANGLE UG306 A/U 2 REQ'D
W259
TO G&N FIXTURE E1 REF
SITE GROUNDING CABLE REF
P1 J9
P1 J3
P1 J1
P1 J2
J10
J6 P4
J4 P2
J5 P3
BLOCK II AGC COLD PLATE REF
BLOCK II APOLLO GUIDANCE COMPUTER
TO G&N FIXTURE E1 REF
SITE GROUNDING CABLE REF
BUFFER CIRCUIT ASSY 2014254-021
PARTIAL REAR VIEW OF BLOCK II G&N FIXTURE
P1
P2
P3
P7
P8
W232
W233
GRD
P1 J2
P1 J3
BLOCK II G&N FIXTURE INTERFACE REF
W259
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
P4 P6
TO UNIVERSAL DSKY HANDLING FIXTURE-E1
BLOCK II G&N FIXTURE E1 REF
TO FACILITY GRD REF
UNIV DSKY
E1
SEE NOTE 10
W260 SEE NOTE 9
DSKY PEDESTAL MOUNT 2014014-011 REF

NOTES
1. SELF TEST ASSEMBLY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021 OR 2014255-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 PART OF COMPUTER TEST SET 2014042-021, -031, -041 & -051
6. W257 GROUND STRAP ASSY 2014115-041 PART OF OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 PART OF CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 PART OF AUX CAL CONSOLE 2014059-021
9. W260 GROUND STRAP ASSY 2014115-051 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011
10. GROUND CABLE ASSY 2014457-011 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011

INTERCONNECTION CHART

FROM		UNIT/CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
BUFFER ASSY	J4 J5 J6	P2 P3 P4	W226	2014137-011 2014137-021	P1		AGC TEST CONN	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	TEST CONN	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	P4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259	

REFERENCE:
1. ASSEMBLY DWG 2014255

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 23 APR
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APPROVAL
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NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II
G & N TEST

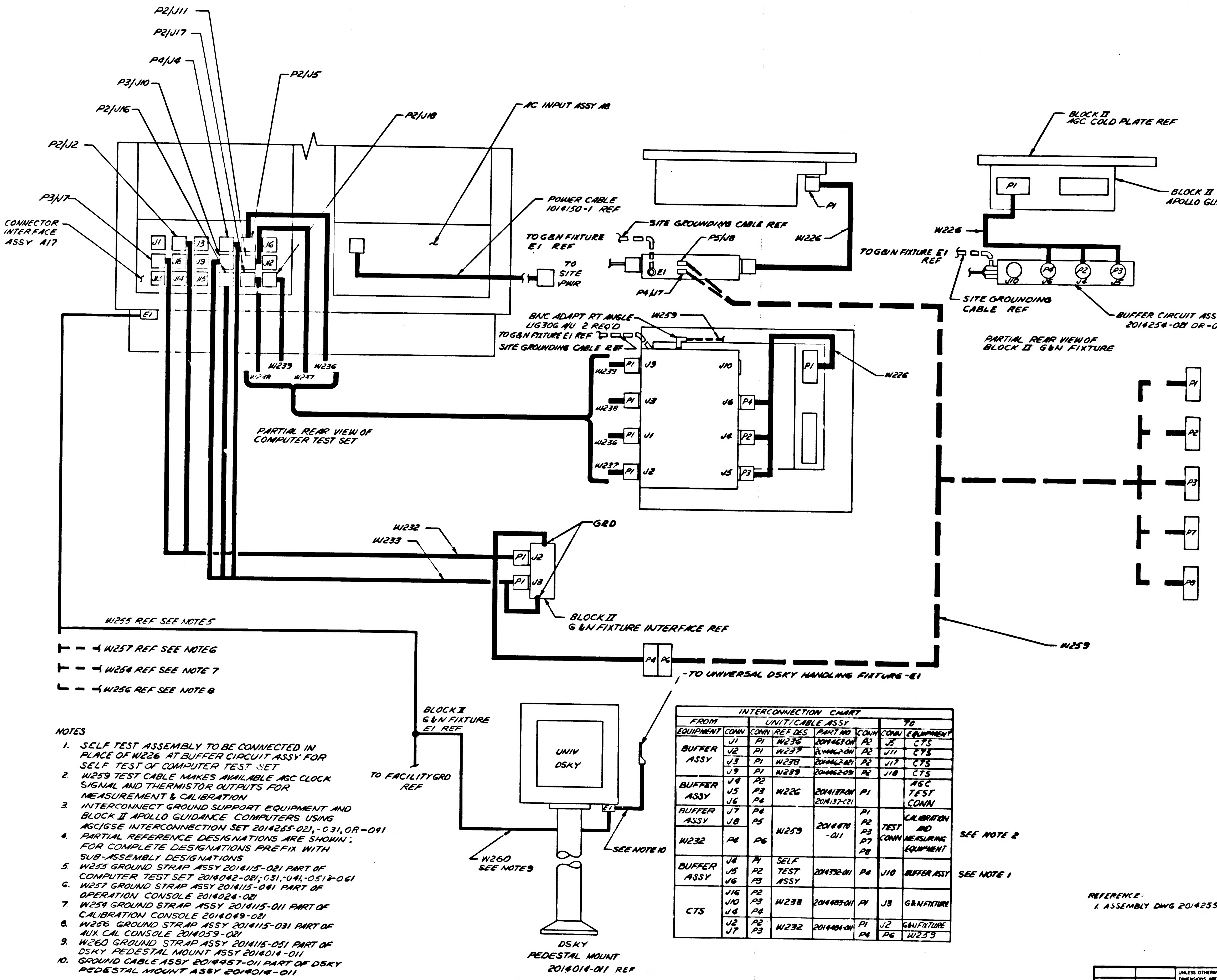
SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016417
SCALE NONE | WT | SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

FOR INFORMATION ONLY

2016417 D

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
-	CLASS A RELEASED PER TDRR 21779		
A	CHANGED PER TDRR 29320 DR [illegible] CHK [illegible] APPD [illegible]	[illegible]	[illegible]
B	CHANGED PER TDRR 305[illegible] DR [illegible] CHK [illegible] APPD [illegible]	[illegible]	[illegible]
C	CHANGED PER TDRR 31287 DR [illegible] CHK [illegible] APPD [illegible]		[illegible]
D	CHANGED PER TDRR [illegible] DR [illegible] CHK [illegible]	[illegible]	


P2/J11
P2/J17
P4/J4
P3/J10
P2/J5
P2/J16
P2/J18
AC INPUT ASSY A8
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
J1
J3
J6
J8
J9
J12
J13
J14
J15
E1
POWER CABLE 1014150-1 REF
TO SITE PWR
W239
W236
W238
W237
PARTIAL REAR VIEW OF COMPUTER TEST SET
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1 REF
P5/J8
P4/J7
E1
P1
W226
BLOCK II AGC COLD PLATE REF
BLOCK II APOLLO GUIDANCE COMPUTER
P1
W226
TO G&N FIXTURE E1 REF
J10
P4
J6
P2
J4
P3
J5
SITE GROUNDING CABLE REF
BUFFER CIRCUIT ASSY 2014254-021 OR-031
PARTIAL REAR VIEW OF BLOCK II G&N FIXTURE
BNC ADAPT RT ANGLE UG306 A/U 2 REQ'D
W259
TO G&N FIXTURE E1 REF
SITE GROUNDING CABLE REF
P1
J9
W239
J10
P1
J3
W238
J6
P4
P1
J1
W236
J4
P2
P1
J2
W237
J5
P3
W226
P1
P2
P3
P7
P8
W232
W233
GRD
P1
J2
P1
J3
BLOCK II G&N FIXTURE INTERFACE REF
W259
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
P4
P6
-TO UNIVERSAL DSKY HANDLING FIXTURE-E1
BLOCK II G&N FIXTURE E1 REF
TO FACILITY GRD REF
UNIV DSKY
E1
W260 SEE NOTE 9
SEE NOTE 10
DSKY PEDESTAL MOUNT 2014014-011 REF

INTERCONNECTION CHART							
FROM		UNIT/CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DES	PART NO	CONN	CONN	EQUIPMENT
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS
	J2	P1	W237	2014462-011	P2	J11	CTS
	J3	P1	W238	2014462-021	P2	J17	CTS
	J9	P1	W239	2014462-031	P2	J18	CTS
BUFFER ASSY	J4 J5 J6	P2 P3 P4	W226	2014137-011 2014137-021	P1		AGC TEST CONN
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	TEST CONN	CALIBRATION AND MEASURING EQUIPMENT
W232	P4	P6					
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259

SEE NOTE 2

SEE NOTE 1

NOTES

1. SELF TEST ASSEMBLY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021, -031, OR-041
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 PART OF COMPUTER TEST SET 2014042-021,-031,-041,-051&-061
6. W257 GROUND STRAP ASSY 2014115-041 PART OF OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 PART OF CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 PART OF AUX CAL CONSOLE 2014059-021
9. W260 GROUND STRAP ASSY 2014115-051 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011
10. GROUND CABLE ASSY 2014457-011 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCE ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON MASS.
CONTRACT NO NAS 9-497
DRAWN [illegible]
CHECKED [illegible]
APPROVAL [illegible]
APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

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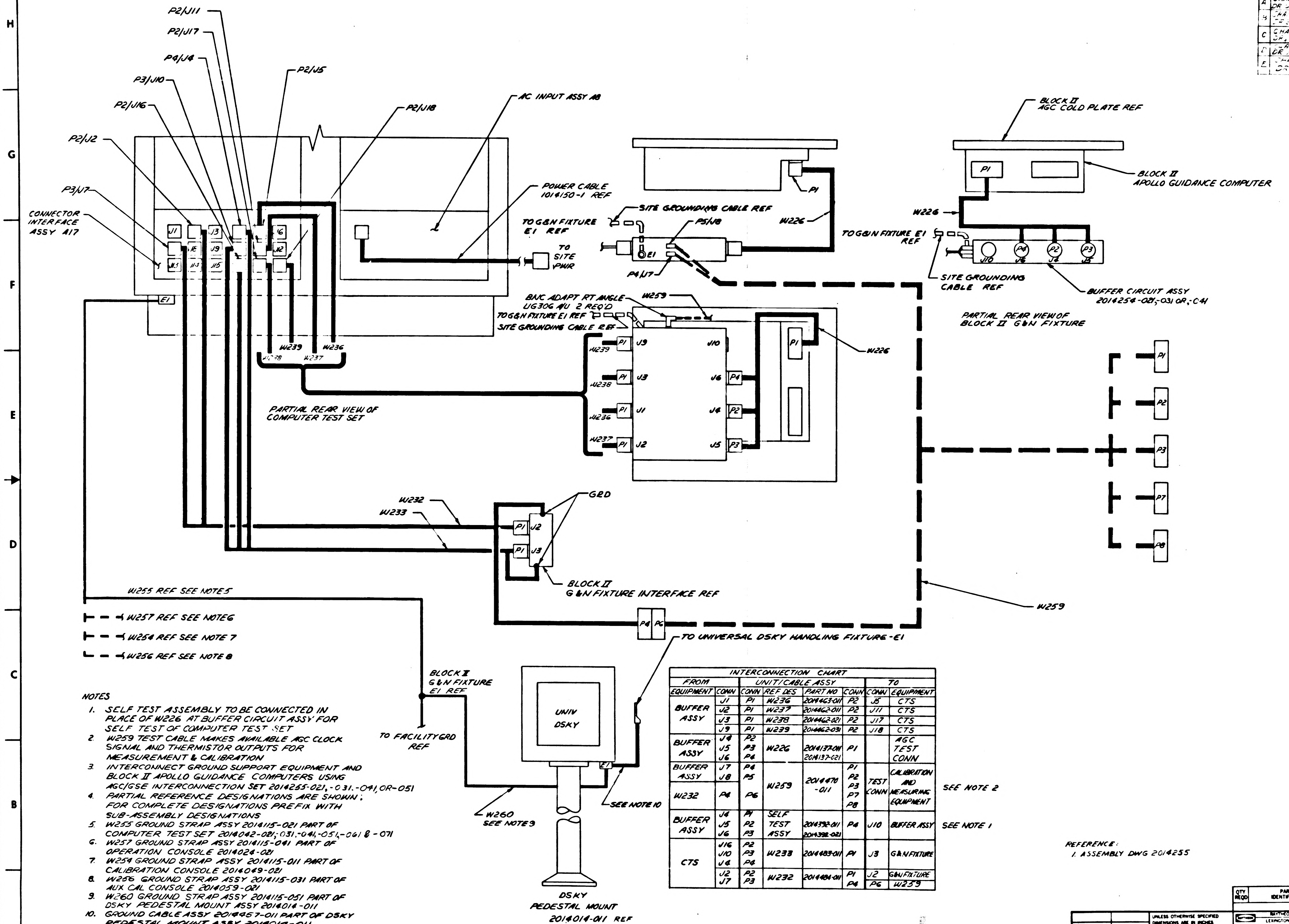
AGC/GSE INTERCONNECTIONS
BLOCK II
G & N TEST

SIZE J
CODE IDENT NO 49956
NASA DRAWING NO 2016417
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2014417 E

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 27279		
A	CHANGED PER TDRR 27326 DR [illegible] CHK SPS APPD [illegible]	[illegible]	[illegible]
B	CHANGED PER TDRR [illegible] DR [illegible] CHK [illegible] APPD	[illegible]	[illegible]
C	CHANGED PER TDRR 31287 DR [illegible] CHK [illegible] APPD		[illegible]
D	CHANGED PER TDRR [illegible]8 DR [illegible] CHK [illegible]		
E	CHANGED PER TDRR [illegible]5592 DR [illegible] CHK [illegible] APPD		


P2/J11
P2/J17
P4/J4
P3/J10
P2/J16
P2/J5
P2/J2
P3/J7
P2/J18
AC INPUT ASSY A8
CONNECTOR INTERFACE ASSY A17
J1
J3
J9
J15
J6
J12
E1
POWER CABLE 1014150-1 REF
TO SITE PWR
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1 REF
P5/J8
P4/J7
E1
P1
W226
W239
W236
W238
W237
PARTIAL REAR VIEW OF COMPUTER TEST SET
BNC ADAPT RT ANGLE UG306 A/U 2 REQ'D
W259
TO G&N FIXTURE E1 REF
SITE GROUNDING CABLE REF
W239
W238
W236
W237
P1
J9
J3
J1
J2
J10
J6
J4
J5
P4
P2
P3
P1
W226
BLOCK II AGC COLD PLATE REF
BLOCK II APOLLO GUIDANCE COMPUTER
P1
W226
TO G&N FIXTURE E1 REF
SITE GROUNDING CABLE REF
J10
P4 J6
P2 J4
P3 J5
BUFFER CIRCUIT ASSY 2014254-021,-031 OR,-041
PARTIAL REAR VIEW OF BLOCK II G&N FIXTURE
P1
P2
P3
P7
P8
W232
W233
GRD
P1 J2
P1 J3
BLOCK II G&N FIXTURE INTERFACE REF
W259
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
P4 P6
TO UNIVERSAL DSKY HANDLING FIXTURE-E1
BLOCK II G&N FIXTURE E1 REF
TO FACILITY GRD REF
UNIV DSKY
E1
W260 SEE NOTE 9
SEE NOTE 10
DSKY PEDESTAL MOUNT 2014014-011 REF

INTERCONNECTION CHART							
FROM		UNIT/CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REF DES	PART NO	CONN	CONN	EQUIPMENT
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS
	J2	P1	W237	2014462-011	P2	J11	CTS
	J3	P1	W238	2014462-021	P2	J17	CTS
	J9	P1	W239	2014462-031	P2	J18	CTS
BUFFER ASSY	J4 J5 J6	P2 P3 P4	W226	2014137-011 2014137-021	P1		AGC TEST CONN
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	TEST CONN	CALIBRATION AND MEASURING EQUIPMENT
W232	P4	P6					
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011 2014392-021	P4	J10	BUFFER ASSY
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259

SEE NOTE 2

SEE NOTE 1

NOTES

1. SELF TEST ASSEMBLY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021, -031.-041, OR-051
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 PART OF COMPUTER TEST SET 2014042-021,-031,-041,-051,-061 & -071
6. W257 GROUND STRAP ASSY 2014115-041 PART OF OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 PART OF CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 PART OF AUX CAL CONSOLE 2014059-021
9. W260 GROUND STRAP ASSY 2014115-051 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011
10. GROUND CABLE ASSY 2014457-011 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

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APPROVAL
NASA APPROVAL
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HOUSTON, TEXAS

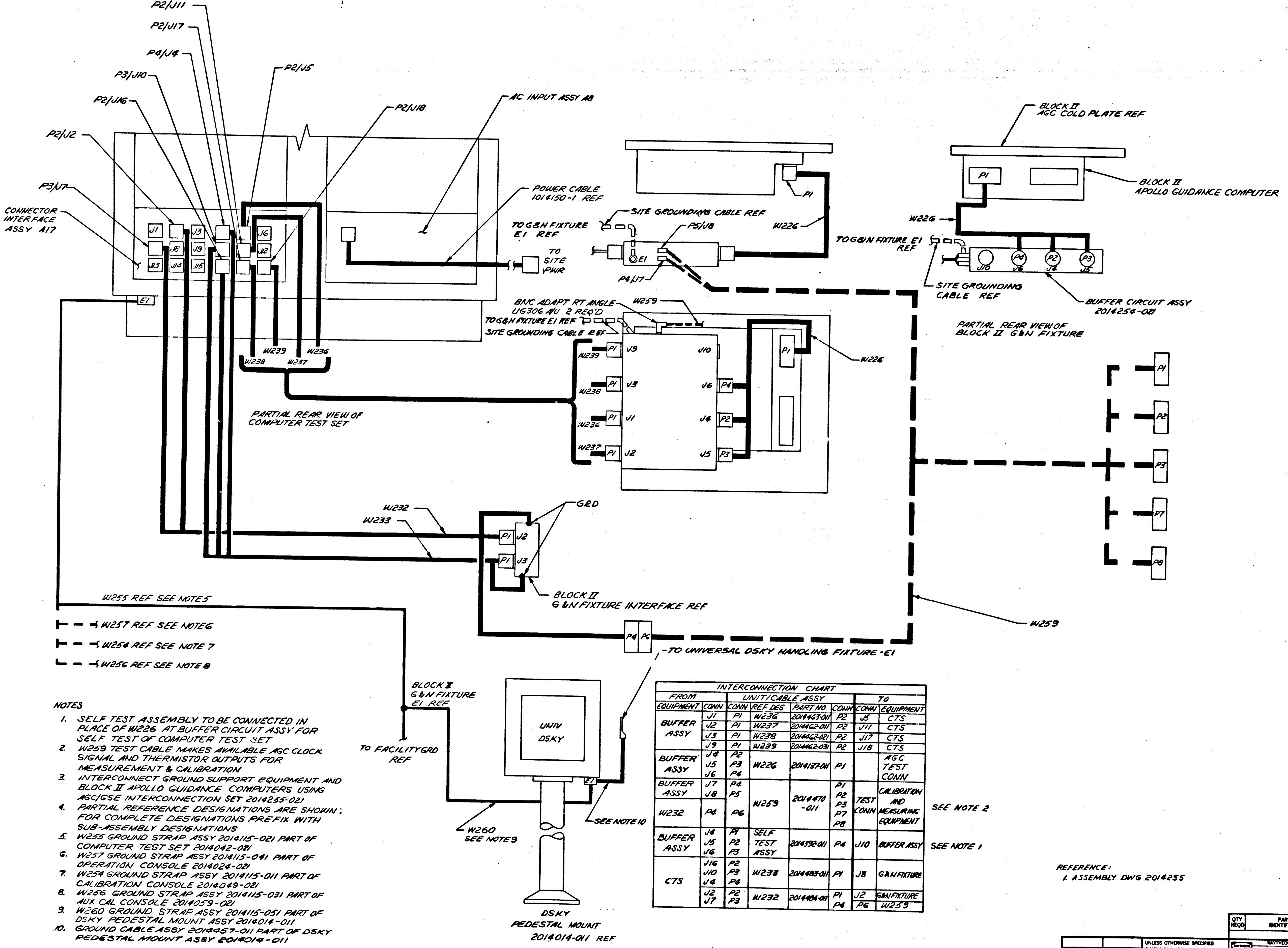
AGC/GSE INTERCONNECTIONS
BLOCK II
G & N TEST

SIZE J | CODE IDENT NO 49956 | NASA DRAWING NO 201-417
SCALE NONE | WT | SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2014417 E

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28779		


P2/J11
P2/J17
P4/J4
P3/J10
P2/J5
P2/J16
P2/J18
AC INPUT ASSY A8
P2/J2
P3/J7
CONNECTOR INTERFACE ASSY A17
J1
J8
J3
J6
J2
J13
J14
J9
J15
E1
POWER CABLE 1014150-1 REF
TO SITE PWR
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1 REF
P5/J8
P4/J7
E1
P1
W226
TO G&N FIXTURE E1 REF
BLOCK II AGC COLD PLATE REF
P1
BLOCK II APOLLO GUIDANCE COMPUTER
W226
J10
P4 J6
P2 J4
P3 J5
SITE GROUNDING CABLE REF
BUFFER CIRCUIT ASSY 2014254-021
PARTIAL REAR VIEW OF BLOCK II G&N FIXTURE
BNC ADAPT RT ANGLE UG306 A/U 2 REQ'D
W259
TO G&N FIXTURE E1 REF
SITE GROUNDING CABLE REF
W239
W238
W237
W236
P1 J9
J10
P1 J3
J6 P4
P1 J1
J4 P2
P1 J2
J5 P3
P1
W226
PARTIAL REAR VIEW OF COMPUTER TEST SET
P1
P2
P3
P7
P8
W232
W233
GRD
P1 J2
P1 J3
BLOCK II G&N FIXTURE INTERFACE REF
W259
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
P4 P6
TO UNIVERSAL DSKY HANDLING FIXTURE-E1
BLOCK II G&N FIXTURE E1 REF
TO FACILITY GRD REF
UNIV DSKY
E1
W260 SEE NOTE 9
SEE NOTE 10
DSKY PEDESTAL MOUNT 2014014-011 REF

INTERCONNECTION CHART								
FROM		UNIT/CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
BUFFER ASSY	J4 J5 J6	P2 P3 P4	W226	2014137-011	P1		AGC TEST CONN	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	TEST CONN	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	P4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1	J2	G&N FIXTURE	
					P4	P6	W259	

NOTES

1. SELF TEST ASSEMBLY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 PART OF COMPUTER TEST SET 2014042-021
6. W257 GROUND STRAP ASSY 2014115-041 PART OF OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 PART OF CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 PART OF AUX CAL CONSOLE 2014059-021
9. W260 GROUND STRAP ASSY 2014115-051 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011
10. GROUND CABLE ASSY 2014457-011 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 23 APR 66
CHECKED 23 APR 66
APPROVAL
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MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II
G & N TEST

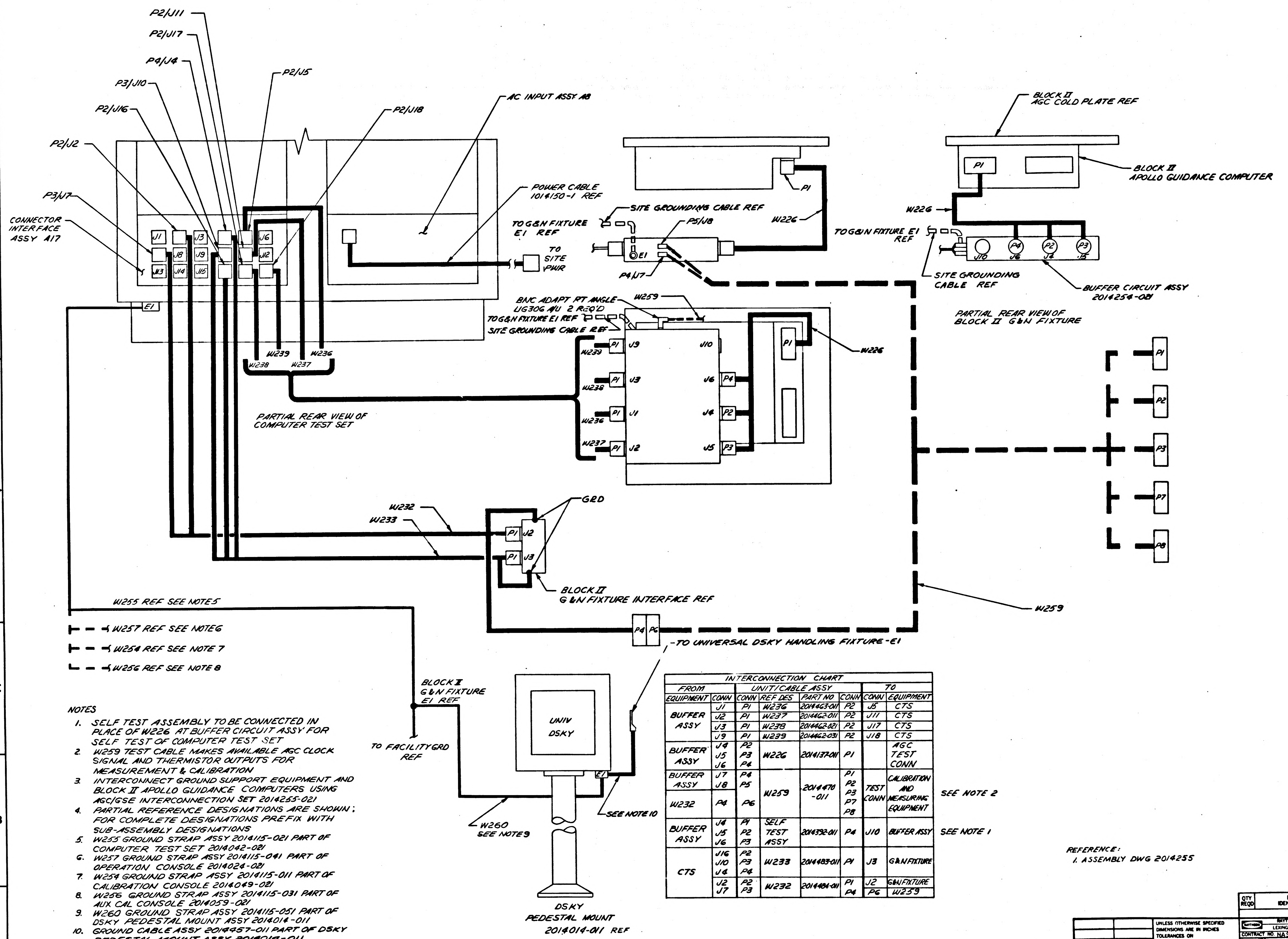
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016417
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016417 -

2016417 –

SYM	REVISIONS DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28799		



P2/J11
P2/J17
P4/J4
P2/J5
P3/J10
P2/J18
P2/J16
AC INPUT ASSY A8
P2/J2
POWER CABLE 1014150-1 REF
P3/J7
CONNECTOR INTERFACE ASSY A17
J1
J3
J6
J8
J9
J12
J13
J14
J15
TO SITE PWR
E1
W239
W236
W238
W237
PARTIAL REAR VIEW OF COMPUTER TEST SET
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1 REF
P5/J8
P1
W226
E1
P4/J7
BNC ADAPT RT ANGLE UG306 A/U 2 REQ'D
W259
TO G&N FIXTURE E1 REF
SITE GROUNDING CABLE REF
P1
J9
J10
J3
J6
P4
J1
J4
P2
J2
J5
P3
W239
W238
W236
W237
W226
BLOCK II AGC COLD PLATE REF
BLOCK II APOLLO GUIDANCE COMPUTER
W226
TO G&N FIXTURE E1 REF
J10
J6
J4
J5
SITE GROUNDING CABLE REF
BUFFER CIRCUIT ASSY 2014254-021
PARTIAL REAR VIEW OF BLOCK II G&N FIXTURE
P1
P2
P3
P7
P8
W232
W233
GRD
J2
J3
BLOCK II G&N FIXTURE INTERFACE REF
W259
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
P4
P6
TO UNIVERSAL DSKY HANDLING FIXTURE-E1
BLOCK II G&N FIXTURE E1 REF
TO FACILITY GRD REF
UNIV DSKY
E1
SEE NOTE 10
W260 SEE NOTE 9
DSKY PEDESTAL MOUNT 2014014-011 REF

NOTES

1. SELF TEST ASSEMBLY TO BE CONNECTED IN PLACE OF W226 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF COMPUTER TEST SET
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK II APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
5. W255 GROUND STRAP ASSY 2014115-021 PART OF COMPUTER TEST SET 2014042-021
6. W257 GROUND STRAP ASSY 2014115-041 PART OF OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 PART OF CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 PART OF AUX CAL CONSOLE 2014059-021
9. W260 GROUND STRAP ASSY 2014115-051 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011
10. GROUND CABLE ASSY 2014457-011 PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011

INTERCONNECTION CHART

FROM		UNIT/CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REF DES	PART NO	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
BUFFER ASSY	J4 J5 J6	P2 P3 P4	W226	2014137-011	P1		AGC TEST CONN	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470 -011	P1 P2 P3 P7 P8	TEST CONN	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W232	P4	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	SEE NOTE 1
CTS	J16 J10 J4	P2 P3 P4	W233	2014483-011	P1	J3	G&N FIXTURE	
	J2 J7	P2 P3	W232	2014484-011	P1 P4	J2 P6	G&N FIXTURE W259	

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN [illegible] DATE 23 APR 65
CHECKED [illegible] 23 APR 65
APPROVAL [illegible]
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK II
G & N TEST

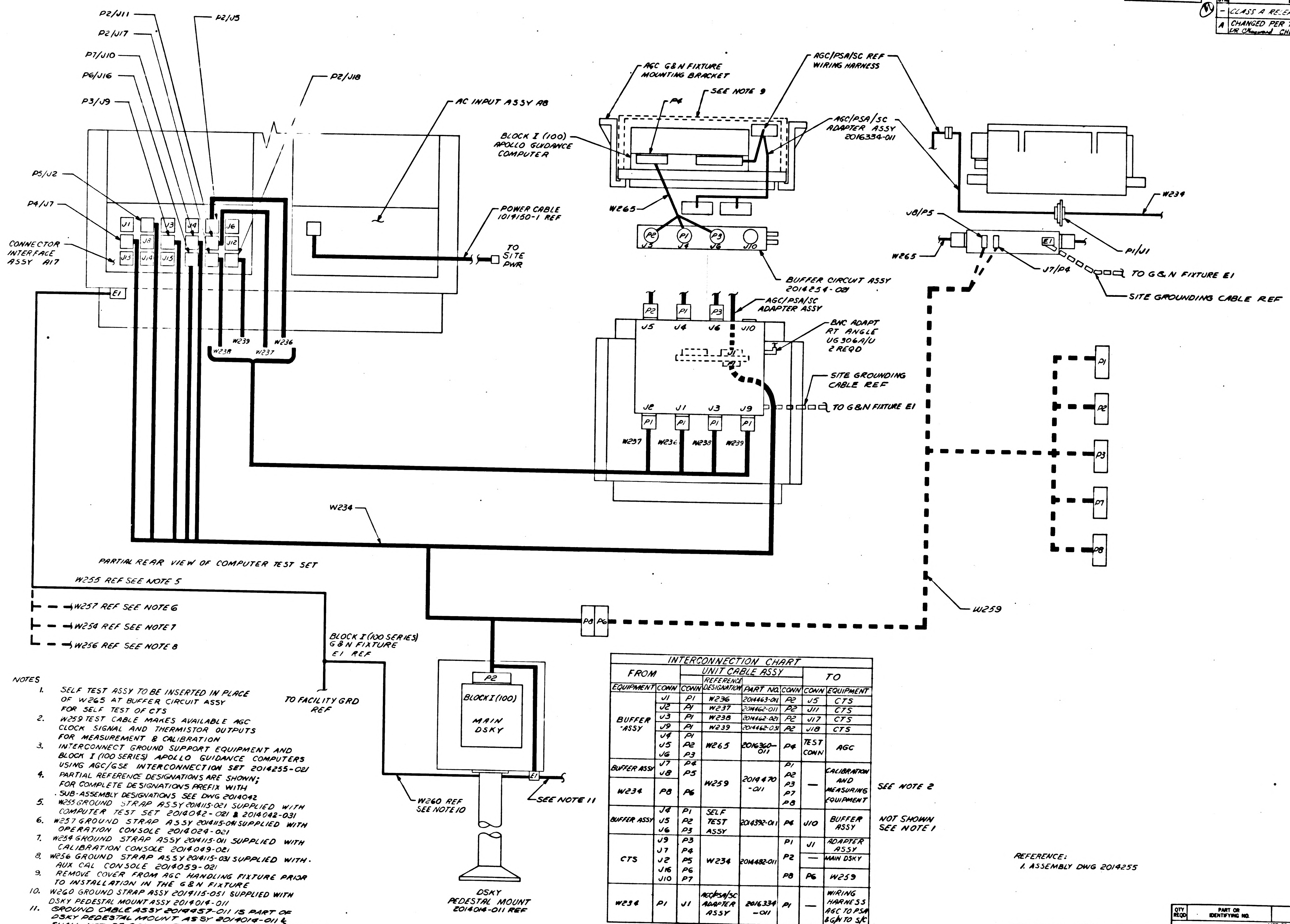
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016417
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016417 –

2016418 A

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 28279		
A	CHANGED PER TDRR 29326 DR Chayward CHK RCK APPD		


P2/J11
P2/J17
P7/J10
P6/J16
P3/J9
P2/J5
P2/J18
AC INPUT ASSY A8
P5/J2
P4/J7
CONNECTOR INTERFACE ASSY A17
J1
J8
J3
J4
J6
J12
J13
J14
J15
E1
POWER CABLE 1019150-1 REF
TO SITE PWR
W239
W236
W238
W237
AGC G&N FIXTURE MOUNTING BRACKET
SEE NOTE 9
P4
BLOCK I (100) APOLLO GUIDANCE COMPUTER
AGC/PSA/SC REF WIRING HARNESS
AGC/PSA/SC ADAPTER ASSY 2016334-011
W265
P2
P1
P3
J5
J4
J6
J10
BUFFER CIRCUIT ASSY 2014254-021
W234
J8/P5
W265
P1/J1
J7/P4
TO G&N FIXTURE E1
SITE GROUNDING CABLE REF
AGC/PSA/SC ADAPTER ASSY
BNC ADAPT RT ANGLE UG 306A/U 2 REQD
J1
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1
J2
J1
J3
J9
W237
W236
W238
W239
P1
P2
P3
P7
P8
W234
PARTIAL REAR VIEW OF COMPUTER TEST SET
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
BLOCK I (100 SERIES) G&N FIXTURE E1 REF
TO FACILITY GRD REF
P8
P6
W259
P2
BLOCK I (100)
MAIN DSKY
E1
W260 REF SEE NOTE 10
SEE NOTE 11
DSKY PEDESTAL MOUNT 2014014-011 REF

NOTES

1. SELF TEST ASSY TO BE INSERTED IN PLACE OF W265 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021 & 2014042-031
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. REMOVE COVER FROM AGC HANDLING FIXTURE PRIOR TO INSTALLATION IN THE G&N FIXTURE
10. W260 GROUND STRAP ASSY 2019115-051 SUPPLIED WITH DSKY PEDESTAL MOUNT ASSY 2014014-011
11. GROUND CABLE ASSY 2019457-011 IS PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011 & SHALL NOT BE CONNECTED TO BLOCK I (100 SERIES) DSKY IT IS FOR USE WITH BLOCK II UNIVERSAL DSKY ONLY-REF 2019359

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REFERENCE DESIGNATION	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P1 P2 P3	W265	2016360-011	P4	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W234	P8	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
CTS	J9 J7 J2 J16 J10	P3 P4 P5 P6 P7	W234	2014482-011	P1	J1	ADAPTER ASSY	
					P2	—	MAIN DSKY	
					P8	P6	W259	
W234	P1	J1	AGC/PSA/SC ADAPTER ASSY	2016334-011	P1	—	WIRING HARNESS AGC TO PSA &G/N TO S/C	

REFERENCE:
1. ASSEMBLY DWG 2014255

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
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CONTRACT NO. NAS 9-497
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MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK I (100) SERIES
G&N TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016418
SCALE NONE
WT
SHEET 1 OF 1

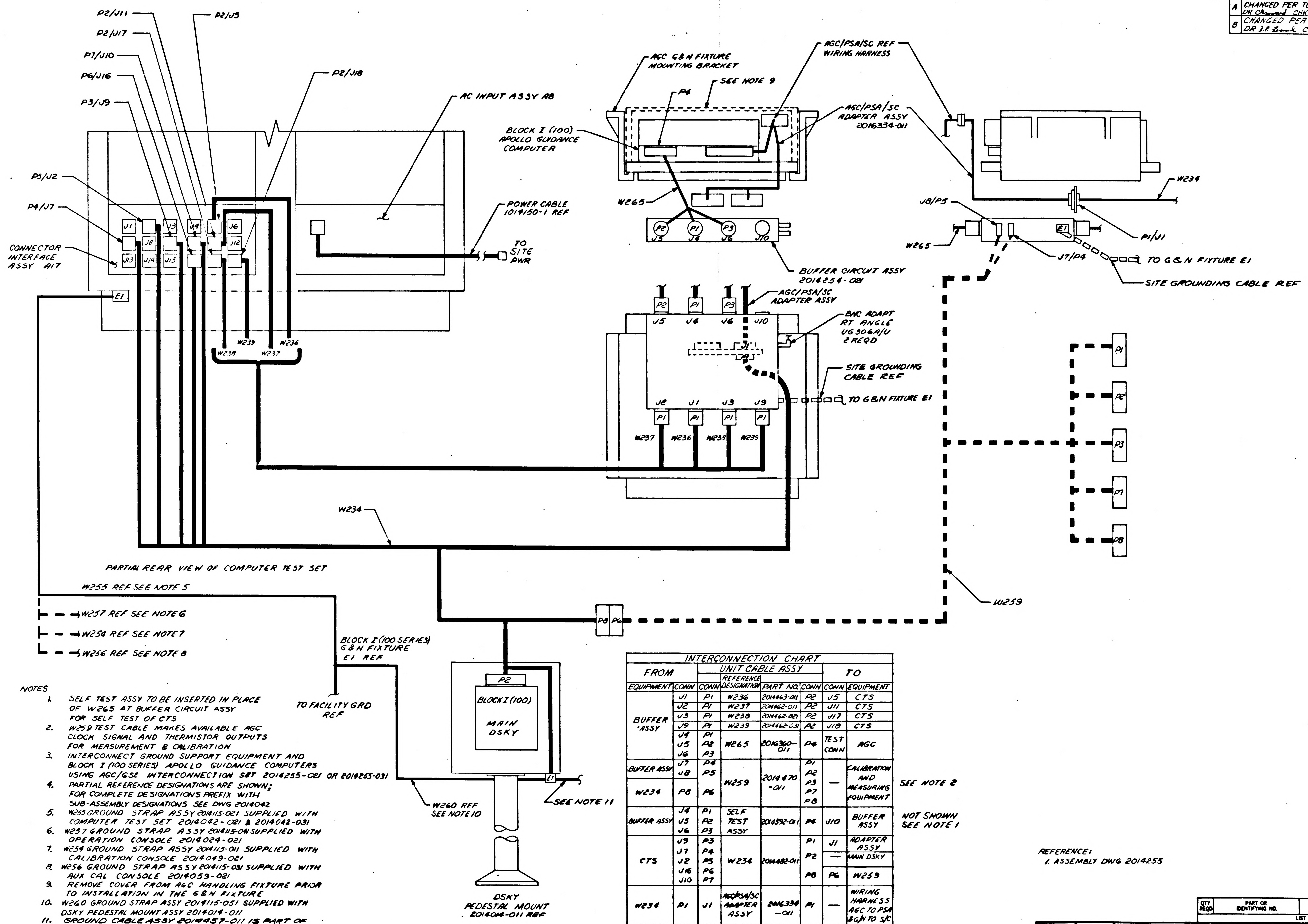
2[illegible]418 A

FOR INFORMATION ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016418 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28279		
A	CHANGED PER TDRR 29326 DR Chayward CHK APPD		
B	CHANGED PER TDRR 30573 DR J.P. Leonard CHK APPD		



P2/J11
P2/J5
P2/J17
P7/J10
P6/J16
P2/J18
P3/J9
AC INPUT ASSY A8
P5/J2
P4/J7
CONNECTOR INTERFACE ASSY A17
J1
J8
J3
J4
J6
J12
J13
J14
J15
E1
W238
W239
W236
W237
POWER CABLE 1014150-1 REF
TO SITE PWR
AGC G&N FIXTURE MOUNTING BRACKET
SEE NOTE 9
P4
BLOCK I (100) APOLLO GUIDANCE COMPUTER
AGC/PSA/SC REF WIRING HARNESS
AGC/PSA/SC ADAPTER ASSY 2016334-011
W265
P2
P1
P3
J5
J4
J6
J10
BUFFER CIRCUIT ASSY 2014254-021
AGC/PSA/SC ADAPTER ASSY
BNC ADAPT RT ANGLE UG306A/U 2 REQD
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1
J2
J1
J3
J9
W237
W236
W238
W239
W234
J8/P5
W265
J7/P4
P1/J1
TO G&N FIXTURE E1
SITE GROUNDING CABLE REF
P1
P2
P3
P7
P8
W234
W259
PARTIAL REAR VIEW OF COMPUTER TEST SET
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
BLOCK I (100 SERIES) G&N FIXTURE E1 REF
TO FACILITY GRD REF
P8
P6
P2
BLOCK I (100) MAIN DSKY
E1
W260 REF SEE NOTE 10
SEE NOTE 11
DSKY PEDESTAL MOUNT 2014014-011 REF

NOTES

1. SELF TEST ASSY TO BE INSERTED IN PLACE OF W265 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021 OR 2014255-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021 & 2014042-031
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. REMOVE COVER FROM AGC HANDLING FIXTURE PRIOR TO INSTALLATION IN THE G&N FIXTURE
10. W260 GROUND STRAP ASSY 2019115-051 SUPPLIED WITH DSKY PEDESTAL MOUNT ASSY 2014014-011
11. GROUND CABLE ASSY 2014457-011 IS PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011 & SHALL NOT BE CONNECTED TO BLOCK I (100 SERIES) DSKY IT IS FOR USE WITH BLOCK II UNIVERSAL DSKY ONLY-REF 2014359

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO	
EQUIPMENT	CONN	CONN	REFERENCE DESIGNATION	PART NO.	CONN	CONN	EQUIPMENT
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS
	J2	P1	W237	2014462-011	P2	J11	CTS
	J3	P1	W238	2014462-021	P2	J17	CTS
	J9	P1	W239	2014462-031	P2	J18	CTS
	J4 J5 J6	P1 P2 P3	W265	2016360-011	P4	TEST CONN	AGC
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT
W234	P8	P6					
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY
CTS	J9 J7 J2 J16 J10	P3 P4 P5 P6 P7	W234	2014482-011	P1	J1	ADAPTER ASSY
					P2	—	MAIN DSKY
					P8	P6	W259
W234	P1	J1	AGC/PSA/SC ADAPTER ASSY	2016334-011	P1	—	WIRING HARNESS AGC TO PSA & G/N TO S/C

SEE NOTE 2

NOT SHOWN SEE NOTE 1

REFERENCE:
1. ASSEMBLY DWG 2014255

MASTER

FOR INFORMATION ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

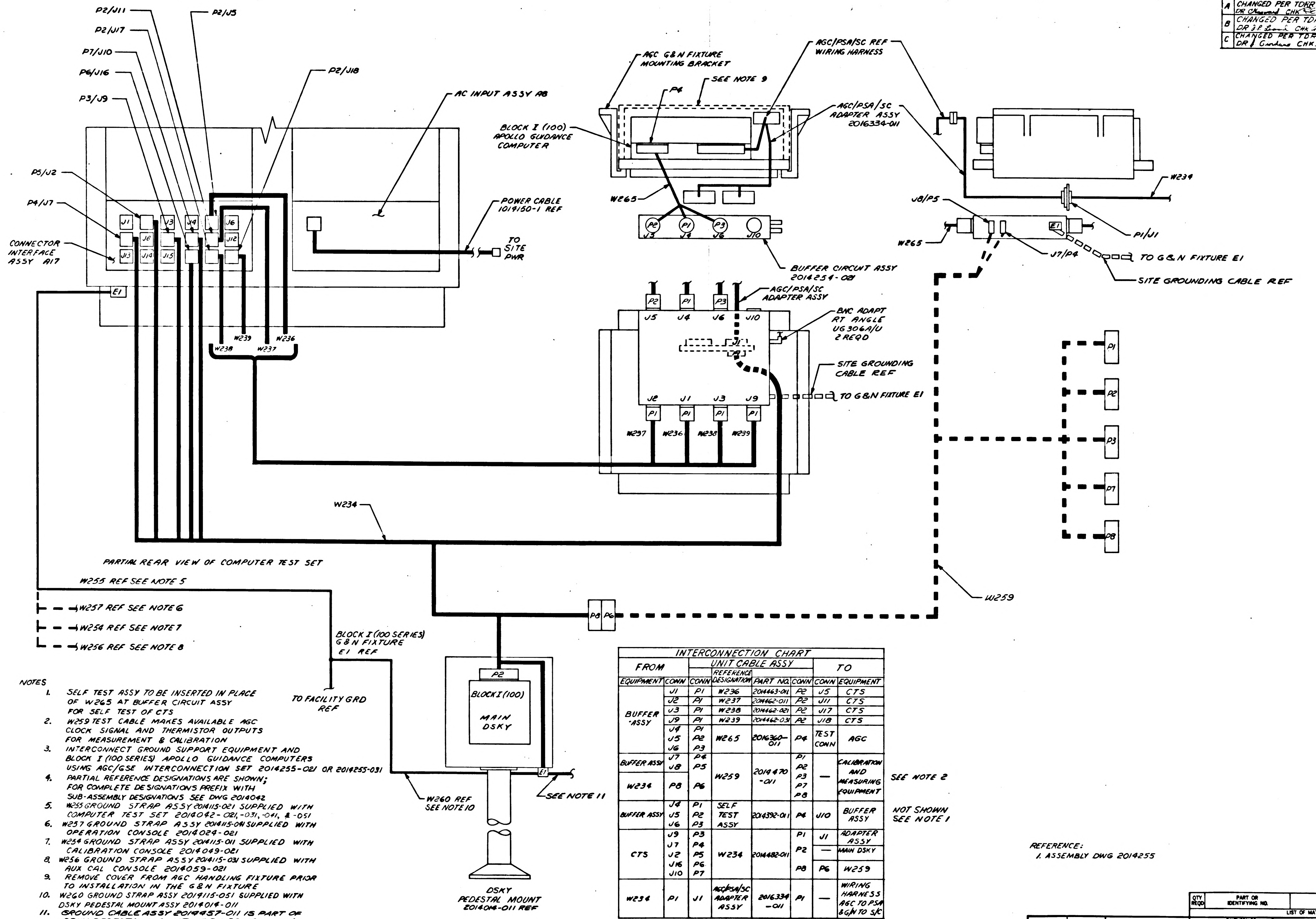
AGC/GSE INTERCONNECTIONS
BLOCK I (100) SERIES
G & N TEST

SIZE J CODE IDENT NO. 49956 NASA DRAWING NO. 2016418
SCALE NONE WT SHEET 1 OF 1

2016418 B

2016418 C

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
–	CLASS A RELEASED PER TDRR 28279		
A	CHANGED PER TDRR 29326 DR [illegible] CHK [illegible] APPD [illegible]	[illegible]	[illegible]
B	CHANGED PER TDRR 30573 DR J.P. Leonard CHK [illegible] APPD [illegible]	[illegible]	[illegible]
C	CHANGED PER TDRR 31287 DR J. Giordano CHK [illegible] APPD [illegible]	[illegible]	[illegible]


P2/J11
P2/J17
P7/J10
P6/J16
P3/J9
P2/J5
P2/J18
AC INPUT ASSY A8
P5/J2
P4/J7
CONNECTOR INTERFACE ASSY A17
J1
J3
J4
J6
J8
J12
J13
J14
J15
E1
POWER CABLE 1019150-1 REF
TO SITE PWR
W239
W236
W238
W237
AGC G&N FIXTURE MOUNTING BRACKET
SEE NOTE 9
P4
BLOCK I (100) APOLLO GUIDANCE COMPUTER
AGC/PSA/SC REF WIRING HARNESS
AGC/PSA/SC ADAPTER ASSY 2016334-011
W265
P2
P1
P3
J5
J4
J6
J10
BUFFER CIRCUIT ASSY 2014254-021
W234
J8/P5
P1/J1
W265
E1
J7/P4
TO G&N FIXTURE E1
SITE GROUNDING CABLE REF
AGC/PSA/SC ADAPTER ASSY
BNC ADAPT RT ANGLE UG 306A/U 2 REQD
J1
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1
J2
J1
J3
J9
P1
W237
W236
W238
W239
P1
P2
P3
P7
P8
W234
W259
PARTIAL REAR VIEW OF COMPUTER TEST SET
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
P8
P6
BLOCK I (100 SERIES) G&N FIXTURE E1 REF
TO FACILITY GRD REF
P2
BLOCK I (100) MAIN DSKY
E1
W260 REF SEE NOTE 10
SEE NOTE 11
DSKY PEDESTAL MOUNT 2014014-011 REF

NOTES

1. SELF TEST ASSY TO BE INSERTED IN PLACE OF W265 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021 OR 2014255-031
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021, -031, -041, & -051
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. REMOVE COVER FROM AGC HANDLING FIXTURE PRIOR TO INSTALLATION IN THE G&N FIXTURE
10. W260 GROUND STRAP ASSY 2019115-051 SUPPLIED WITH DSKY PEDESTAL MOUNT ASSY 2014014-011
11. GROUND CABLE ASSY 2019457-011 IS PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011 & SHALL NOT BE CONNECTED TO BLOCK I (100 SERIES) DSKY IT IS FOR USE WITH BLOCK II UNIVERSAL DSKY ONLY-REF 2014359

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REFERENCE DESIGNATION	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P1 P2 P3	W265	2016360-011	P4	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W234	P8	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
CTS	J9 J7 J2 J16 J10	P3 P4 P5 P6 P7	W234	2014482-011	P1	J1	ADAPTER ASSY	
					P2	—	MAIN DSKY	
					P8	P6	W259	
W234	P1	J1	AGC/PSA/SC ADAPTER ASSY	2016334-011	P1	—	WIRING HARNESS AGC TO PSA & G/N TO S/C	

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±
DECIMALS .XXX ±
ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN [illegible] DATE [illegible]
CHECKED [illegible] 23 APR [illegible]
APPROVAL [illegible] 9/25/[illegible]
APPROVAL [illegible] 9/25 [illegible]
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

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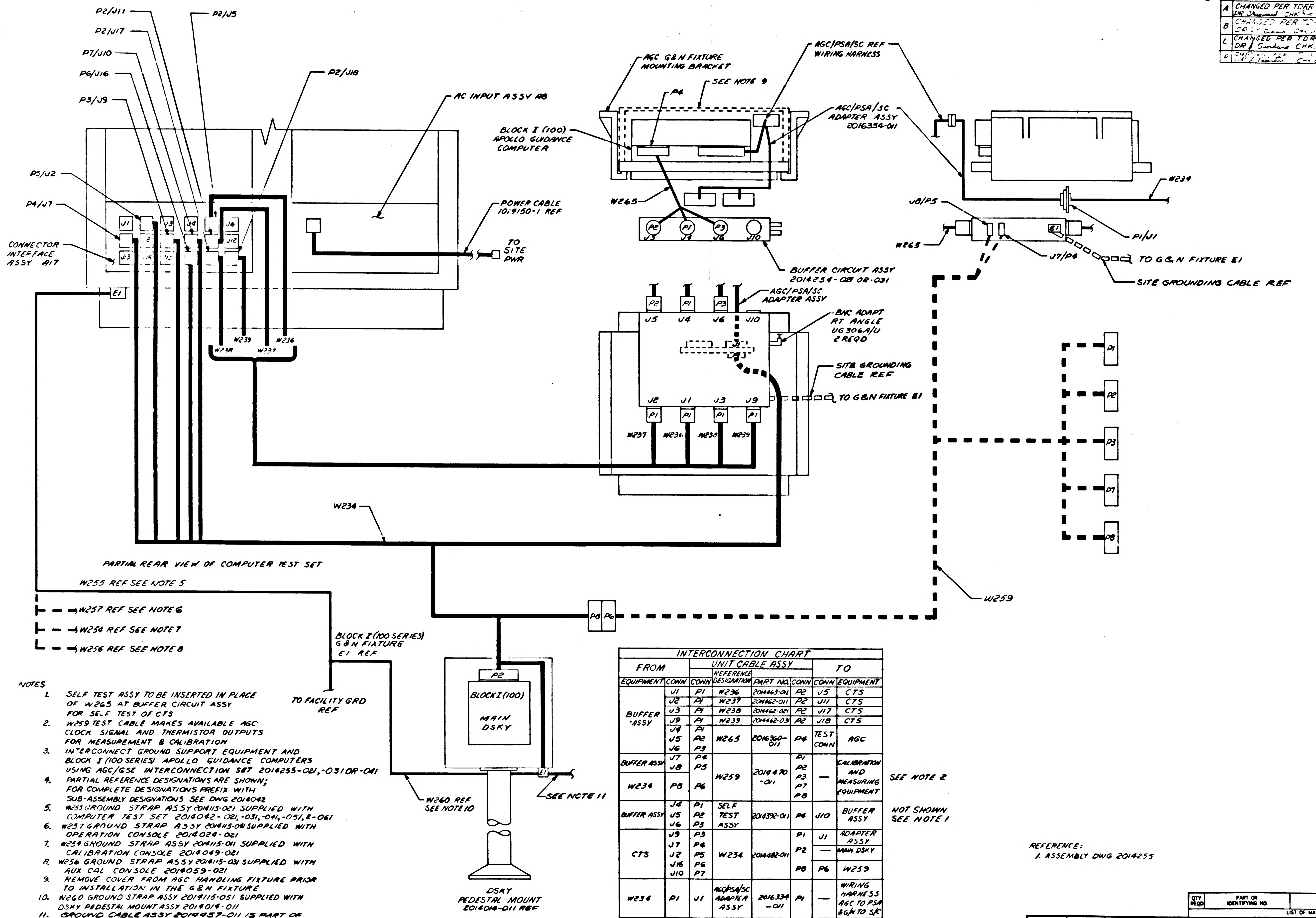
AGC/GSE INTERCONNECTIONS
BLOCK I (100) SERIES
G & N TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016418
SCALE NONE
WT
SHEET 1 OF 1

2016418 C

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28279		
A	CHANGED PER TDRR 29326 DR Chayward CHK [illegible] APPD [illegible]	[illegible]	[illegible]
B	CHANGED PER TDRR 30579 DR [illegible] CHK [illegible] APPD [illegible]	[illegible]	[illegible]
C	CHANGED PER TDRR 31287 DR Gardano CHK [illegible] APPD [illegible]	[illegible]	[illegible]
D	CHANGED PER [illegible] DR [illegible] CHK L. [illegible]	[illegible]	[illegible]


P2/J11
P2/J17
P7/J10
P6/J16
P3/J9
P2/J5
P2/J18
P5/J2
P4/J7
CONNECTOR INTERFACE ASSY A17
J1
J2
J3
J4
J6
J12
E1
AC INPUT ASSY A8
POWER CABLE 1019150-1 REF
TO SITE PWR
W239
W236
W238
W237
PARTIAL REAR VIEW OF COMPUTER TEST SET
W234
AGC G&N FIXTURE MOUNTING BRACKET
SEE NOTE 9
P4
BLOCK I (100) APOLLO GUIDANCE COMPUTER
AGC/PSA/SC REF WIRING HARNESS
AGC/PSA/SC ADAPTER ASSY 2016334-011
W265
P2
P1
P3
J10
J5
J4
J6
BUFFER CIRCUIT ASSY 2014254-021 OR-031
AGC/PSA/SC ADAPTER ASSY
BNC ADAPT RT ANGLE UG 306A/U 2 REQD
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1
J2
J1
J3
J9
W237
W236
W238
W239
W234
J8/P5
P1/J1
J7/P4
TO G&N FIXTURE E1
SITE GROUNDING CABLE REF
P1
P2
P3
P7
P8
W259
P8
P6
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
BLOCK I (100 SERIES) G&N FIXTURE E1 REF
TO FACILITY GRD REF
BLOCK I (100) MAIN DSKY
W260 REF SEE NOTE 10
SEE NOTE 11
DSKY PEDESTAL MOUNT 2014014-011 REF

NOTES
1. SELF TEST ASSY TO BE INSERTED IN PLACE OF W265 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021, -031 OR -041
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021, -031, -041, -051, & -061
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. REMOVE COVER FROM AGC HANDLING FIXTURE PRIOR TO INSTALLATION IN THE G&N FIXTURE
10. W260 GROUND STRAP ASSY 2019115-051 SUPPLIED WITH DSKY PEDESTAL MOUNT ASSY 2014014-011
11. GROUND CABLE ASSY 2014457-011 IS PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011 & SHALL NOT BE CONNECTED TO BLOCK I (100 SERIES) DSKY IT IS FOR USE WITH BLOCK II UNIVERSAL DSKY ONLY-REF 2014359

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REFERENCE DESIGNATION	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P1 P2 P3	W265	2016360-011	P4	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W234	P8	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
CTS	J9 J7 J2 J16 J10	P3 P4 P5 P6 P7	W234	2014482-011	P1	J1	ADAPTER ASSY	
					P2	—	MAIN DSKY	
					P8	P6	W259	
W234	P1	J1	AGC/PSA/SC ADAPTER ASSY	2016334-011	P1	—	WIRING HARNESS AGC TO PSA & G/N TO S/C	

REFERENCE:
1. ASSEMBLY DWG 2014255

FOR INFORMATION ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

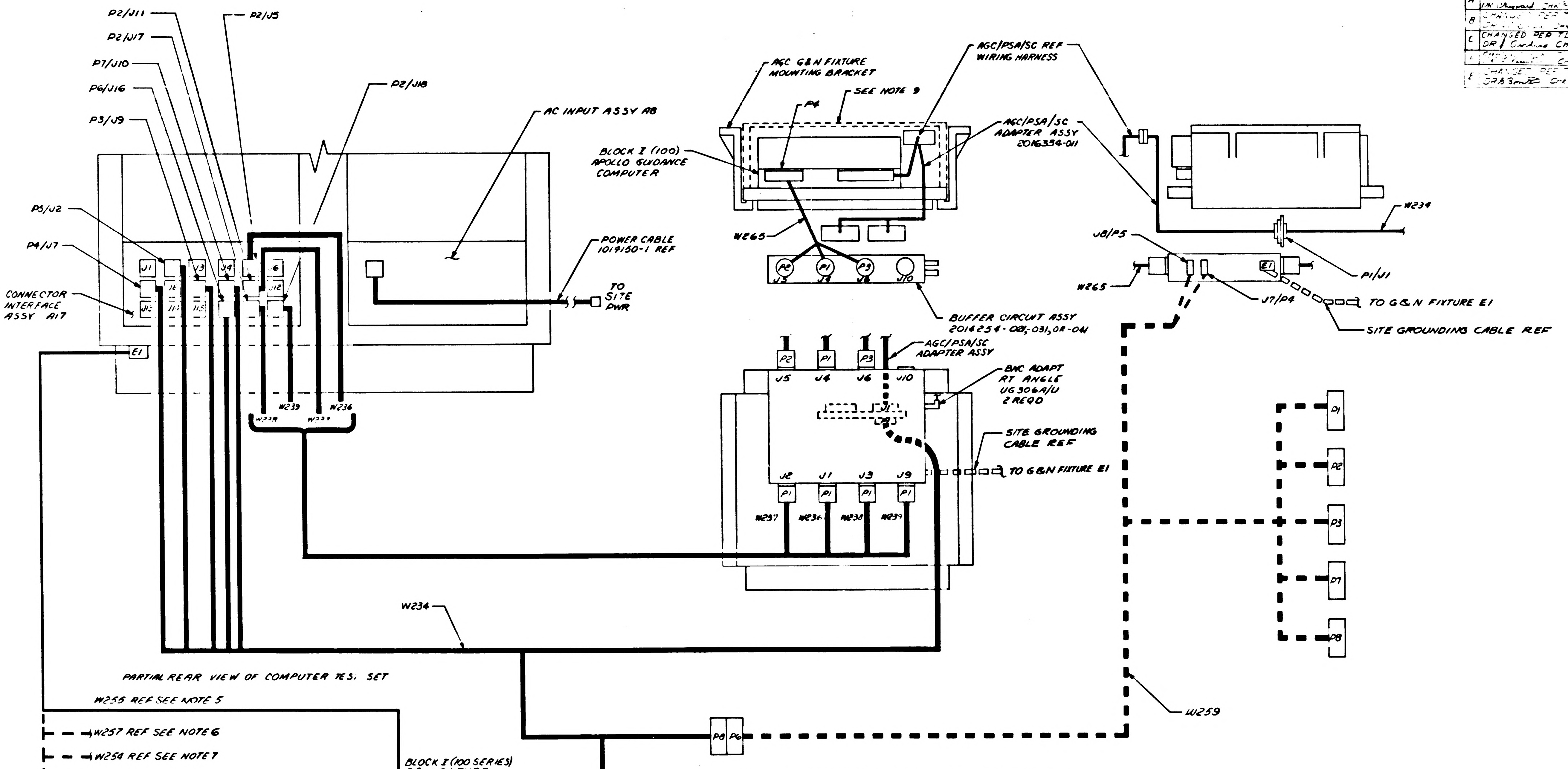
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

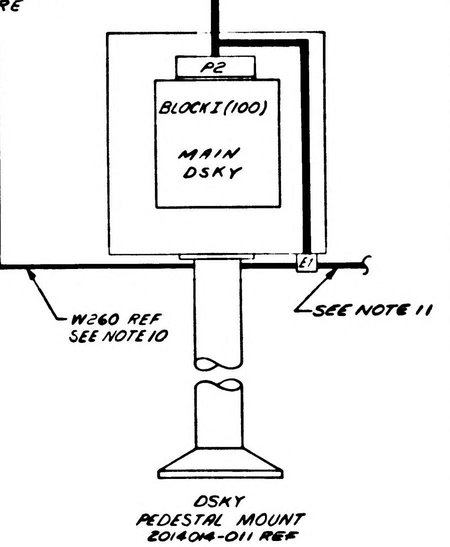
AGC/GSE INTERCONNECTIONS
BLOCK I (100) SERIES
G & N TEST

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016418
SCALE NONE | WT | SHEET 1 OF 1

2016418 D

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 28279		
A	CHANGED PER TDRR 29[illegible] DR [illegible] CHK [illegible] APPD [illegible]	[illegible]	[illegible]
B	CHANGED PER TDRR [illegible] DR [illegible] CHK [illegible]	[illegible]	[illegible]
C	CHANGED PER TDRR 31287 DR [illegible] CHK [illegible] APPD	[illegible]	[illegible]
D	[illegible]	[illegible]	[illegible]
E	CHANGED PER TDRR [illegible] DR [illegible] CHK [illegible] APPD	[illegible]	[illegible]


P2/J11
P2/J5
P2/J17
P7/J10
P6/J16
P3/J9
P2/J18
AC INPUT ASSY A8
P5/J2
P4/J7
CONNECTOR INTERFACE ASSY A17
J1
J3
J4
J6
J12
E1
POWER CABLE 1019150-1 REF
TO SITE PWR
W238
W239
W237
W236
AGC G&N FIXTURE MOUNTING BRACKET
SEE NOTE 9
P4
BLOCK I (100) APOLLO GUIDANCE COMPUTER
AGC/PSA/SC REF WIRING HARNESS
AGC/PSA/SC ADAPTER ASSY 2016334-011
W265
P2
P1
P3
J5
J4
J6
J10
BUFFER CIRCUIT ASSY 2014254-021,-031,OR-041
W234
J8/P5
P1/J1
W265
E1
J7/P4
TO G&N FIXTURE E1
SITE GROUNDING CABLE REF
AGC/PSA/SC ADAPTER ASSY
BNC ADAPT RT ANGLE UG 306A/U 2 REQD
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1
J2
J1
J3
J9
W237
W236
W238
W239
P1
P2
P3
P7
P8
W234
W259
PARTIAL REAR VIEW OF COMPUTER TEST SET
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
P8
P6


BLOCK I (100 SERIES) G&N FIXTURE E1 REF
P2
BLOCK I (100) MAIN DSKY
E1
W260 REF SEE NOTE 10
SEE NOTE 11
DSKY PEDESTAL MOUNT 2014014-011 REF

TO FACILITY GRD REF

NOTES

1. SELF TEST ASSY TO BE INSERTED IN PLACE OF W265 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021,-031,-041,OR-051
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021,-031,-041,-051,-061,&-071
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. REMOVE COVER FROM AGC HANDLING FIXTURE PRIOR TO INSTALLATION IN THE G&N FIXTURE
10. W260 GROUND STRAP ASSY 2014115-051 SUPPLIED WITH DSKY PEDESTAL MOUNT ASSY 2014014-011
11. GROUND CABLE ASSY 2014457-011 IS PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011 & SHALL NOT BE CONNECTED TO BLOCK I (100 SERIES) DSKY IT IS FOR USE WITH BLOCK II UNIVERSAL DSKY ONLY–REF 2014359

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REFERENCE DESIGNATION	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P1 P2 P3	W265	2016360-011	P4	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W234	P8	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011 2014392-021	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
CTS	J9 J7 J2 J16 J10	P3 P4 P5 P6 P7	W234	2014482-011	P1	J1	ADAPTER ASSY	
					P2	—	MAIN DSKY	
					P8	P6	W259	
W234	P1	J1	AGC/PSA/SC ADAPTER ASSY	2016334-011	P1	—	WIRING HARNESS AGC TO PSA & G/N TO S/C	

REFERENCE:
1. ASSEMBLY DWG 2014255

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON MASS
CONTRACT NO NAS 9-[illegible]
DRAWN [illegible] DATE [illegible]
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK I (100) SERIES
G&N TEST

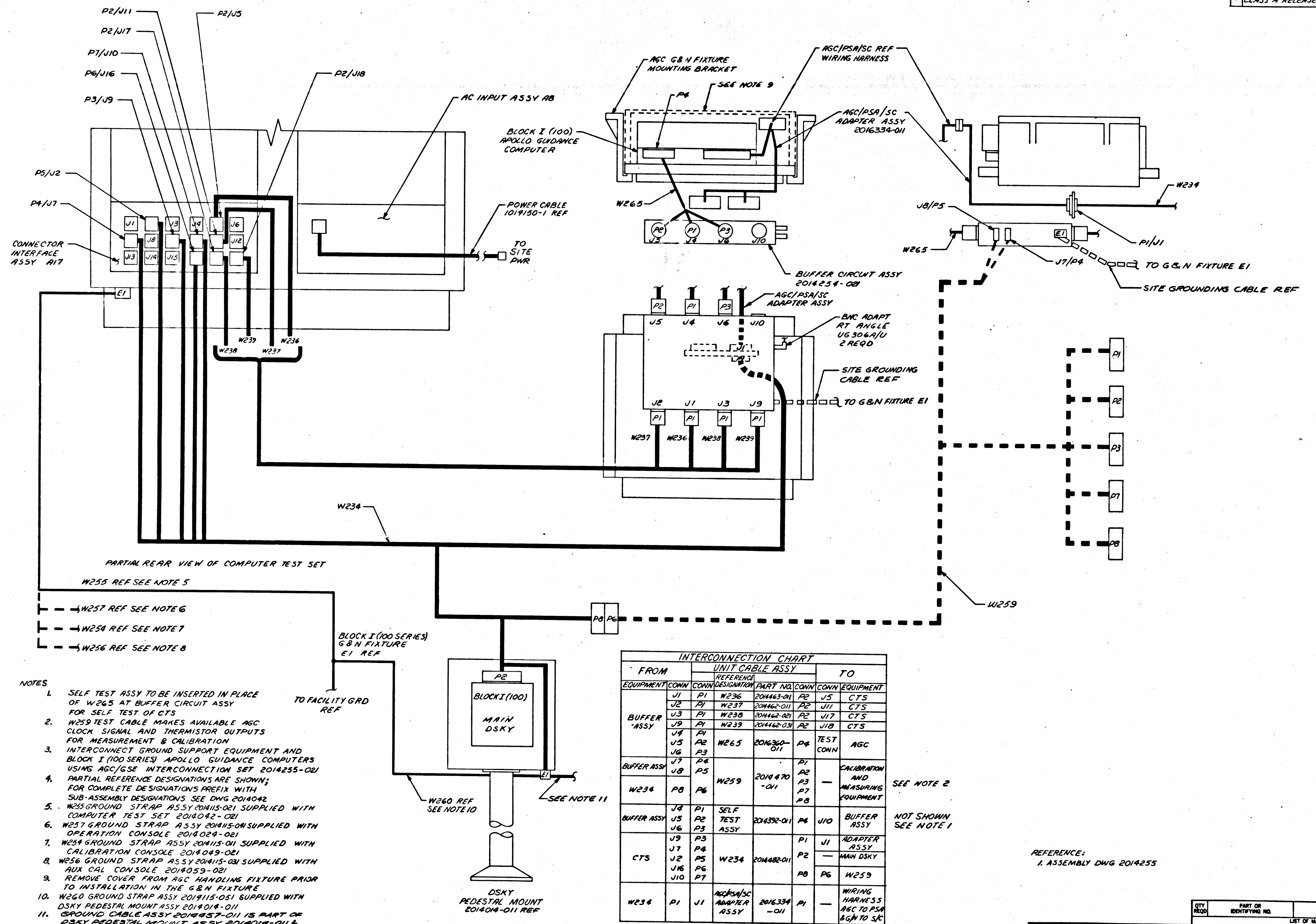
SIZE J
CODE IDENT NO 49956
NASA DRAWING NO 2016418
SCALE NONE
WT
SHEET 1 OF 1

FOR INFORMATION ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016418 E

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 28279		



P2/J11
P2/J5
P2/J17
P7/J10
P6/J16
P2/J18
P3/J9
AC INPUT ASSY A8
P5/J2
P4/J7
POWER CABLE 1019150-1 REF
CONNECTOR INTERFACE ASSY A17
J1 J8 J3 J4 J6 J13 J14 J15 J12
TO SITE PWR
E1
W239 W236 W238 W237
W234
PARTIAL REAR VIEW OF COMPUTER TEST SET
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
BLOCK I (100 SERIES) G&N FIXTURE E1 REF
TO FACILITY GRD REF
P8 P6
P2
BLOCK I (100)
MAIN DSKY
W260 REF SEE NOTE 10
SEE NOTE 11
DSKY PEDESTAL MOUNT 2014014-011 REF
AGC G&N FIXTURE MOUNTING BRACKET
AGC/PSA/SC REF WIRING HARNESS
SEE NOTE 9
P4
BLOCK I (100) APOLLO GUIDANCE COMPUTER
AGC/PSA/SC ADAPTER ASSY 2016334-011
W265
P2 P1 P3
J5 J4 J6 J10
BUFFER CIRCUIT ASSY 2014254-021
AGC/PSA/SC ADAPTER ASSY
BNC ADAPT RT ANGLE UG306A/U 2 REQD
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1
J2 J1 J3 J9
P1 P1 P1 P1
W237 W236 W238 W239
W234
J8/P5
P1/J1
W265
E1
J7/P4
TO G&N FIXTURE E1
SITE GROUNDING CABLE REF
P1 P2 P3 P7 P8
W259

NOTES

1. SELF TEST ASSY TO BE INSERTED IN PLACE OF W265 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. REMOVE COVER FROM AGC HANDLING FIXTURE PRIOR TO INSTALLATION IN THE G&N FIXTURE
10. W260 GROUND STRAP ASSY 2014115-051 SUPPLIED WITH DSKY PEDESTAL MOUNT ASSY 2014014-011
11. GROUND CABLE ASSY 2014457-011 IS PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011 & SHALL NOT BE CONNECTED TO BLOCK I (100 SERIES) DSKY IT IS FOR USE WITH BLOCK II UNIVERSAL DSKY ONLY-REF 2014359

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REFERENCE DESIGNATION	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P1 P2 P3	W265	2016360-011	P4	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W234	P8	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
CTS	J9 J7 J2 J16 J10	P3 P4 P5 P6 P7	W234	2014482-011	P1	J1	ADAPTER ASSY	
					P2	—	MAIN DSKY	
					P8	P6	W259	
W234	P1	J1	AGC/PSA/SC ADAPTER ASSY	2016334-011	P1	—	WIRING HARNESS AGC TO PSA & G/N TO S/C	

REFERENCE:
1. ASSEMBLY DWG 2014255

MASTER

FOR INFORMATION ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS .XX ±
DECIMALS .XXX ±
ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

NEXT ASSY | USED ON
APPLICATION

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 23 APR 66
CHECKED 23 APR 66
APPROVAL 4/25/66
APPROVAL 4/25/66
APPROVAL 4/…/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK I (100) SERIES
G & N TEST

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016418
SCALE NONE | WT | SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016418 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
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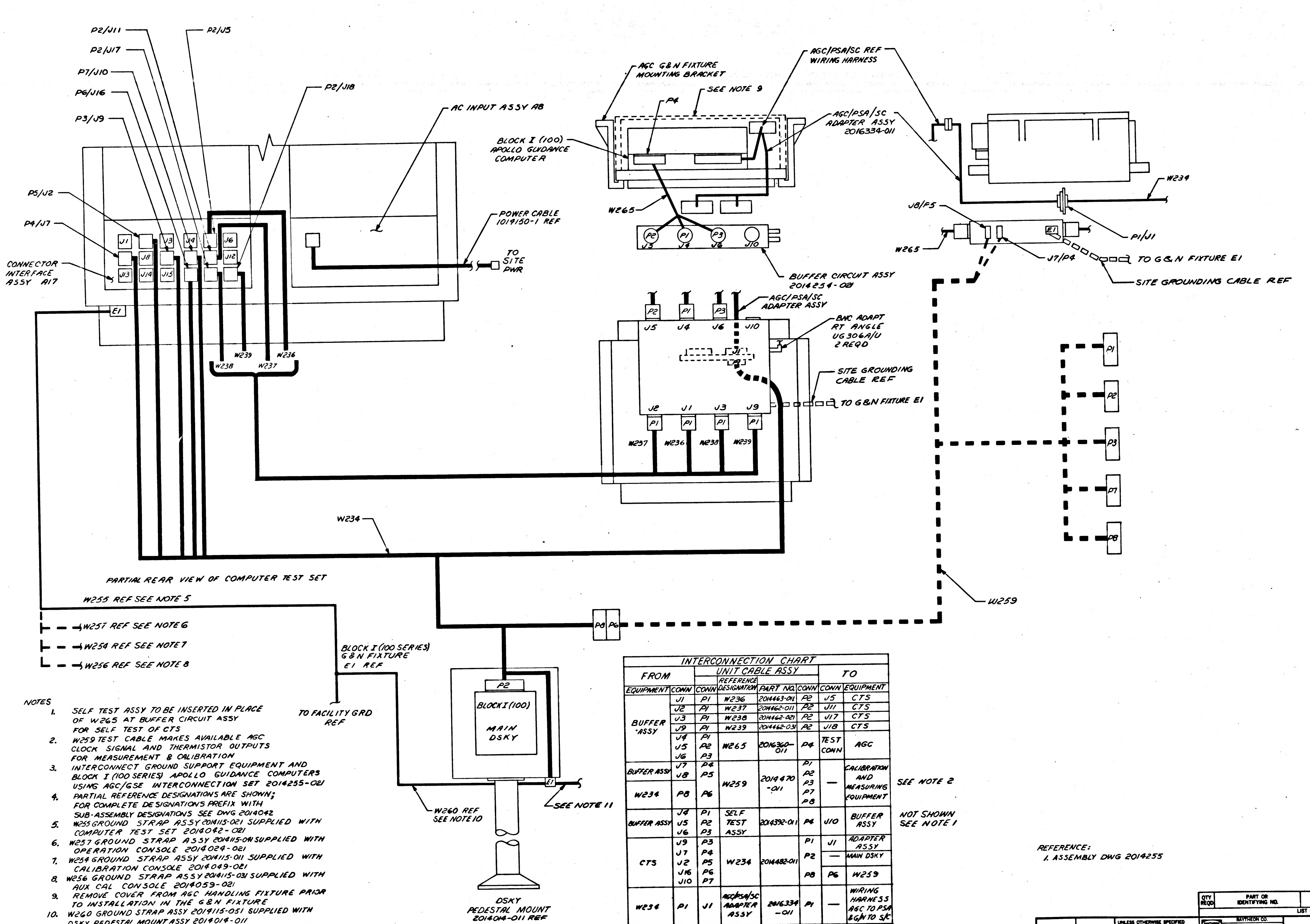

P2/J11
P2/J5
P2/J17
P7/J10
P6/J16
P2/J18
P3/J9
AC INPUT ASSY A8
P5/J2
P4/J7
CONNECTOR INTERFACE ASSY A17
J1
J8
J3
J4
J6
J13
J14
J15
J12
E1
POWER CABLE 1019150-1 REF
TO SITE PWR
W239
W236
W238
W237
AGC G&N FIXTURE MOUNTING BRACKET
SEE NOTE 9
P4
BLOCK I (100) APOLLO GUIDANCE COMPUTER
AGC/PSA/SC REF WIRING HARNESS
AGC/PSA/SC ADAPTER ASSY 2016334-011
W265
P2
P1
P3
J5
J4
J6
J10
BUFFER CIRCUIT ASSY 2014254-021
AGC/PSA/SC ADAPTER ASSY
BNC ADAPT RT ANGLE UG 306A/U 2 REQD
J5
J4
J6
J10
SITE GROUNDING CABLE REF
TO G&N FIXTURE E1
J2
J1
J3
J9
P1
W237
W236
W238
W239
W234
J8/P5
W265
E1
J7/P4
P1/J1
TO G&N FIXTURE E1
SITE GROUNDING CABLE REF
P1
P2
P3
P7
P8
W259
W234
PARTIAL REAR VIEW OF COMPUTER TEST SET
W255 REF SEE NOTE 5
W257 REF SEE NOTE 6
W254 REF SEE NOTE 7
W256 REF SEE NOTE 8
P8
P6
BLOCK I (100 SERIES) G&N FIXTURE E1 REF
TO FACILITY GRD REF
P2
BLOCK I (100) MAIN DSKY
E1
W260 REF SEE NOTE 10
SEE NOTE 11
DSKY PEDESTAL MOUNT 2014014-011 REF

NOTES

1. SELF TEST ASSY TO BE INSERTED IN PLACE OF W265 AT BUFFER CIRCUIT ASSY FOR SELF TEST OF CTS
2. W259 TEST CABLE MAKES AVAILABLE AGC CLOCK SIGNAL AND THERMISTOR OUTPUTS FOR MEASUREMENT & CALIBRATION
3. INTERCONNECT GROUND SUPPORT EQUIPMENT AND BLOCK I (100 SERIES) APOLLO GUIDANCE COMPUTERS USING AGC/GSE INTERCONNECTION SET 2014255-021
4. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS SEE DWG 2014042
5. W255 GROUND STRAP ASSY 2014115-021 SUPPLIED WITH COMPUTER TEST SET 2014042-021
6. W257 GROUND STRAP ASSY 2014115-041 SUPPLIED WITH OPERATION CONSOLE 2014024-021
7. W254 GROUND STRAP ASSY 2014115-011 SUPPLIED WITH CALIBRATION CONSOLE 2014049-021
8. W256 GROUND STRAP ASSY 2014115-031 SUPPLIED WITH AUX CAL CONSOLE 2014059-021
9. REMOVE COVER FROM AGC HANDLING FIXTURE PRIOR TO INSTALLATION IN THE G&N FIXTURE
10. W260 GROUND STRAP ASSY 2019115-051 SUPPLIED WITH DSKY PEDESTAL MOUNT ASSY 2014014-011
11. GROUND CABLE ASSY 2019457-011 IS PART OF DSKY PEDESTAL MOUNT ASSY 2014014-011 & SHALL NOT BE CONNECTED TO BLOCK I (100 SERIES) DSKY IT IS FOR USE WITH BLOCK II UNIVERSAL DSKY ONLY-REF 2014359

INTERCONNECTION CHART

FROM		UNIT CABLE ASSY				TO		
EQUIPMENT	CONN	CONN	REFERENCE DESIGNATION	PART NO.	CONN	CONN	EQUIPMENT	
BUFFER ASSY	J1	P1	W236	2014463-011	P2	J5	CTS	
	J2	P1	W237	2014462-011	P2	J11	CTS	
	J3	P1	W238	2014462-021	P2	J17	CTS	
	J9	P1	W239	2014462-031	P2	J18	CTS	
	J4 J5 J6	P1 P2 P3	W265	2016360-011	P4	TEST CONN	AGC	
BUFFER ASSY	J7 J8	P4 P5	W259	2014470-011	P1 P2 P3 P7 P8	—	CALIBRATION AND MEASURING EQUIPMENT	SEE NOTE 2
W234	P8	P6						
BUFFER ASSY	J4 J5 J6	P1 P2 P3	SELF TEST ASSY	2014392-011	P4	J10	BUFFER ASSY	NOT SHOWN SEE NOTE 1
CTS	J9 J7 J2 J16 J10	P3 P4 P5 P6 P7	W234	2014482-011	P1	J1	ADAPTER ASSY	
					P2	—	MAIN DSKY	
					P8	P6	W259	
W234	P1	J1	AGC/PSA/SC ADAPTER ASSY	2016334-011	P1	—	WIRING HARNESS AGC TO PSA & G/N TO S/C	

REFERENCE:
1. ASSEMBLY DWG 2014255

MASTER

FOR INFORMATION ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 23 APR
CHECKED 23 APR 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

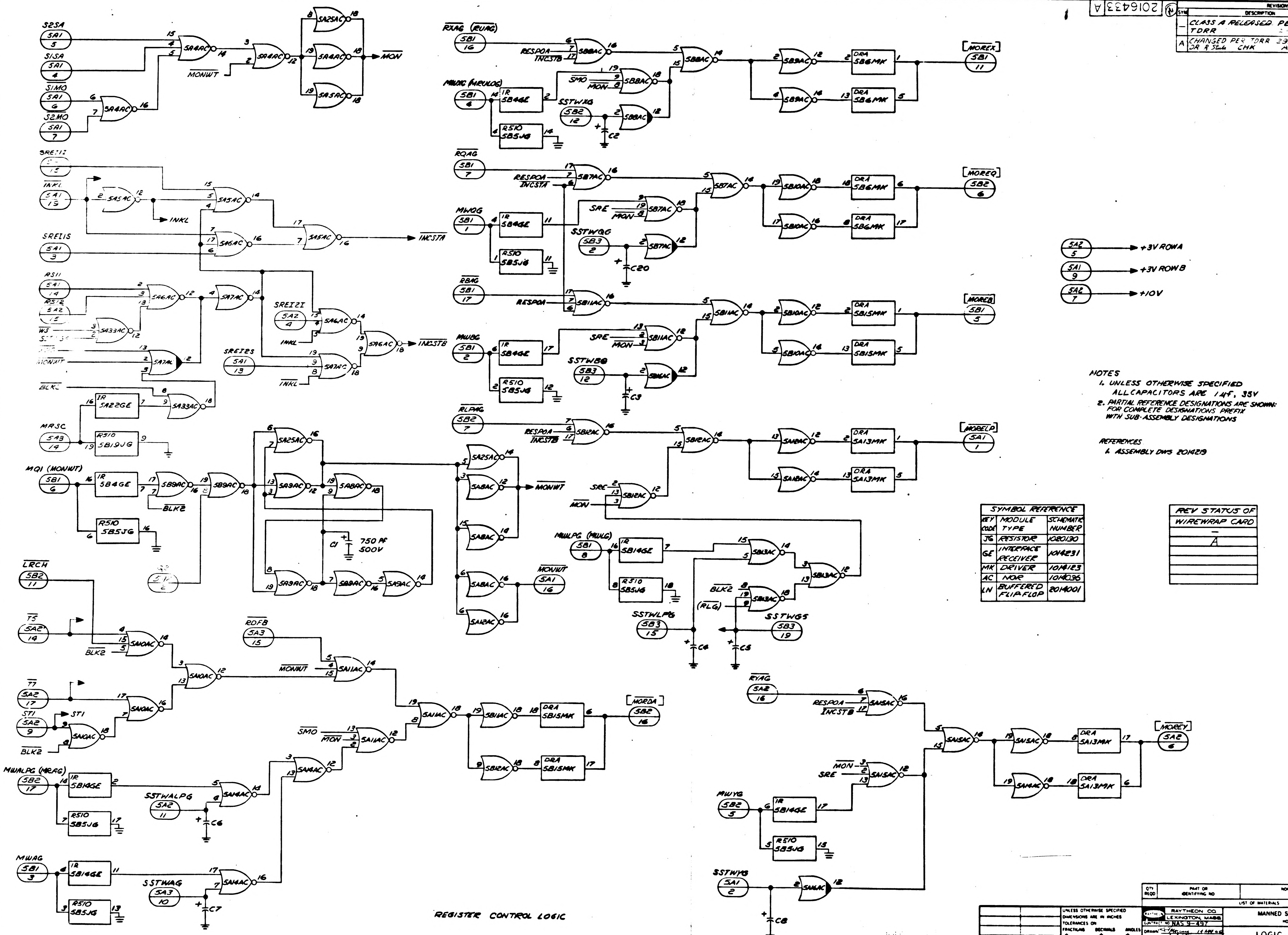
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

AGC/GSE INTERCONNECTIONS
BLOCK I (100) SERIES
G & N TEST

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016418
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 2 4 5 2 5		
A	CHANGED PER TDRR 23340 DR R Stahl CHK APPD	7/4/66	gff


S2SA
5A1 5
S1SA
5A1 4
S1MO
5A1 6
S2MO
5A1 7
SA4AC
MONWT
SA2SAC
SA4AC
SA5AC
MON
SREI1I
INKL
5A1 13
SA5AC
SREI1S
5A1 3
SA6AC
SA5AC
INCSTA
RS11
RS12
WS
SA33AC
SA7AC
SA22GE
SB19JG
BLKC
MRSC
5A3 14
SREI2I
5A2 4
SREI2S
5A1 13
SA6AC
SA7AC
INCSTB
MQ1 (MONWT)
5B1 6
SB4GE
SB5JG
SB9AC
BLK2
SA9AC
SA8AC
C1 750 PF 500V
MONWT
5A1 16
SA12AC
LRCH
5B2 11
T5
5A2 19
T7
5A2 17
ST1
5A2 9
SA10AC
RDFB
5A3 15
SA11AC
SMO
MON
MORDA
5B2 16
SB15MK
SB12AC
MWALPG (MRAG)
5B2 17
SB14GE
SSTWALPG
5A2 11
C6
MWAG
5B1 3
SSTWAG
5A3 10
C7
RXAG (RUAG)
5B1 16
RESPOA
INCSTB
SB8AC
MWXG (MRULG)
5B1 4
SSTWXG
5B2 12
C2
SB6MK
MOREX
5B1 11
RQAG
5B1 7
INCSTA
SB7AC
SB10AC
MOREQ
5B2 6
MWQG
5B1 1
SRE
SSTWQG
5B3 2
C20
RBAG
5B1 17
SB11AC
SB15MK
MOREB
5B1 5
MWBG
5B1 2
SSTWBG
5B3 12
C3
RLPAG
5B2 7
SB12AC
SA13MK
MORELP
5A1 1
MWLPG (MWLG)
5B1 8
SB13AC
(RLG)
SSTWLPG
5B3 15
C4
SSTWGS
5B3 19
C5
RYAG
5A2 16
SA15AC
SA14AC
SA13MK
MOREY
5A2 6
MWYG
5B2 5
SSTWYG
5A1 2
C8
5A2 5
+3V ROWA
5A1 9
+3V ROWB
5A2 7
+10V

REGISTER CONTROL LOGIC

NOTES
1. UNLESS OTHERWISE SPECIFIED ALL CAPACITORS ARE 1 μf, 35V
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCES
1. ASSEMBLY DWS 2014219

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
JG	RESISTOR	1080130
GE	INTERFACE RECEIVER	1014231
MK	DRIVER	1014123
AC	NOR	1014036
LN	BUFFERED FLIPFLOP	2014001

REV STATUS OF WIREWRAP CARD
—
A

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN Mazum 14 MAY 66
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

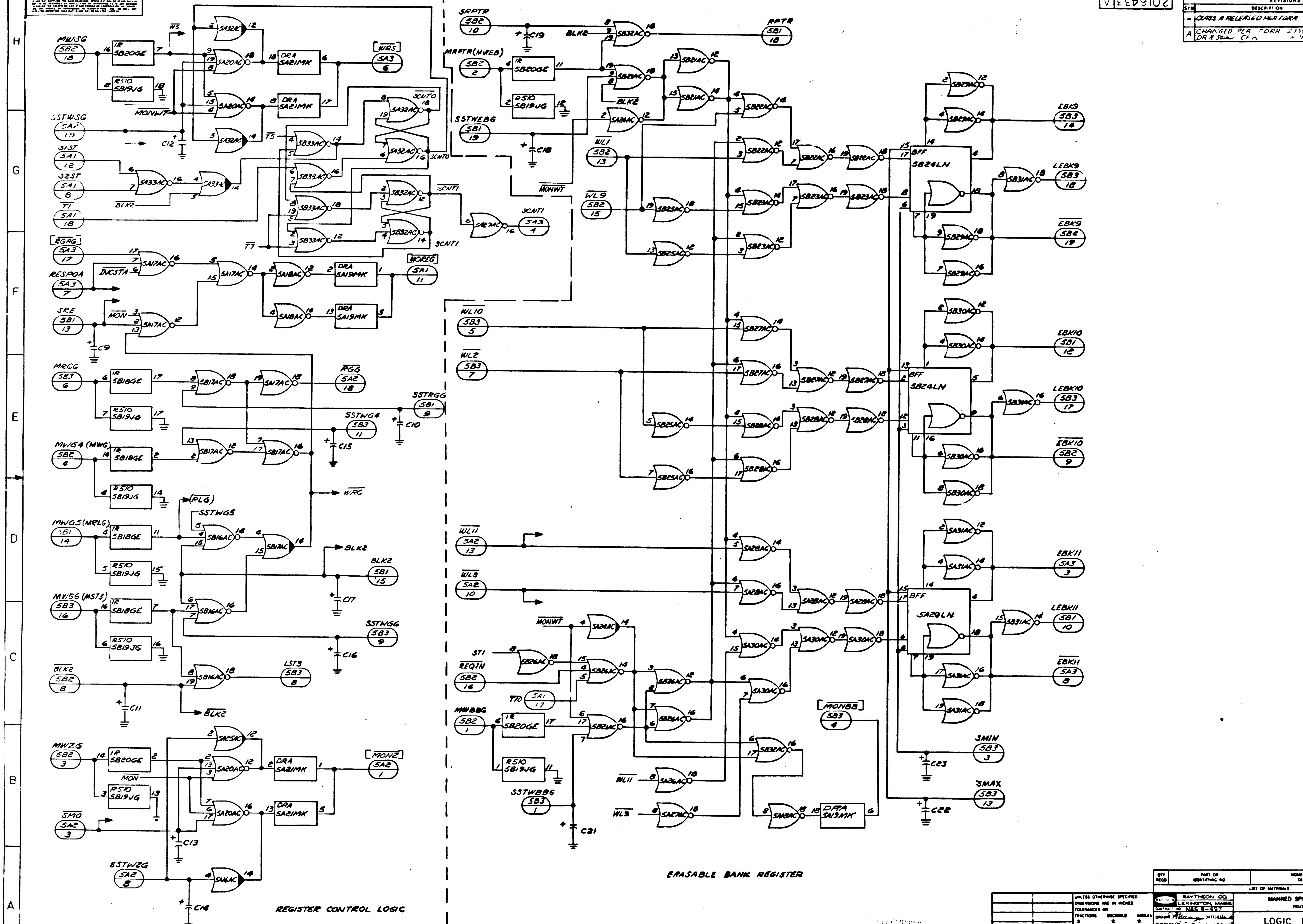
MANNED SPACECRAFT CENTER
HOUSTON TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1-PLATE 5
COMPUTER TEST SET

CODE IDENT NO 49956
SIZE J
NASA DRAWING NO 2016433
SCALE NONE
WT
SHEET 1 OF 2

2016433 A

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TORR		
A	CHANGED PER TORR 23340 DR R. St CH APPD		



MWSG SB2 18
SB20GE
SB19JG
WS
SA32AC
SA20AC
SA21MK
WRS SA3 6
SSTWSG SA2 19
MONWT
S1ST SA1 12
S2ST SA1 8
T1 SA1 18
BLK2
SA33AC
SB33AC
SCNT0
SA32AC
SB32AC
SCNT1
SA27AC
SCNT1 SA3 4
T5
T7
RGAG SA3 17
RESPOA SA3 7
INCSTA
SA17AC
SA18AC
SA19MK
MOREG SA1 11
SRE SB1 13
MON
MRGG SB3 6
SB18GE
SB17AC
RGG SA2 18
SSTRGG SB1 9
SSTWG4 SB3 11
MWG4 (MWG) SB2 4
WRG
PLG
SSTWG5
MWG5 (MRLG) SB1 14
SB16AC
BLK2 SB1 15
MWG6 (MST3) SB3 16
SSTWG6 SB3 9
LST3 SB3 8
BLK2 SB2 8
MWZG SB2 3
SA25AC
MONZ SA2 1
SMO SA2 3
SSTWZG SA2 8
SA16AC
REGISTER CONTROL LOGIC
SRPTR SB2 10
MRPTR (MWEB) SB2 2
RPTR SB1 18
SSTWEBG SB1 19
WL1 SB2 13
WL9 SB2 15
SB21AC
SB22AC
SB23AC
SB25AC
SB24LN
BFF
SB29AC
EBK9 SB3 14
LEBK9 SB3 18
EBK9 SB2 19
WL10 SB3 5
WL2 SB3 7
SB27AC
SB28AC
SB30AC
SB31AC
EBK10 SB1 12
LEBK10 SB3 17
EBK10 SB2 9
WL11 SA2 13
WL3 SA2 10
SA28AC
SA29LN
SA30AC
SA31AC
EBK11 SA3 3
LEBK11 SB1 10
EBK11 SA3 8
MONWT
ST1
REQIN SB2 14
SA24AC
SB26AC
T10 SA1 17
MWBBG SB2 1
SSTWBBG SB3 1
MONBB SB3 4
SMIN SB3 3
SMAX SB3 13
SA26AC
SA27AC
SA18AC
SA19MK
ERASABLE BANK REGISTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS
CONTRACT NO NAS 9-497
DRAWN DATE
CHECKED 14 MAY
APPROVAL 16 May 66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 5/19/66

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

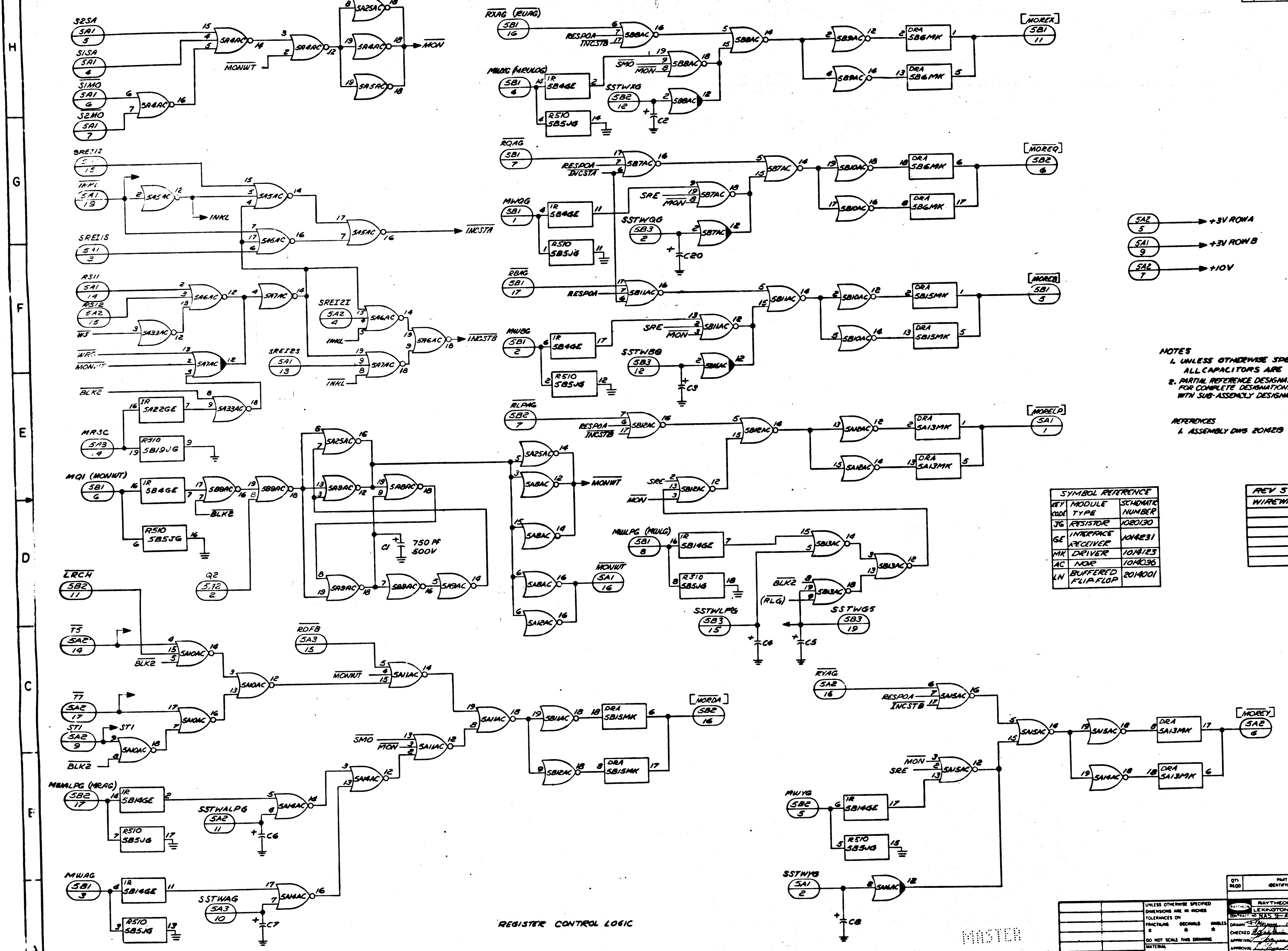
LOGIC DIAGRAM
LOGIC DRAWER I-PLATE 5
COMPUTER TEST SET

CODE IDENT NO 49956 SIZE J NASA DRAWING NO. 2016433
SCALE NONE WT SHEET 2 OF 2

2016433 A

2016433	-

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 29328		



S2SA
S1SA
S1MO
S2MO
MONWT
MON
SREI1
INKL
SREI5
INCSTA
RS11
RS12
WS
WRG
MONWT
BLK2
SREI2I
SREI2S
INCSTB
MRSC
MQI (MONWT)
C1 750 PF 500V
Q2
LRCH
T5
T7
ST1
RDFB
SMO
MORDA
MWLPG (MRAG)
SSTWALPG
MWAG
SSTWAG
RXAG (RUAG)
RESPOA
MWUG (MEULOG)
SSTWUG
MOREX
RQAG
MWQG
SRE
SSTWQG
MOREQ
RBAG
MWBG
SSTWBG
MOREB
RLPAG
MORELP
MWLPG (MWLG)
SSTWLPG
SSTWGS
RLG
RYAG
MWYG
SSTWYG
MOREY
5A2 5 → +3V ROWA
5A1 9 → +3V ROWB
5A2 7 → +10V

REGISTER CONTROL LOGIC

NOTES

1. UNLESS OTHERWISE SPECIFIED ALL CAPACITORS ARE 1 μf, 35V
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCES

1. ASSEMBLY DWG 2014219

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
JG	RESISTOR	1020130
GE	INTERFACE RECEIVER	1014231
MK	DRIVER	1014123
AC	NOR	1014036
LN	BUFFERED FLIP-FLOP	2014001

REV STATUS OF WIREWRAP CARD
—

MASTER

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN Morum 14 MAY 66
CHECKED 14 MAY 66
APPROVAL 16 May 6
APPROVAL
APPROVAL 5/16/66
NASA APPROVAL
MIT APPROVAL 6-3-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1-PLATE 5
COMPUTER TEST SET

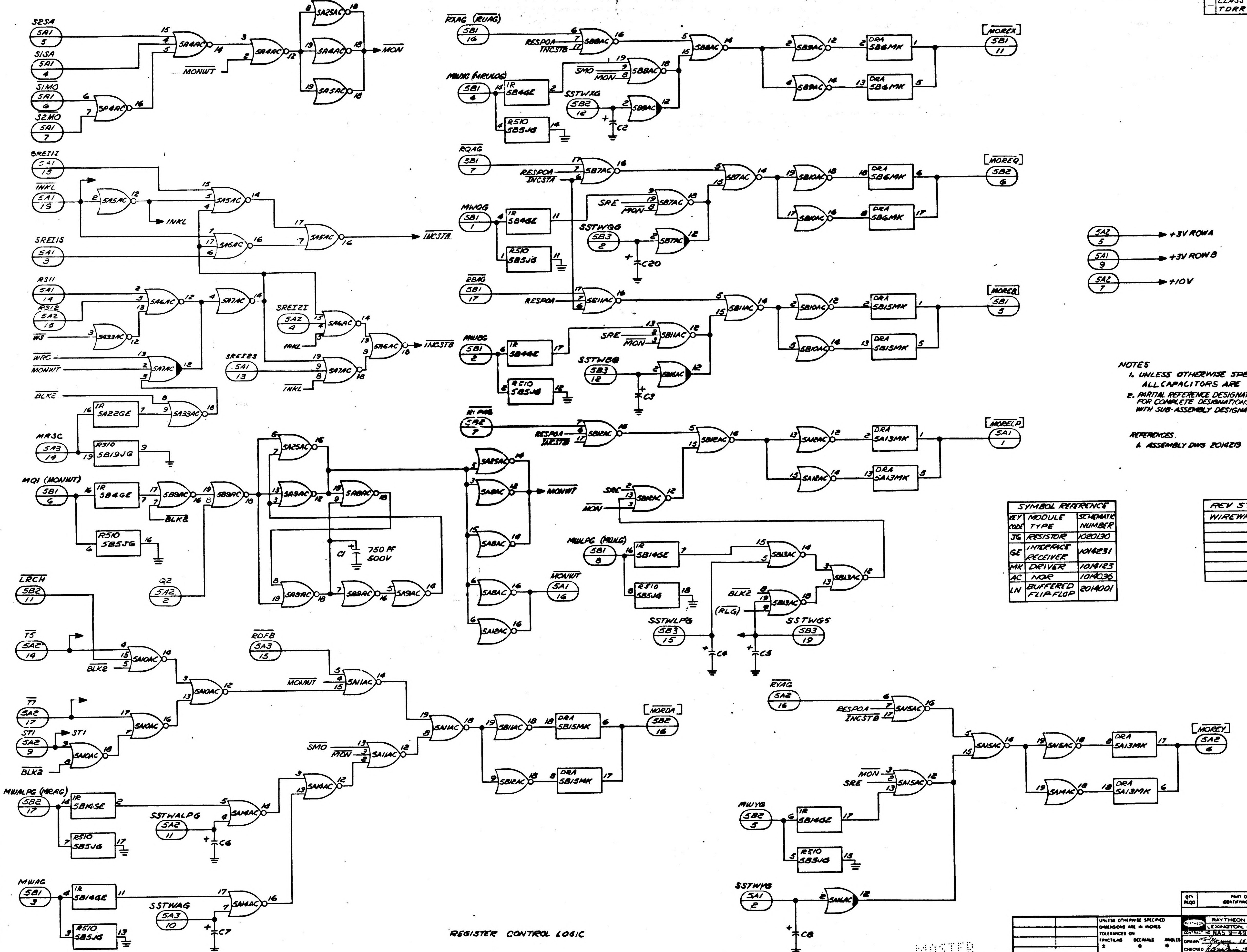
CODE IDENT NO	SIZE	NASA DRAWING NO
49956	J	2016433
SCALE NONE	WT	SHEET 1 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016433	-

2016433 -

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
—	CLASS A RELEASED PER TDRR 24325		



S2SA
SA1 5
S1SA
SA1 4
S1MO
SA1 6
S2MO
SA1 7
SA4AC
SA2AC
SA5AC
SP4AC
MONWT
MON
SREI13
SA1 15
INKL
SA1 19
SA5AC
SA6AC
INKL
SREI1S
SA1 3
INCSTA
RSI1
SA1 14
RSI2
SA2 15
WS
SA33AC
SA7AC
SREI2I
SA2 4
SREI23
SA1 13
INCSTB
WRG
MONWT
BLK2
SA22GE
SA33AC
MRSC
SA3 14
SB19JG
MQI (MONWT)
SB1 6
SB4GE
SB5JG
SB8AC
SB9AC
SA9AC
SA8AC
C1 750 pF 500V
Q2
SA2 2
MONWT
SA1 16
LRCH
SB2 11
T5
SA2 14
BLK2
SA10AC
RDFB
SA3 15
SA11AC
T7
SA2 17
ST1
SA2 9
SMO
MON
MWALPG (MRAG)
SB2 17
SB14GE
SSTWALPG
SA2 11
C6
MWAG
SB1 3
SSTWAG
SA3 10
C7
SA14AC
SB11AC
SB12AC
DRA SB15MK
MORDA
SB2 16
REGISTER CONTROL LOGIC
RXAG (RUAG)
SB1 16
RESPOA
INCSTB
SB8AC
MWUG (MRULOG)
SB1 4
SSTWXG
SB2 12
C2
SMO
MON
SB9AC
DRA SB6MK
MOREX
SB1 11
RQAG
SB1 7
RESPOA
INCSTA
SB7AC
SRE
MON
MWQG
SB1 1
SSTWQG
SB3 2
C20
SB10AC
MOREQ
SB2 6
RBAG
SB1 17
SB11AC
MWBG
SB1 2
SSTWBG
SB3 12
C3
DRA SB15MK
MOREB
SB1 5
RLPAG
SA2 7
SB12AC
SA10AC
SA12AC
DRA SA13MK
MORELP
SA1 1
SRE
MON
MWLPG (MWLG)
SB1 8
SB13AC
BLK2
(RLG)
SSTWLPG
SB3 15
C4
C5
SSTWGS
SB3 19
RYAG
SA2 16
RESPOA
INCSTB
SA15AC
MON
SRE
MWYG
SB2 5
SSTWYG
SA1 2
C8
DRA SA13MK
MOBEY
SA2 6
SA2 5
+3V ROWA
SA1 9
+3V ROWB
SA2 7
+10V

NOTES
1. UNLESS OTHERWISE SPECIFIED ALL CAPACITORS ARE 1 μf, 35V
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCES.
1. ASSEMBLY DWG 2014219

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
JG	RESISTOR	1020130
GE	INTERFACE RECEIVER	1014231
MK	DRIVER	1014123
AC	NOR	1014036
LN	BUFFERED FLIPFLOP	2014001

REV STATUS OF WIREWRAP CARD
—

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN 14 MAY 66
CHECKED 14 MAY 66
APPROVAL 16 May 66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1-PLATE 5
COMPUTER TEST SET

CODE IDENT NO 49956 | SIZE J | NASA DRAWING NO 2016433
SCALE NONE | WT | SHEET 1 OF 2

2016433 -

E1

2016433 -

SYM	DESCRIPTION	DATE	APPROVED
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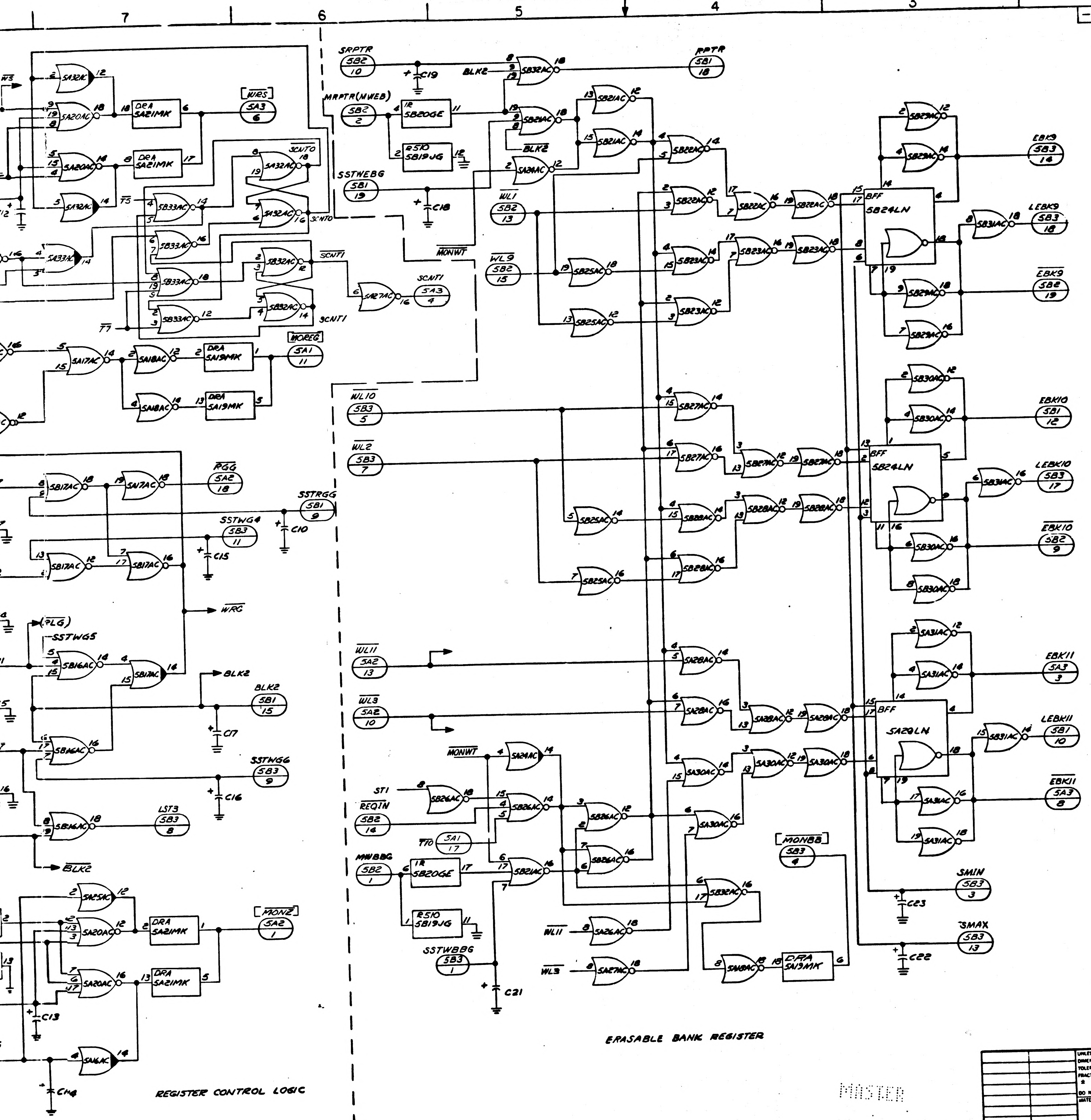
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RPTR SB1 18
MRPTR(MWEB) SB2 2
SSTWEBG SB1 19
WL1 SB2 13
WL9 SB2 15
WL10 SB3 5
WL2 SB3 7
WL11 SA2 13
WL3 SA2 10
MONWT
ST1
REQIN SB2 14
T10 SA1 17
MWBBG SB2 1
SSTWBBG SB3 1
MONBB SB3 4
BLK2
EBK9 SB3 14
LEBK9 SB3 18
EBK9 SB2 19
EBK10 SB1 12
LEBK10 SB3 17
EBK10 SB2 9
EBK11 SA3 3
LEBK11 SB1 10
EBK11 SA3 8
SMIN SB3 3
SMAX SB3 13
BFF SB24LN
BFF SA29LN
DRA SB19MK
WRS SA3 6
SCNT0
SCNT1 SA3 4
MOREG SA1 11
RGG SA2 18
SSTRGG SB1 9
SSTWG4 SB3 11
WRG
SSTWG5
BLK2 SB1 15
SSTWG6 SB3 9
LST3 SB3 8
MONZ SA2 1
DRA SA21MK
DRA SA19MK
C10 C13 C14 C15 C16 C17 C18 C19 C21 C22 C23
ERASABLE BANK REGISTER
REGISTER CONTROL LOGIC

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN DATE 4 May 66
CHECKED 14 MAY 66
APPROVAL 11 May 66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 5/19/66

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HOUSTON TEXAS

LOGIC DIAGRAM
LOGIC DRAWER I-PLATE 5
COMPUTER TEST SET

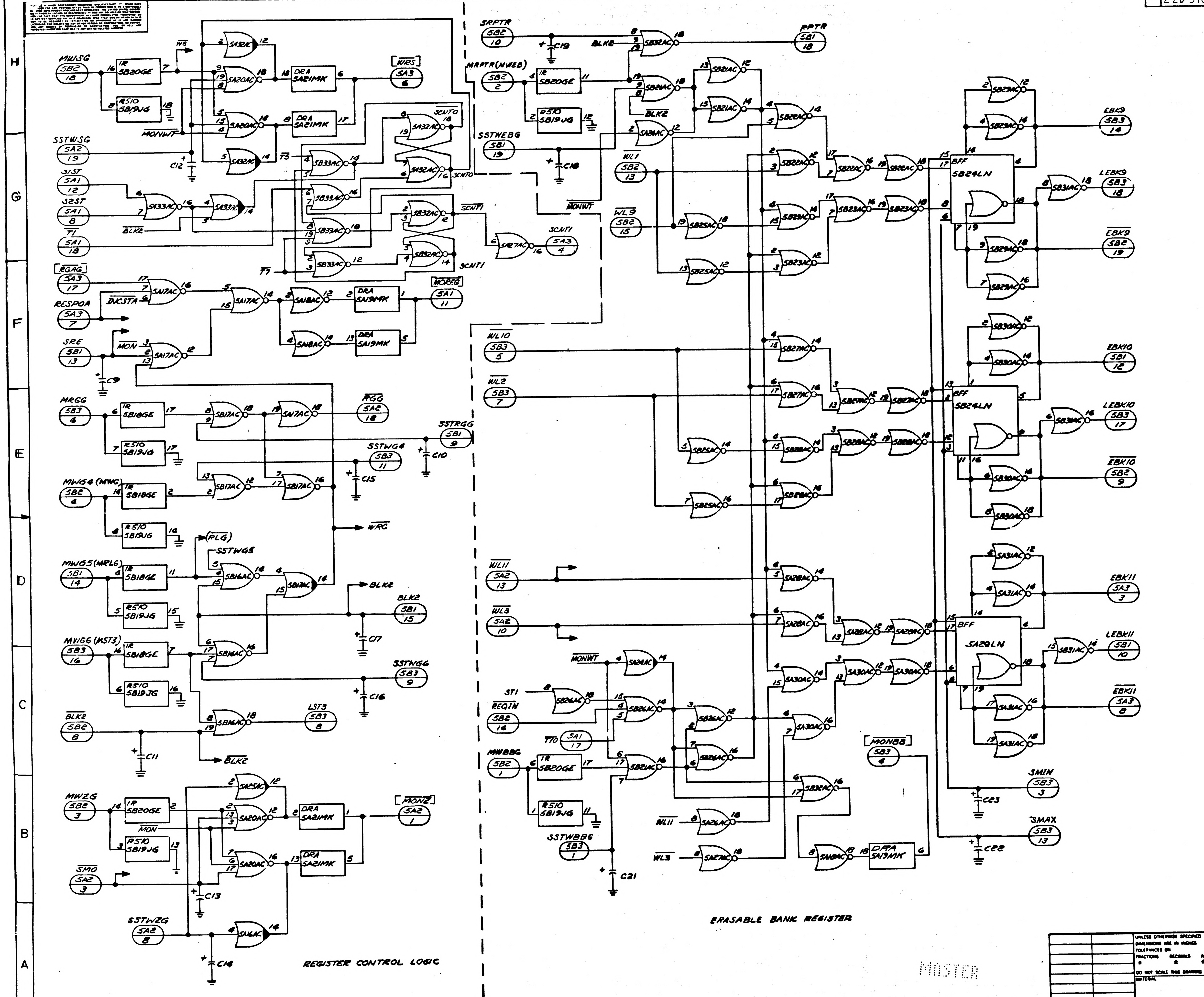
CODE IDENT NO 49956
SIZE J
NASA DRAWING NO. 2016433
SCALE NONE
WT
SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016433

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 2332-1		

2016433 –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1R SB20GE
R510 SB19JG
WS
SA32AC
SA20AC
DRA SA21MK
WRS SA3 6
MONWT
SSTWSG SA2 19
C12
DRA SA21MK
SCNTO
SA32AC
SA32AC
T5
SB33AC
S1ST SA1 12
S2ST SA1 8
SA33AC
SA33AC
BLK2
T1 SA1 18
SB32AC
SCNT1
SB32AC
SCNT1
SA27AC
SCNT1 SA3 4
T7
EGAG SA3 17
INCSTA
SA17AC
SA18AC
DRA SA19MK
MORFG SA1 11
RESPOA SA3 7
MON
SRE SB1 13
C9
MRGG SB3 6
SB18GE
SB17AC
RGG SA2 18
SSTRGG SB1 9
SSTWG4 SB3 11
C10
C15
MWG4 (MWG) SB2 4
WRG
(RLG)
SSTWG5
MWG5 (MRLG) SB1 14
SB16AC
BLK2 SB1 15
C17
MWG6 (MST3) SB3 16
SSTWG6 SB3 9
C16
LST3 SB3 8
BLK2 SB2 8
C11
MWZG SB2 3
SA25AC
SA20AC
MONZ SA2 1
SMO SA2 3
C13
SSTWZG SA2 8
SA16AC
C14
REGISTER CONTROL LOGIC
SRPTR SB2 10
C19
SB32AC
RPTR SB1 18
MRPTR (MWEB) SB2 2
SB20GE
SB19JG
SB21AC
BLK2
SA31AC
SSTWEBG SB1 19
C18
WL1 SB2 13
WL9 SB2 15
SB22AC
SB25AC
SB23AC
BFF SB24LN
SB29AC
EBK9 SB3 14
SB31AC
LEBK9 SB3 18
EBK9 SB2 19
WL10 SB3 5
WL2 SB3 7
SB27AC
SB28AC
SB30AC
EBK10 SB1 12
LEBK10 SB3 17
EBK10 SB2 9
WL11 SA2 13
WL3 SA2 10
SA28AC
SA29LN
SA30AC
SA31AC
EBK11 SA3 3
LEBK11 SB1 10
EBK11 SA3 8
MONWT
SA24AC
ST1
REQIN SB2 14
SB26AC
T10 SA1 17
MWBBG SB2 1
SSTWBBG SB3 1
C21
SB32AC
MONBB SB3 4
SMIN SB3 3
C23
SMAX SB3 13
C22
WL11
SA26AC
WL3
SA27AC
SA18AC
DRA SA19MK
ERASABLE BANK REGISTER

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN [illegible] DATE 4 May 66
CHECKED [illegible] 14 May 66
APPROVAL [illegible] 16 May 66
APPROVAL [illegible] 16 May 66
APPROVAL
NASA APPROVAL
MIT APPROVAL [illegible]
MIT APPROVAL [illegible] 5/10/66

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

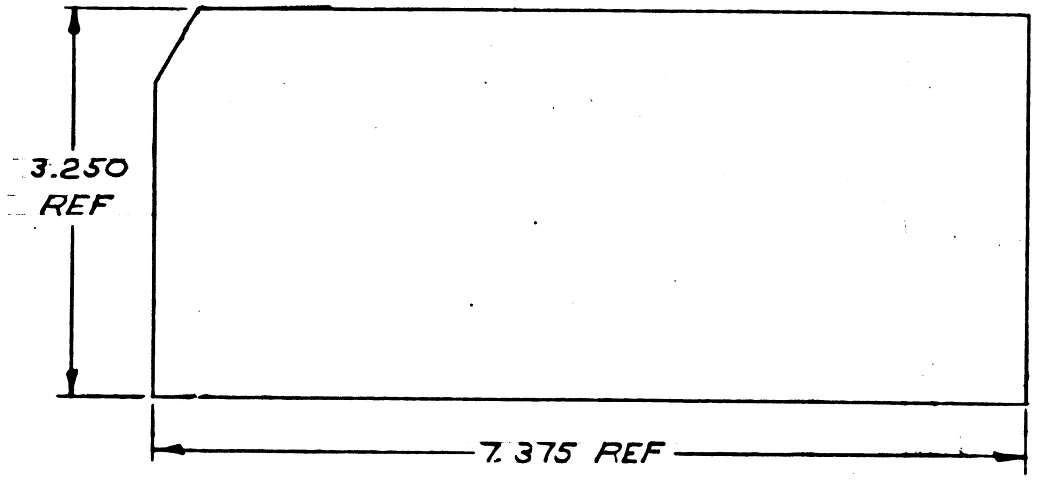
LOGIC DIAGRAM
LOGIC DRAWER I-PLATE 5
COMPUTER TEST SET

CODE IDENT NO	SIZE	NASA DRAWING NO.
49956	J	2016433
SCALE NONE	WT	SHEET 2 OF 2

2016433 –

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 29328		
A	CHANGED PER TDRR 29340 DR R. Steele CHK APPD	7/11/66	aff

NO. OF CARDS 660



REFRENCE DRAWINGS

LOGIC DIAGRAM 2016433

MECH ASSY 2014219

NOTES

1. USE CARD FORM IBM U11897
   OR EQUIVALENT
2. INTERPRET DRAWING IN ACCORDANCE
   WITH STANDARDS PRESCRIBED
   BY MIL-D-70327

RAYTHEON RAYTHEON CO. LEXINGTON, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
CONTRACT NO. NAS 9-497			
DRAWN R. Fleischer DATE 14 MAY 66	WIRE WRAP MACHINE CARDS LOGIC PLATE 5 LOGIC DRAWER 1 COMPUTER TEST SET		
CHECKED Duboing 14 MAY 66			
APPROVAL 11 May			
APPROVAL D. O'Bryant 5/16/66			
APPROVAL 5/16/66			
NASA APPROVAL	SIZE B	CODE IDENT NO. 49956	NASA DRAWING NO. 2016434
MIT APPROVAL 6-7-66			
MIT APPROVAL 5 May '66	SCALE 1/1	WT	SHEET 1 OF 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
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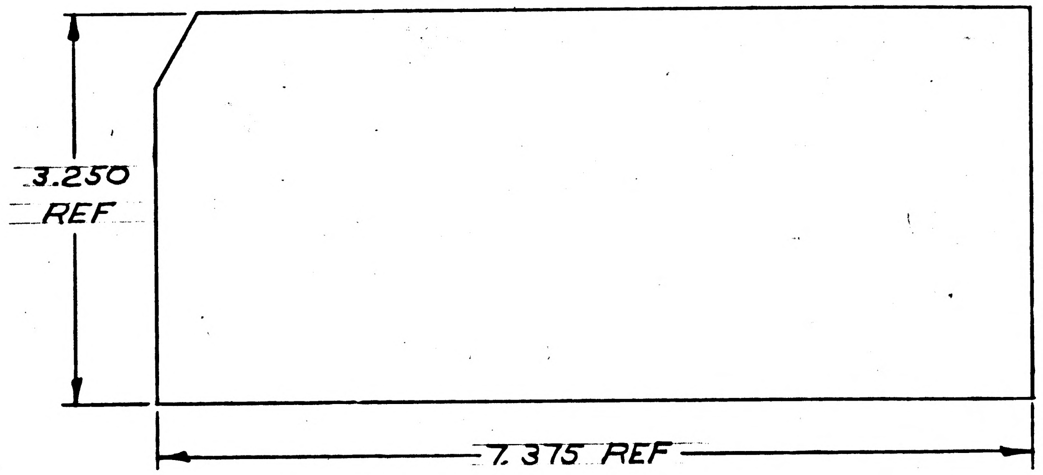

REFRENCE DRAWINGS

LOGIC DIAGRAM 2016433

MECH ASSY 2014219

NOTES

1. USE CARD FORM IBM U11897 OR EQUIVALENT
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

RAYTHEON CO. LEXINGTON, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
CONTRACT NO. NAS 9-497			
DRAWN R. Fleischer DATE 14 MAY 66	WIRE WRAP MACHINE CARDS LOGIC PLATE 5 LOGIC DRAWER I COMPUTER TEST SET		
CHECKED 14 MAY 66			
APPROVAL			
APPROVAL 5/11/66			
APPROVAL 5/11/66			
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MIT APPROVAL			
MIT APPROVAL	SCALE 1/1	WT	SHEET 1 OF 1

2016435 -

SYM	DESCRIPTION	DATE	APPROVED
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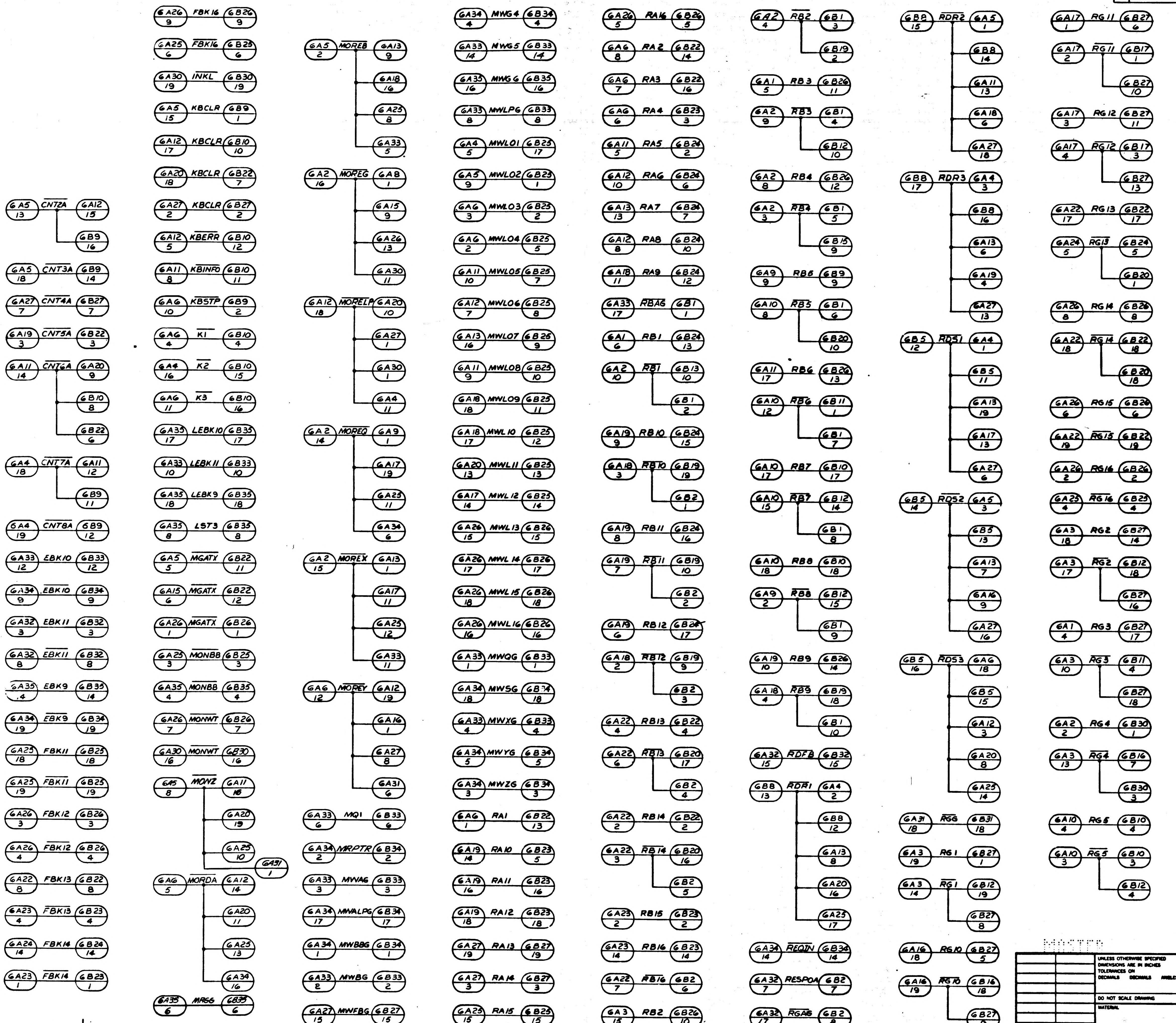
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GA5 18 CNT3A GB9 14
GA27 7 CNT4A GB27 7
GA19 3 CNT5A GB22 3
GA11 14 CNT6A GA20 9 GB10 8 GB22 4
GA4 18 CNT7A GA11 12 GB9 11
GA4 19 CNT8A GB9 12
GA33 12 EBK10 GB33 12
GA34 9 EBK10 GB34 9
GA32 3 EBK11 GB32 3
GA32 8 EBK11 GB32 8
GA35 4 EBK9 GB35 14
GA34 19 EBK9 GB34 19
GA25 18 FBK11 GB25 18
GA25 19 FBK11 GB25 19
GA26 3 FBK12 GB26 3
GA26 4 FBK12 GB26 4
GA22 8 FBK13 GB22 8
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GA23 1 FBK14 GB23 1
GA26 9 FBK16 GB26 9
GA25 6 FBK16 GB25 6
GA30 19 INKL GB30 19
GA5 15 KBCLR GB9 1
GA12 17 KBCLR GB10 10
GA20 18 KBCLR GB22 7
GA27 2 KBCLR GB27 2
GA12 5 KBERR GB10 12
GA11 8 KBINFO GB10 11
GA6 10 KBSTP GB9 2
GA6 4 K1 GB10 4
GA4 16 K2 GB10 15
GA6 11 K3 GB10 16
GA35 17 LEBK10 GB35 17
GA33 10 LEBK11 GB33 10
GA35 18 LEBK9 GB35 18
GA35 8 LST3 GB35 8
GA5 5 MGATX GB22 11
GA15 6 MGATX GB22 12
GA26 1 MGATX GB26 1
GA25 3 MONBB GB25 3
GA35 4 MONBB GB35 4
GA26 7 MONWT GB26 7
GA30 16 MONWT GB30 16
GA5 8 MONZ GA11 16 GA20 19 GA25 10 GA31 1
GA6 5 MORDA GA12 14 GA20 11 GA25 13 GA34 16
GA35 6 MRGG GB35 6
GA5 2 MOREB GA13 9 GA18 16 GA25 8 GA33 5
GA2 16 MOREG GA8 1 GA15 9 GA26 13 GA30 11
GA12 18 MORELP GA20 10 GA27 1 GA30 1 GA4 11
GA2 14 MOREQ GA9 1 GA17 19 GA23 11 GA34 6
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GA6 12 MOREY GA12 19 GA16 1 GA27 8 GA31 6
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GA34 18 MWSG GB34 18
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GA34 5 MWYG GB34 5
GA34 3 MWZG GB34 3
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GA27 19 RA13 GB27 19
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GA13 13 RA7 GB26 7
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GA10 12 RB6 GB11 1 GB1 7
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GA10 15 RB7 GB12 14 GB1 8
GA10 18 RB8 GB10 18
GA9 2 RB8 GB12 15 GB1 9
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GB5 12 RDS1 GA4 1 GB5 11 GA13 19 GA17 13 GA27 6
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GB5 16 RDS3 GA6 18 GB5 15 GA12 3 GA20 8 GA25 14
GA31 18 RGG GB31 18
GA3 19 RG1 GB27 1
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GA10 3 RG5 GB10 3 GB12 4

NOTES:
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCES:
1. ASSEMBLY DWG 2014228

REV STATUS OF WIREWRAP
WIREWRAPCARD REV

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES
DO NOT SCALE DRAWING
MATERIAL

NEXT ASSY USED ON
APPLICATION

RAYTHEON CO.
LEXINGTON MASS.
CONTRACT NO. NAS 9-497
DRAWN
CHECKED
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1 PLATE 6
COMPUTER TEST SET

CODE IDENT NO. 49956 SIZE J NASA DRAWING NO. 2016435 -
SCALE NONE WT SHEET 1 OF 1

2016435 -

2016435 -

SYM	DESCRIPTION	DATE	APPROVED
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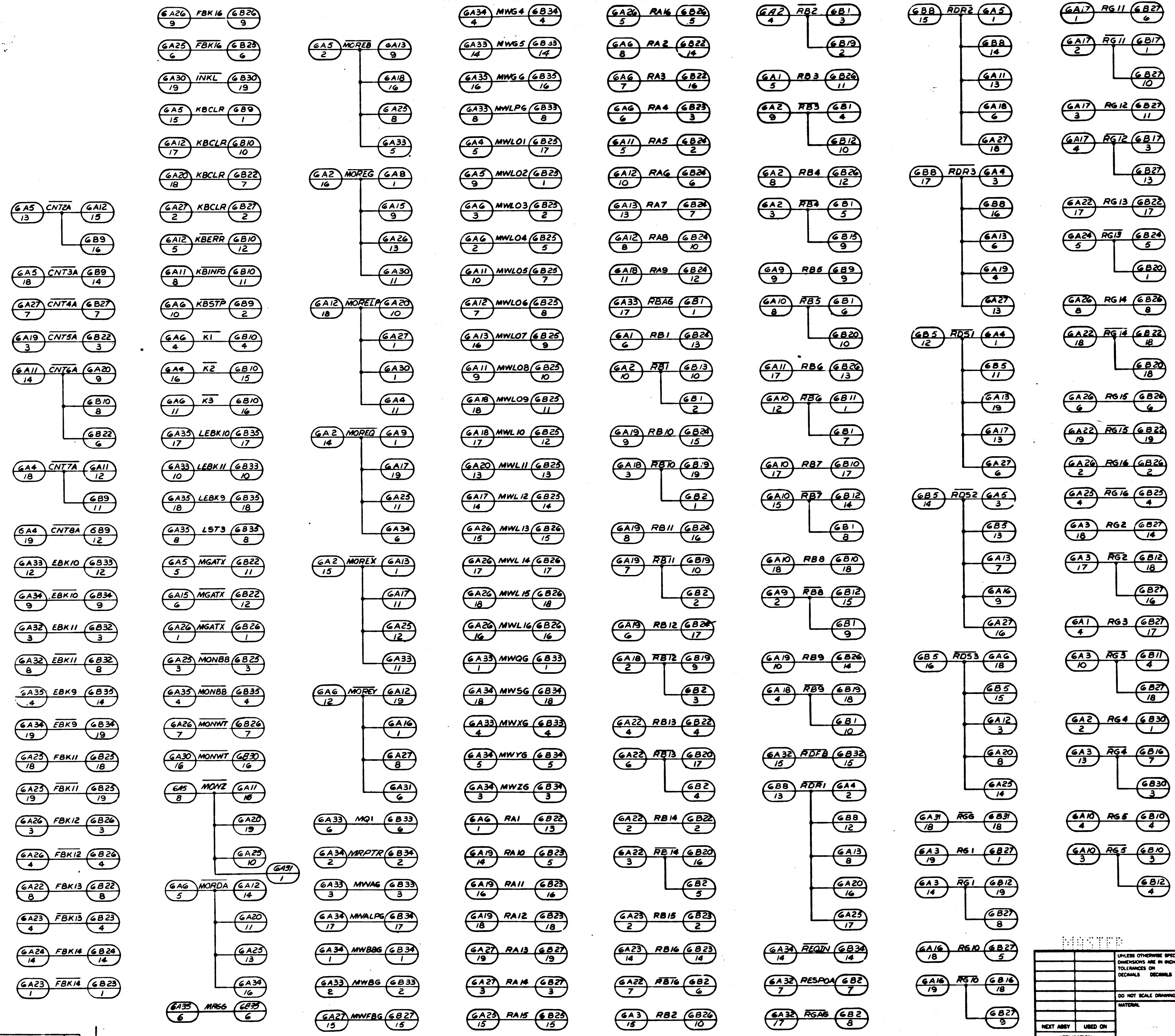
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NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCES:

1. ASSEMBLY DWG 2014228

REV STATUS OF WIREWRAP
WIREWRAPCARD REV
—

MASTER

NEXT ASSY	USED ON	
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING
MATERIAL

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE
CHECKED 18 MAY 66
APPROVAL 18 May 66
APPROVAL D. O'Bryant 5/18/66
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1 PLATE 6
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016435 -
SCALE NONE
WT
SHEET 1 OF 2

2016435 -

2016435 | -

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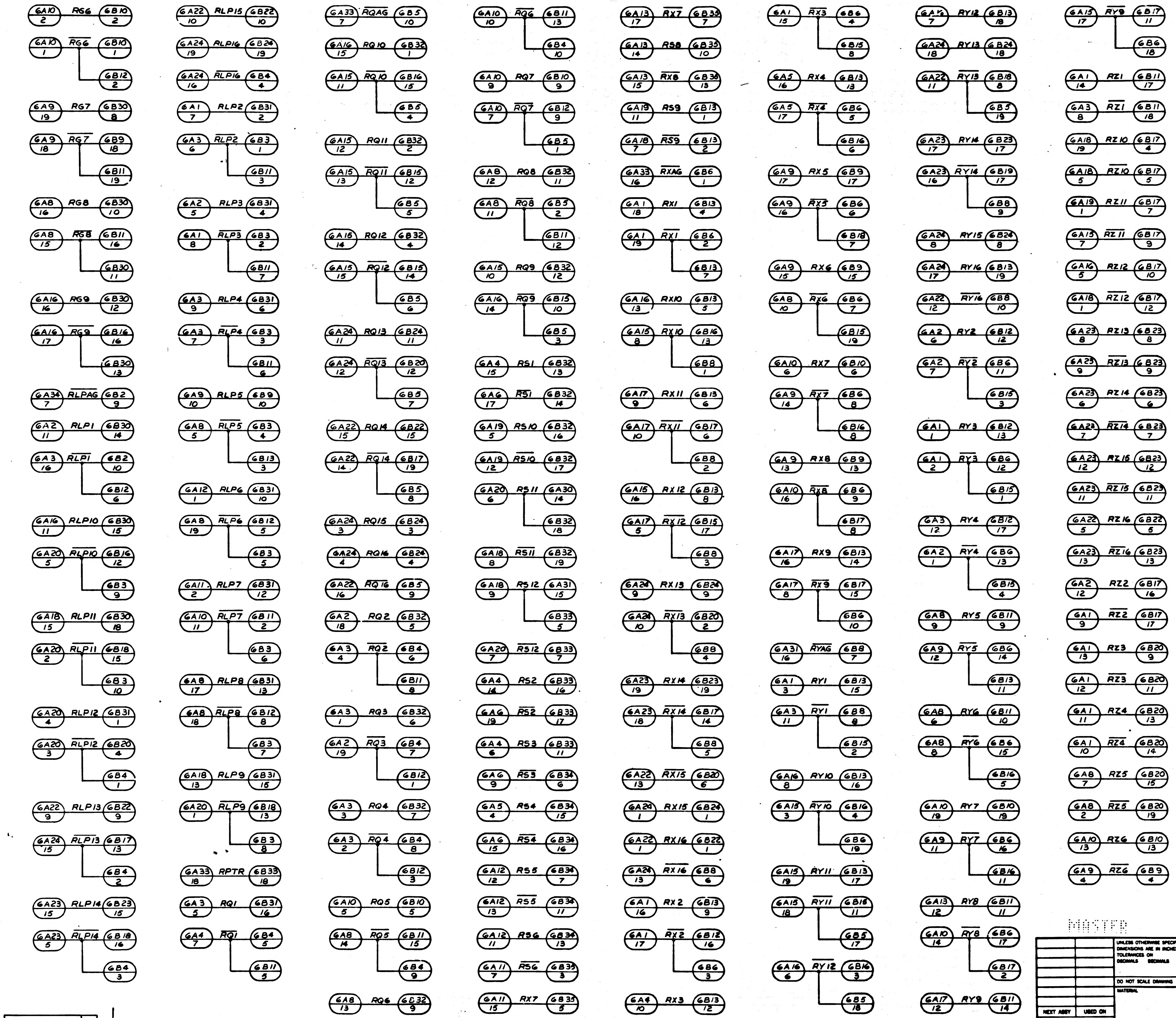

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RZ4
RZ5
RZ6

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN K. Hainchen DATE 6 MAY 62
CHECKED 10 MAY 66
APPROVAL 16 May 66
APPROVAL D. 5/16/66
APPROVAL
NASA APPROVAL
MIT APPROVAL 6-3-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1 PLATE 6
COMPUTER TEST SET

CODE IDENT NO. 49956 | SIZE J | NASA DRAWING NO. 2016435

SCALE NONE | WT | SHEET 2 OF 3

2016435 | -

2016435 —

SYM	DESCRIPTION	DATE	APPROVED
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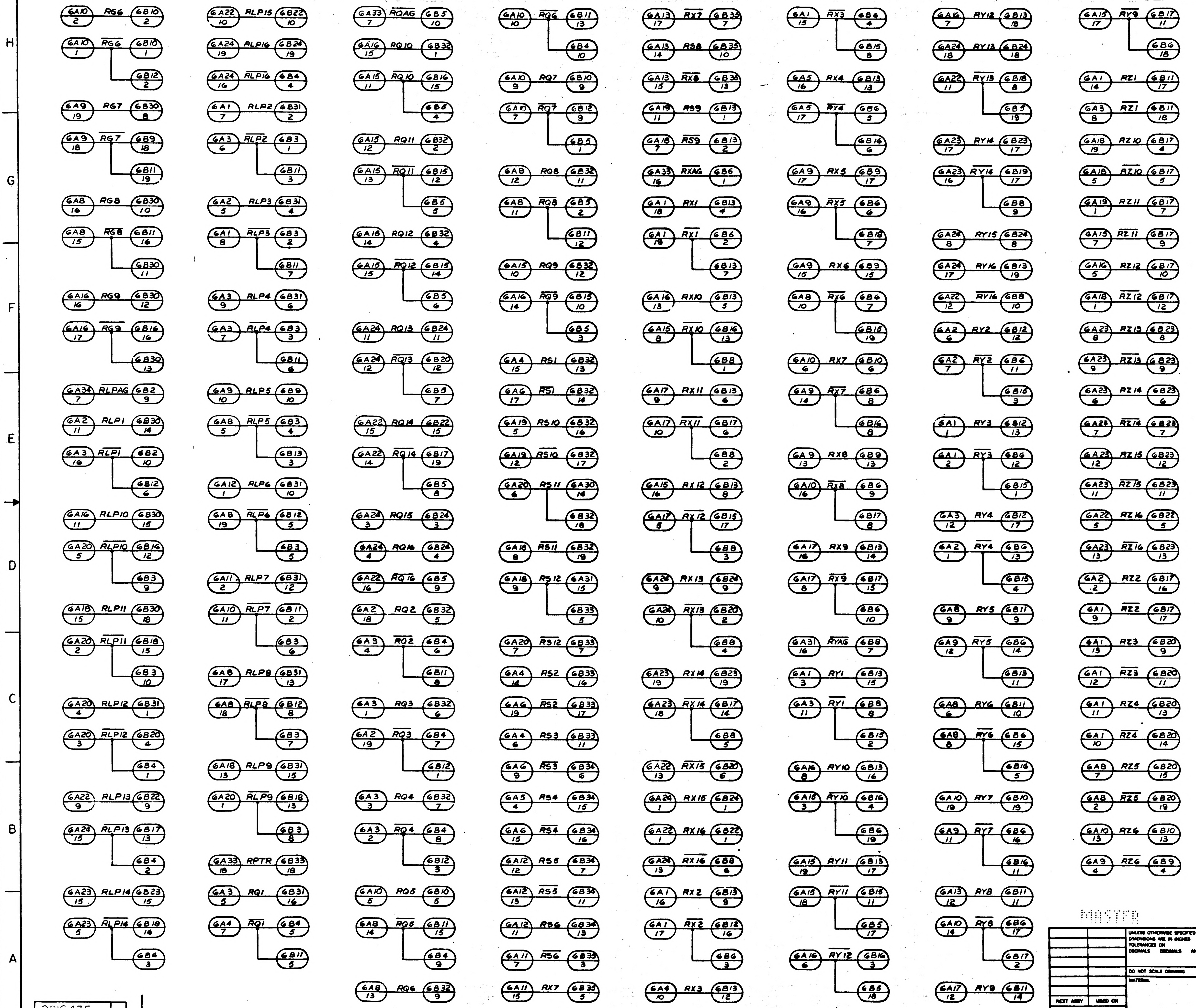

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GA8 7 RZ5 GB20 15
GA8 2 $\overline{RZ5}$ GB20 19
GA10 13 RZ6 GB10 13
GA9 4 $\overline{RZ6}$ GB9 4

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING

MATERIAL

NEXT ASSY | USED ON

APPLICATION

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1 PLATE 6
COMPUTER TEST SET

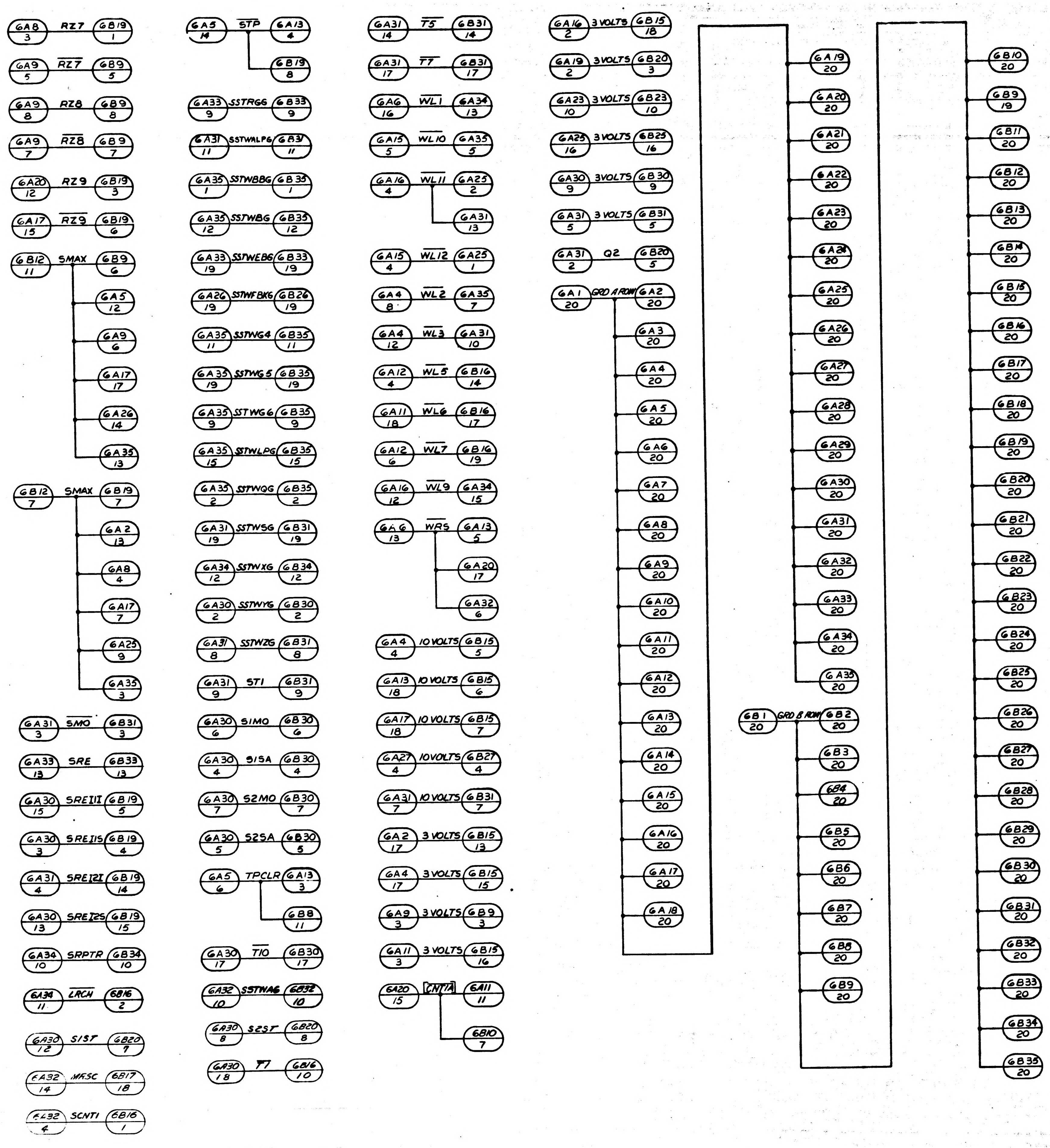
CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	J	2016435

SCALE | WT | SHEET

2016435 —

2016435 —

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 29324		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6A9 5 $\overline{RZ7}$ 6B9 5
6A9 8 RZ8 6B9 8
6A9 7 $\overline{RZ8}$ 6B9 7
6A20 12 RZ9 6B19 3
6A17 15 $\overline{RZ9}$ 6B19 6
6B12 11 SMAX 6B9 6, 6A5 12, 6A9 6, 6A17 17, 6A26 14, 6A35 13
6B12 7 SMAX 6B19 7, 6A2 13, 6A8 4, 6A17 7, 6A25 9, 6A35 3
6A31 3 $\overline{SMO}$ 6B31 3
6A33 13 SRE 6B33 13
6A30 15 SREI1I 6B19 5
6A30 3 SREI1S 6B19 4
6A31 4 SREI2I 6B19 14
6A30 13 SREI2S 6B19 15
6A34 10 SRPTR 6B34 10
6A34 11 $\overline{LRCH}$ 6B16 2
6A30 12 S1ST 6B20 7
6A32 14 MFSC 6B17 18
6A32 4 SCNT1 6B16 1
6A5 14 $\overline{STP}$ 6A13 4, 6B19 8
6A33 9 SSTRGG 6B33 9
6A31 11 SSTWALPG 6B31 11
6A35 1 SSTWBBG 6B35 1
6A35 12 SSTWBG 6B35 12
6A33 19 SSTWEBG 6B33 19
6A26 19 SSTWFBKG 6B26 19
6A35 11 SSTWG4 6B35 11
6A35 19 SSTWG5 6B35 19
6A35 9 SSTWG6 6B35 9
6A35 15 SSTWLPG 6B35 15
6A35 2 SSTWQG 6B35 2
6A31 19 SSTWSG 6B31 19
6A34 12 SSTWXG 6B34 12
6A30 2 SSTWYG 6B30 2
6A31 8 SSTWZG 6B31 8
6A31 9 ST1 6B31 9
6A30 6 S1MO 6B30 6
6A30 4 S1SA 6B30 4
6A30 7 S2MO 6B30 7
6A30 5 S2SA 6B30 5
6A5 6 TPCLR 6A13 3, 6B8 11
6A30 17 $\overline{T10}$ 6B30 17
6A32 10 SSTWAG 6B32 10
6A30 8 S2ST 6B20 8
6A30 18 T7 6B16 10
6A31 14 $\overline{T5}$ 6B31 14
6A31 17 $\overline{T7}$ 6B31 17
6A6 16 $\overline{WL1}$ 6A34 13
6A15 5 $\overline{WL10}$ 6A35 5
6A16 4 $\overline{WL11}$ 6A25 2, 6A31 13
6A15 4 $\overline{WL12}$ 6A25 1
6A4 8 $\overline{WL2}$ 6A35 7
6A4 12 $\overline{WL3}$ 6A31 10
6A12 4 $\overline{WL5}$ 6B16 14
6A11 18 $\overline{WL6}$ 6B16 17
6A12 6 $\overline{WL7}$ 6B16 19
6A16 12 $\overline{WL9}$ 6A34 15
6A6 13 $\overline{WRS}$ 6A13 5, 6A20 17, 6A32 6
6A4 4 10 VOLTS 6B15 5
6A13 18 10 VOLTS 6B15 6
6A17 18 10 VOLTS 6B15 7
6A27 4 10 VOLTS 6B27 4
6A31 7 10 VOLTS 6B31 7
6A2 17 3 VOLTS 6B15 13
6A4 17 3 VOLTS 6B15 15
6A9 3 3 VOLTS 6B9 3
6A11 3 3 VOLTS 6B15 16
6A20 15 CNT1A 6A11 11, 6B10 7
6A16 2 3 VOLTS 6B15 18
6A19 2 3 VOLTS 6B20 3
6A23 10 3 VOLTS 6B23 10
6A25 16 3 VOLTS 6B25 16
6A30 9 3 VOLTS 6B30 9
6A31 5 3 VOLTS 6B31 5
6A31 2 Q2 6B20 5
6A1 20 GRD A ROW 6A2 20, 6A3 20, 6A4 20, 6A5 20, 6A6 20, 6A7 20, 6A8 20, 6A9 20, 6A10 20, 6A11 20, 6A12 20, 6A13 20, 6A14 20, 6A15 20, 6A16 20, 6A17 20, 6A18 20, 6A19 20, 6A20 20, 6A21 20, 6A22 20, 6A23 20, 6A24 20, 6A25 20, 6A26 20, 6A27 20, 6A28 20, 6A29 20, 6A30 20, 6A31 20, 6A32 20, 6A33 20, 6A34 20, 6A35 20
6B1 20 GRD B ROW 6B2 20, 6B3 20, 6B4 20, 6B5 20, 6B6 20, 6B7 20, 6B8 20, 6B9 20, 6B10 20, 6B9 19, 6B11 20, 6B12 20, 6B13 20, 6B14 20, 6B15 20, 6B16 20, 6B17 20, 6B18 20, 6B19 20, 6B20 20, 6B21 20, 6B22 20, 6B23 20, 6B24 20, 6B25 20, 6B26 20, 6B27 20, 6B28 20, 6B29 20, 6B30 20, 6B31 20, 6B32 20, 6B33 20, 6B34 20, 6B35 20

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN R. Hw[illegible] DATE 14 MAY 66
CHECKED P. [illegible] 14 MAY 66
APPROVAL [illegible] 16 MAY 66
APPROVAL D. J. Bryant 5/16/66
APPROVAL M. O. [illegible] 5/16/66
NASA APPROVAL
MIT APPROVAL [illegible] 3-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1 PLATE 6
COMPUTER TEST SET

CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	J	2016435

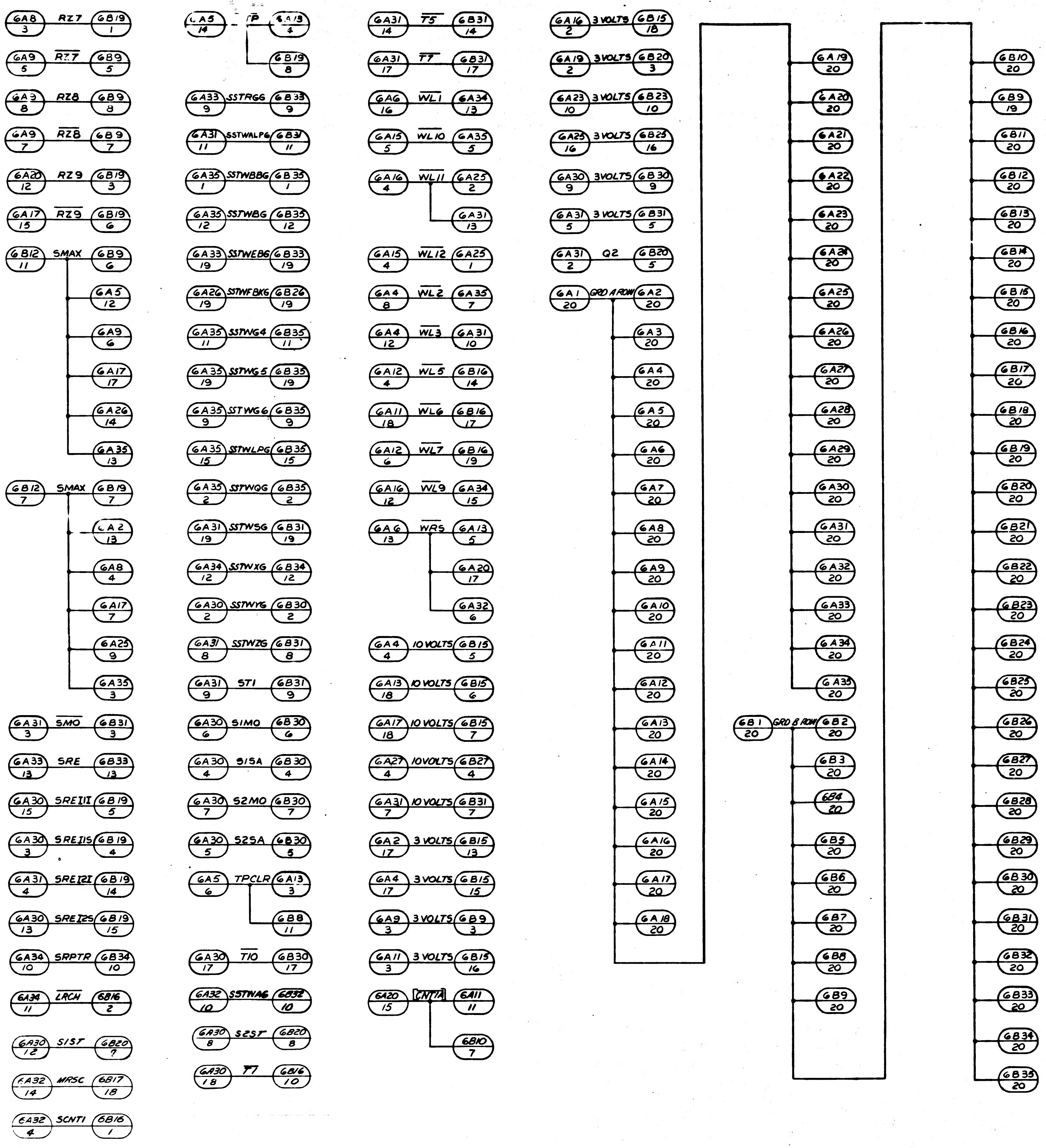
SCALE NONE | WT | SHEET 3 OF 3

MASTER

2016435 —

2016435 —

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 21326		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6A9 5 RZ7 6B9 5
6A9 8 RZ8 6B9 8
6A9 7 RZ8 6B9 7
6A20 12 RZ9 6B19 3
6A17 15 RZ9 6B19 6
6B12 11 SMAX 6B9 6; 6A5 12; 6A9 6; 6A17 17; 6A26 14; 6A35 13
6B12 7 SMAX 6B19 7; 6A2 13; 6A8 4; 6A17 7; 6A25 9; 6A35 3
6A31 3 SMO 6B31 3
6A33 13 SRE 6B33 13
6A30 15 SREI1I 6B19 5
6A30 3 SREI1S 6B19 4
6A31 4 SREI2I 6B19 14
6A30 13 SREI2S 6B19 15
6A34 10 SRPTR 6B34 10
6A34 11 LRCH 6B16 2
6A30 12 S1ST 6B20 7
6A32 14 MRSC 6B17 18
6A32 4 SCNT1 6B16 1
6A5 14 TP 6A13 4; 6B19 8
6A33 9 SSTRGG 6B33 9
6A31 11 SSTWALPG 6B31 11
6A35 1 SSTWBBG 6B35 1
6A35 12 SSTWBG 6B35 12
6A33 19 SSTWEBG 6B33 19
6A26 19 SSTWFBKG 6B26 19
6A35 11 SSTWG4 6B35 11
6A35 19 SSTWG5 6B35 19
6A35 9 SSTWG6 6B35 9
6A35 15 SSTWLPG 6B35 15
6A35 2 SSTWQG 6B35 2
6A31 19 SSTWSG 6B31 19
6A34 12 SSTWXG 6B34 12
6A30 2 SSTWYG 6B30 2
6A31 8 SSTWZG 6B31 8
6A31 9 ST1 6B31 9
6A30 6 S1MO 6B30 6
6A30 4 S1SA 6B30 4
6A30 7 S2MO 6B30 7
6A30 5 S2SA 6B30 5
6A5 6 TPCLR 6A13 3; 6B8 11
6A30 17 T10 6B30 17
6A32 10 SSTWAG 6B32 10
6A30 8 S2ST 6B20 8
6A30 18 T7 6B16 10
6A31 14 T5 6B31 14
6A31 17 T7 6B31 17
6A6 16 WL1 6A34 13
6A15 5 WL10 6A35 5
6A16 4 WL11 6A25 2; 6A31 13
6A15 4 WL12 6A25 1
6A4 8 WL2 6A35 7
6A4 12 WL3 6A31 10
6A12 4 WL5 6B16 14
6A11 18 WL6 6B16 17
6A12 6 WL7 6B16 19
6A16 12 WL9 6A34 15
6A6 13 WRS 6A13 5; 6A20 17; 6A32 6
6A4 4 10 VOLTS 6B15 5
6A13 18 10 VOLTS 6B15 6
6A17 18 10 VOLTS 6B15 7
6A27 4 10VOLTS 6B27 4
6A31 7 10 VOLTS 6B31 7
6A2 17 3 VOLTS 6B15 13
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6A11 3 3 VOLTS 6B15 16
6A20 15 CNT1A 6A11 11; 6B10 7
6A16 2 3 VOLTS 6B15 18
6A19 2 3VOLTS 6B20 3
6A23 10 3 VOLTS 6B23 10
6A25 16 3 VOLTS 6B25 16
6A30 9 3VOLTS 6B30 9
6A31 5 3 VOLTS 6B31 5
6A31 2 Q2 6B20 5
6A1 20 GRD A ROW 6A2 20; 6A3 20; 6A4 20; 6A5 20; 6A6 20; 6A7 20; 6A8 20; 6A9 20; 6A10 20; 6A11 20; 6A12 20; 6A13 20; 6A14 20; 6A15 20; 6A16 20; 6A17 20; 6A18 20
6A19 20; 6A20 20; 6A21 20; 6A22 20; 6A23 20; 6A24 20; 6A25 20; 6A26 20; 6A27 20; 6A28 20; 6A29 20; 6A30 20; 6A31 20; 6A32 20; 6A33 20; 6A34 20; 6A35 20
6B1 20 GRD B ROW 6B2 20; 6B3 20; 6B4 20; 6B5 20; 6B6 20; 6B7 20; 6B8 20; 6B9 20
6B10 20; 6B9 19; 6B11 20; 6B12 20; 6B13 20; 6B14 20; 6B15 20; 6B16 20; 6B17 20; 6B18 20; 6B19 20; 6B20 20; 6B21 20; 6B22 20; 6B23 20; 6B24 20; 6B25 20; 6B26 20; 6B27 20; 6B28 20; 6B29 20; 6B30 20; 6B31 20; 6B32 20; 6B33 20; 6B34 20; 6B35 20

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 14 MAY 66
CHECKED 14 MAY 66
APPROVAL 16 May 66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1 PLATE 6
COMPUTER TEST SET

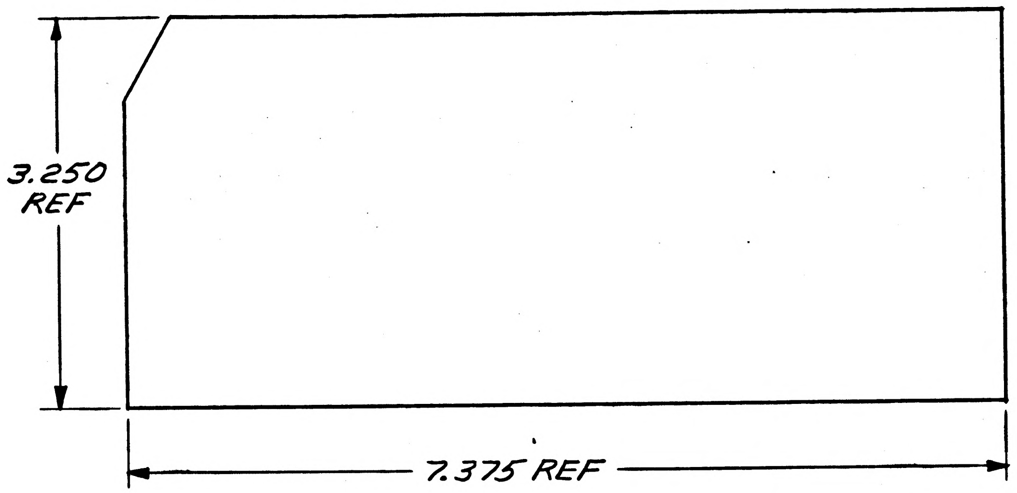
CODE IDENT NO. 49956 SIZE J NASA DRAWING NO. 2016435
SCALE NONE WT SHEET 3 OF 3

MASTER

2016435 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 29328		

NO. OF CARDS 661



REFERENCE DRAWINGS
LOGIC DIAGRAM 2016435
MECH ASSY 2014228

NOTES
1. USE CARD FORM IBM U11897 OR EQUIVALENT
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN R. Fleischer DATE 14 MAY 66
CHECKED 14 MAY 66
APPROVAL 16 May 66
APPROVAL 5/16/66
APPROVAL 5/16/66
NASA APPROVAL
MIT APPROVAL 3-66
MIT APPROVAL 19 May 6

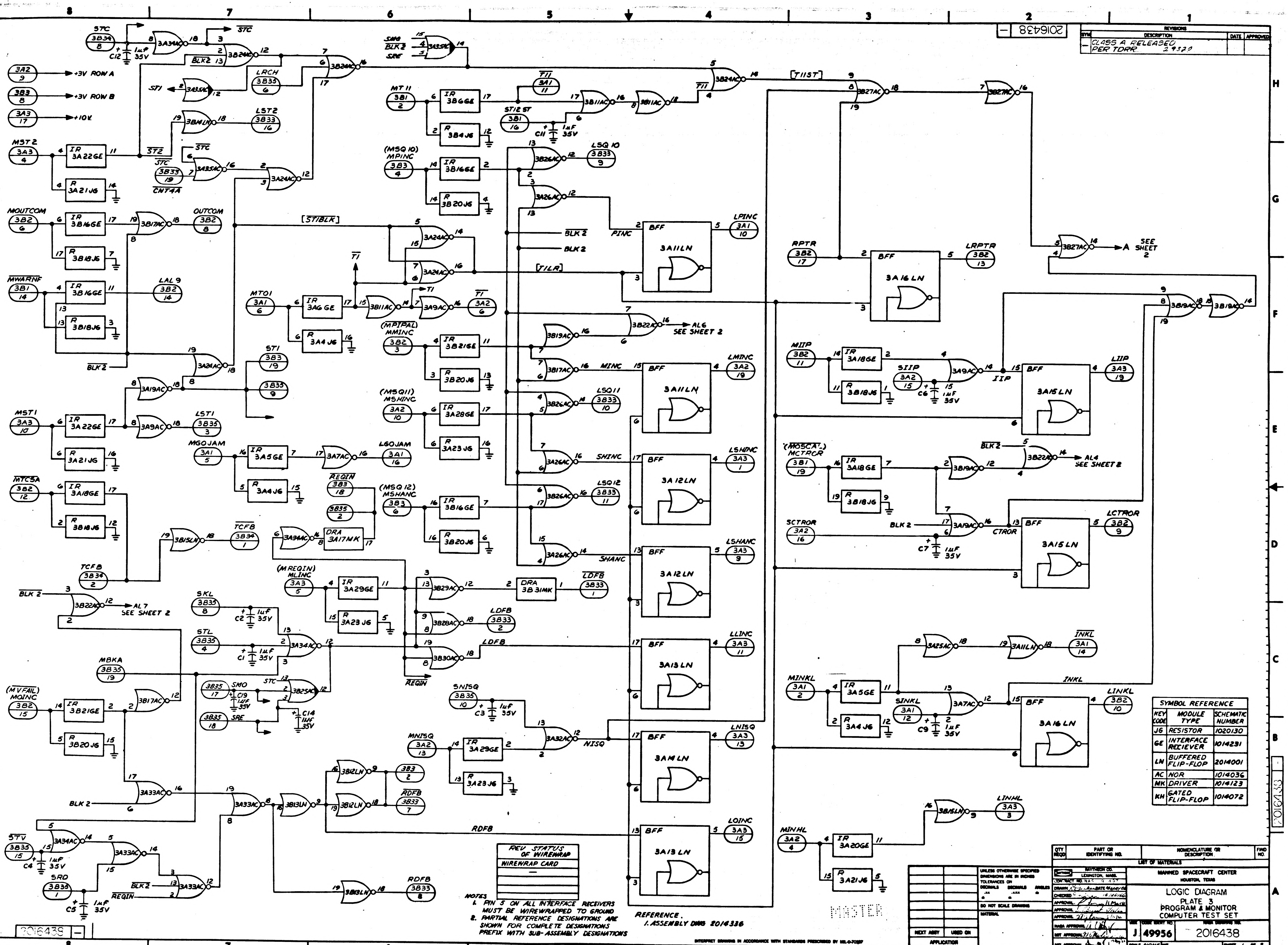
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE WRAP MACHINE CARDS
INTERCONNECTION PLATE 6
LOGIC DRAWER I
COMPUTER TEST SET

SIZE B
CODE IDENT NO. 49956
NASA DRAWING NO. 2016436
SCALE 1/1
WT
SHEET 1 OF 1

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 29320		

2016438 —


STC 3B34 8
C12 1µF 35V
3A34AC
STC
3B24AC
BLK2
ST1
3A35AC
LRCH 3B35 6
3A2 9 +3V ROW A
3B3 8 +3V ROW B
3A3 17 +10V
3B14LN
LST2 3B33 16
MST2 3A3 4
IR 3A22GE
R 3A21J6
ST2
STC 3B33 19
CNT4A
3A35AC
3A24AC
MOUTCOM 3B2 6
IR 3B16GE
R 3B18J6
3B17AC
OUTCOM 3B2 8
MWARNF 3B1 14
IR 3B16GE
R 3B18J6
LAL9 3B2 14
BLK2
3A24AC
ST1 3B3 19
3A19AC
3B33 9
MST1 3A3 10
IR 3A22GE
R 3A21J6
3A9AC
LST1 3B35 3
MTC5A 3B2 12
IR 3A18GE
R 3B18J6
3B15LN
TCFB 3B34 1
TCFB 3B34 2
BLK 2
3B22AC
AL7 SEE SHEET 2
MBKA 3B35 19
(MVFAIL) MOINC 3B2 15
IR 3B21GE
R 3B20J6
3B17AC
3A33AC
BLK 2
STV 3B35 15
C4 1µF 35V
3A34AC
3A33AC
SRD 3B39 1
C5 1µF 35V
BLK2
REQIN
3A33AC
SMS BLK2 SRE 3A35AC
3B24AC
MT11 3B1 2
IR 3B6GE
R 3B4J6
T11 3A1 11
ST12 ST 3B1 16
C11 1µF 35V
3B11AC
3B24AC
[T11ST]
3B27AC
3B27AC
(MSQ10) MPINC 3B3 4
IR 3B16GE
R 3B20J6
3B26AC
LSQ10 3B33 9
3A26AC
BLK2
BLK2
PINC
BFF 3A11LN
LPINC 3A1 10
[ST/BLK]
3A24AC
T1
3A24AC
[T/LR]
MTO1 3A1 6
IR 3A6GE
R 3A4J6
3B11AC
3A9AC
T1 3A2 6
(MPIPAL) MMINC 3B2 3
IR 3B21GE
R 3B20J6
3B19AC
3B22AC
AL6 SEE SHEET 2
3B17AC
MINC
BFF 3A11LN
LMINC 3A2 19
(MSQ11) MSHINC 3A2 10
IR 3A28GE
R 3A23J6
3B26AC
LSQ11 3B33 10
MGOJAM 3A1 5
IR 3A5GE
R 3A4J6
3A7AC
LGOJAM 3A1 16
3A26AC
SHINC
BFF 3A12LN
LSHINC 3A3 1
REQIN 3B3 18
3B35 2
DRA 3A17MK
(MSQ12) MSHANC 3B3 6
IR 3B16GE
R 3B20J6
3B26AC
LSQ12 3B33 11
3A34AC
3A26AC
SHANC
BFF 3A12LN
LSHANC 3A3 9
(MREQIN) MLINC 3A3 5
IR 3A29GE
R 3A23J6
3B29AC
DRA 3B31MK
LDFB 3B33 1
SKL 3B35 8
C2 1µF 35V
3B28AC
LDFB 3B33 2
STL 3B35 4
C1 1µF 35V
3A34AC
3B30AC
LDFB
BFF 3A13LN
LLINC 3A3 11
REQIN
3B35 17 SMO C19 1µF 35V
STC
3B25AC
3B35 18 SRE
C14 1µF 35V
SNISQ 3B35 10
C3 1µF 35V
3A32AC
NISQ
BFF 3A14LN
LNISQ 3A3 13
MNISQ 3A2 13
IR 3A29GE
R 3A23J6
3B12LN
3B3 2
3B12LN
RDFB 3B33 7
3A33AC
3B13LN
RDFB
BFF 3A13LN
LOINC 3A3 15
3B13LN
RDFB 3B33 8
RPTR 3B2 17
BFF 3A16LN
LRPTR 3B2 13
3B27AC
A SEE SHEET 2
3B19AC
3B19AC
MIIP 3B2 11
IR 3A18GE
R 3B18J6
SIIP 3A2 15
C6 1µF 35V
3A9AC
IIP
BFF 3A15LN
LIIP 3A3 19
(MOSCAL) MCTROR 3B1 19
IR 3A18GE
R 3B18J6
3B19AC
BLK2
3B22AC
AL4 SEE SHEET 2
SCTROR 3A2 16
BLK 2
C7 1µF 35V
3A19AC
CTROR
BFF 3A15LN
LCTROR 3B2 9
3A25AC
3A11LN
INKL 3A1 14
MINKL 3A1 2
IR 3A5GE
R 3A4J6
SINKL 3A1 12
C9 1µF 35V
3A7AC
INKL
BFF 3A16LN
LINKL 3B2 10
MINHL 3A2 4
IR 3A20GE
R 3A21J6
3B15LN
LINHL 3A3 3

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
J6	RESISTOR	1020130
GE	INTERFACE RECIEVER	1014231
LN	BUFFERED FLIP-FLOP	2014001
AC	NOR	1014036
MK	DRIVER	1014123
KH	GATED FLIP-FLOP	1014072

REV STATUS OF WIREWRAP
WIREWRAP CARD
—

NOTES
1. PIN 5 ON ALL INTERFACE RECEIVERS MUST BE WIREWRAPPED TO GROUND
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE.
1. ASSEMBLY DWG 2014336

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 14 MAY 66
CHECKED 14 MAY 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

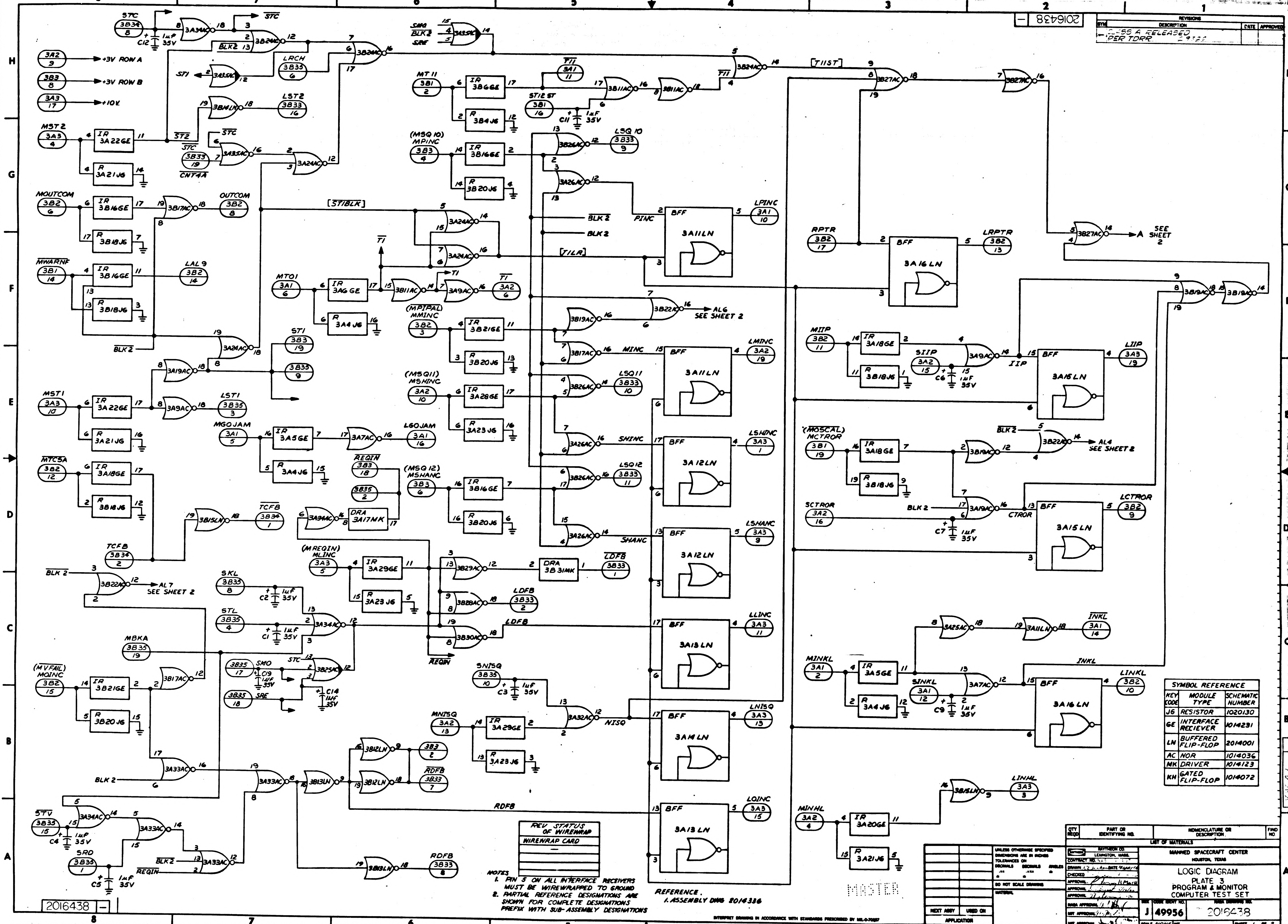
LOGIC DIAGRAM
PLATE 3
PROGRAM & MONITOR
COMPUTER TEST SET

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016438
SCALE NONE | WT | SHEET 1 OF 2

2016438 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 29322		

2016438 —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+3V ROW B
+10V
MST2
STC
C12 1μF 35V
3A34AC
3B24AC
3B24AC
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ST1
3A35AC
LRCH 3B33 6
3B14LN
LST2 3B33 16
3A22GE
3A21J6
ST2
STC 3B33 19
CNT4A
3A35AC
3A24AC
MOUTCOM 3B2 6
3B16GE
3B18J6
3B17AC
OUTCOM 3B2 8
[ST/BLK]
MWARNF 3B1 14
3B16GE
LAL9 3B2 14
3B18J6
BLK2
3A24AC
3A19AC
ST1 3B3 19
3B33 9
MST1 3A3 10
3A22GE
3A21J6
3A9AC
LST1 3B35 3
MTC5A 3B2 12
3A18GE
3B18J6
3B15LN
TCFB 3B34 1
TCFB 3B34 2
BLK 2
3B22AC
AL7 SEE SHEET 2
SKL 3B35 8
C2 1μF 35V
STL 3B35 4
C1 1μF 35V
3A34AC
MBKA 3B35 19
(MVFAIL) MOINC 3B2 15
3B21GE
3B20J6
3B17AC
3B35 17 SMO
C19 1μF 35V
3B35 18 SRE
C14 1μF 35V
3B25AC
3A33AC
BLK 2
3A33AC
3B13LN
3B12LN
3B3 2
RDFB 3B33 7
RDFB
STV 3B35 15
C4 1μF 35V
3A34AC
3A33AC
SRD 3B35 1
C5 1μF 35V
BLK2
REQIN
3A33AC
3B13LN
RDFB 3B33 8
SMO BLK2 SRE
3A35AC
MT11 3B1 2
3B6GE
3B4J6
T11 3A1 11
ST12 ST 3B1 16
C11 1μF 35V
3B11AC
3B11AC
T11
3B24AC
(MSQ10) MPINC 3B3 4
3B16GE
3B20J6
3B26AC
LSQ10 3B33 9
3B26AC
BLK2
BLK 2
PINC
BFF 3A11LN
LPINC 3A1 10
[T1LA]
T1
MTO1 3A1 6
3A6GE
3A4J6
3B11AC
3A9AC
T1 3A2 6
3B22AC
AL6 SEE SHEET 2
(MPIPAL) MMINC 3B2 3
3B21GE
3B20J6
3B19AC
3B17AC
MINC
BFF 3A11LN
LMINC 3A2 19
(MSQ11) MSHINC 3A2 10
3A28GE
3A23J6
3B26AC
LSQ11 3B33 10
MGOJAM 3A1 5
3A5GE
3A4J6
3A7AC
LGOJAM 3A1 16
3A26AC
SHINC
BFF 3A12LN
LSHINC 3A3 1
REQIN 3B3 18
3B35 2
3A34AC
DRA 3A17MK
(MSQ12) MSHANC 3B3 3
3B16GE
3B20J6
3B26AC
LSQ12 3B33 11
3A26AC
SHANC
BFF 3A12LN
LSHANC 3A3 9
(MREQIN) MLINC 3A3 5
3A29GE
3A23J6
3B29AC
DRA 3B31MK
LDFB 3B33 1
3B28AC
LDFB 3B33 2
3B30AC
LDFB
REQIN
BFF 3A13LN
LLINC 3A3 11
SNISQ 3B35 10
C3 1μF 35V
3A32AC
NISQ
BFF 3A14LN
LNISQ 3A3 15
MNISQ 3A2 13
3A29GE
3A23J6
BFF 3A13LN
LOINC 3A3 15
[T1IST]
3B27AC
3B27AC
3B27AC
A SEE SHEET 2
RPTR 3B2 17
BFF 3A16LN
LRPTR 3B2 13
3B19AC
3B19AC
M11P 3B2 11
3A18GE
3B18J6
S11P 3A2 15
C6 1μF 35V
3A9AC
I1P
BFF 3A15LN
L11P 3A3 19
(MOSCAL) MCTROR 3B1 19
3A18GE
3B18J6
3B19AC
BLK2
3B22AC
AL4 SEE SHEET 2
SCTROR 3A2 16
BLK 2
3A19AC
C7 1μF 35V
CTROR
BFF 3A15LN
LCTROR 3B2 9
3A25AC
3A11LN
INKL 3A1 14
INKL
MINKL 3A1 2
3A5GE
3A4J6
SINKL 3A1 12
C9 1μF 35V
3A7AC
BFF 3A16LN
LINKL 3B2 10
3B15LN
LINHL 3A3 3
MINHL 3A2 4
3A20GE
3A21J6
8 7 6 5 4 3 2 1
H G F E D C B A

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
J6	RESISTOR	1020130
GE	INTERFACE RECIEVER	1014231
LN	BUFFERED FLIP-FLOP	2014001
AC	NOR	1014036
MK	DRIVER	1014123
KH	GATED FLIP-FLOP	1014072

REV STATUS OF WIREWRAP
WIREWRAP CARD
—

NOTES
1. PIN 5 ON ALL INTERFACE RECEIVERS MUST BE WIREWRAPPED TO GROUND
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE.
1. ASSEMBLY DWG 2014336

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
PLATE 3
PROGRAM & MONITOR
COMPUTER TEST SET

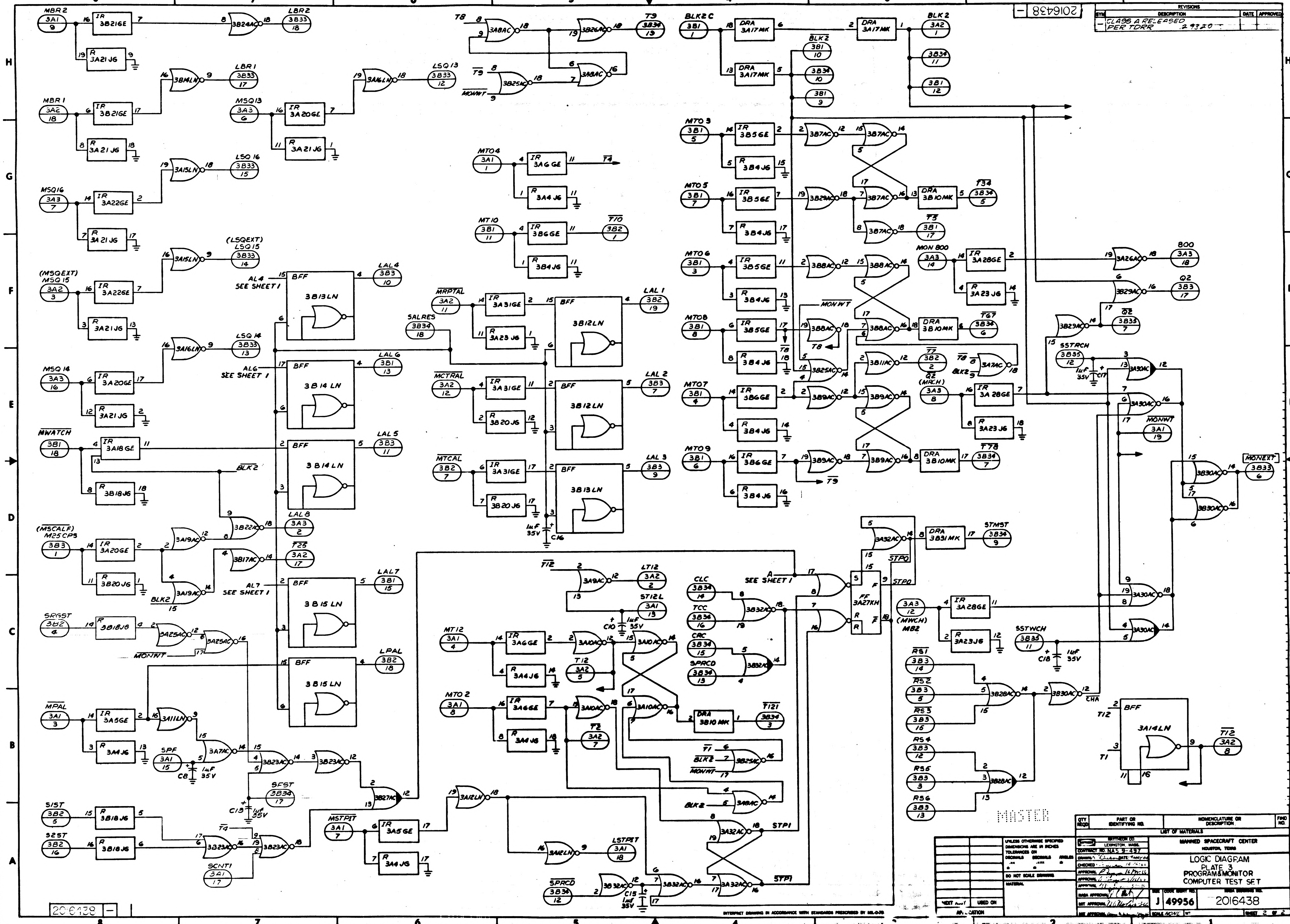
SIZE	CODE IDENT NO.	NASA DRAWING NO.
J	49956	2016438

SCALE NONE WT SHEET 1 OF 2

2016438 —

2016438	—

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 29320		



MBR2 3A1 9
3B21GE
3A21J6
3B24AC
LBR2 3B33 18
MBR1 3A2 18
3B14LN
LBR1 3B33 17
MSQ13 3A3 6
3A20GE
3A16LN
LSQ13 3B33 12
3A15LN
LSQ16 3B33 15
MSQ16 3A3 7
3A22GE
(LSQEXT) LSQ15 3B33 14
(MSQEXT) MSQ15 3A2 3
3A226E
MSQ14 3A3 16
LSQ14 3B33 13
MWATCH 3B1 18
3A18GE
3B18J6
BLK2
(MSCALF) M25CPS 3B3 1
3B20J6
3A19AC
3B22AC
LAL8 3A3 2
3B17AC
T25 3A2 17
SRGST 3B2 4
3B18J6
3A25AC
MONWT
MPAL 3A1 3
3A5GE
3A4J6
3A11LN
3A7AC
SPF 3A1 15
C8 1µf 35V
3B23AC
SFST 3B34 17
C13 1µf 35V
3B27AC
S1ST 3B2 5
S2ST 3B2 16
3B23AC
SCNT1 3A1 17
T4
AL4 SEE SHEET 1
BFF
3B13LN
LAL4 3B3 10
AL6 SEE SHEET 1
3B14LN
LAL6 3B1 13
LAL5 3B3 11
AL7 SEE SHEET 1
3B15LN
LAL7 3B1 15
LPAL 3B2 18
SALRES 3B34 18
MRPTAL 3A2 11
3A31GE
3A23J6
3B12LN
LAL1 3B2 19
MCTRAL 3A2 12
3B20J6
LAL2 3B3 7
MTCAL 3B2 7
LAL3 3B3 9
C16 1µf 35V
T8
3A8AC
3B26AC
T9 3B34 19
3B25AC
MONWT
MTO4 3A1 1
3A6GE
3A4J6
T4
MT10 3B1 11
3B6GE
3B4J6
T10 3B2 1
T12
3A9AC
LT12 3A2 2
ST12L 3A1 13
C10 1µf 35V
MT12 3A1 4
3A10AC
T12 3A2 5
MTO2 3A1 8
T2 3A2 7
3B10MK
T121 3B34 3
T1
BLK2
MONWT
3B25AC
3A8AC
MSTPIT 3A1 7
3A12LN
LSTPIT 3A1 18
SPRCD 3B34 12
3B32AC
C15 1µf 35V
3A32AC
STP1
BLK2C 3B1 1
DRA 3A17MK
BLK2 3A2 1
BLK2 3B1 10
3B34 10
3B1 9
3B34 11
3B1 12
MTO3 3B1 5
3B5GE
3B4J6
3B7AC
MTO5 3B1 7
3B29AC
3B10MK
T34 3B34 5
T3 3B1 17
MTO6 3B1 3
3B8AC
MON800 3A3 14
3A28GE
3A23J6
3A26AC
800 3A3 18
3B29AC
Q2 3B3 17
Q2 3B35 7
MTO8 3B1 8
T67 3B34 6
T8
3B25AC
3B11AC
T7 3B2 2
SSTRCH 3B35 12
3A30AC
C17 1µf 35V
MTO7 3B1 4
3B9AC
Q2 (MRCH) 3A3 8
MONWT 3A1 19
MTO9 3B1 6
3B6GE
T78 3B34 7
T9
3B30AC
MONEXT 3B33 6
3A32AC
DRA 3B31MK
STMST 3B34 9
STPO
A SEE SHEET 1
CLC 3B34 14
TCC 3B34 16
CRC 3B34 15
SPRCD 3B34 13
FF 3A27KH
3A3 12 (MWCH) MB2
3A23J6
SSTWCH 3B35 11
C18 1µf 35V
RS1 3B3 14
RS2 3B3 5
RS3 3B3 15
RS4 3B3 12
RS5 3B3 3
RS6 3B3 13
3B28AC
3B30AC
CHA
T12
BFF 3A14LN
T1
T12 3A2 8
MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 7 MAY 66
CHECKED 14 May 66
APPROVAL 16 Mar 66
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

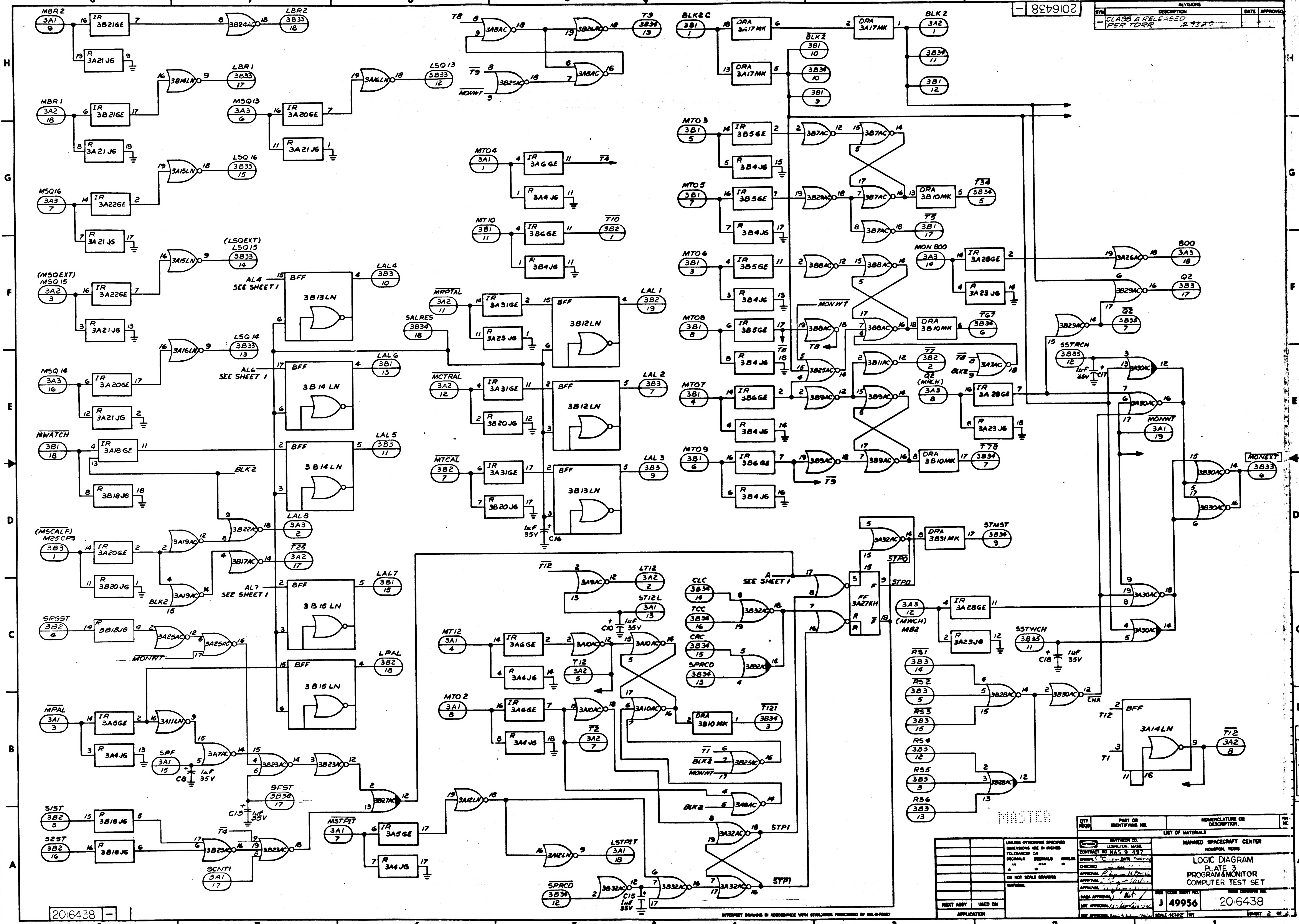
LOGIC DIAGRAM
PLATE 3
PROGRAM & MONITOR
COMPUTER TEST SET

SIZE	CODE IDENT NO.	NASA DRAWING NO.
J	49956	2016438

SCALE NONE WT SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70

2016438	—


8
7
6
5
4
3
2
1
H
G
F
E
D
C
B
A
MBR2 3A1 9
IR 3B21GE
R 3A21J6
3B24AC
LBR2 3B33 18
MBR1 3A2 18
3B14LN
LBR1 3B33 17
MSQ13 3A3 6
IR 3A20GE
R 3A21J6
3A16LN
LSQ13 3B33 12
MSQ16 3A3 7
IR 3A22GE
3A15LN
LSQ16 3B33 15
(MSQEXT) MSQ15 3A2 3
(LSQEXT) LSQ15 3B33 14
MSQ14 3A3 16
IR 3A20GE
LSQ14 3B33 13
MWATCH 3B1 18
IR 3A18GE
R 3B18J6
BLK2
(MSCALF) M25CPS 3B3 1
IR 3A20GE
R 3B20J6
3A19AC
3B22AC
LAL8 3A3 2
3B17AC
T23 3A2 17
SRGST 3B2 4
R 3B18J6
3A25AC
MONWT
MPAL 3A1 3
IR 3A5GE
R 3A4J6
3A11LN
3A7AC
SPF 3A1 15
C8 1uF 35V
3B23AC
SFST 3B34 17
C13 1uF 35V
3B27AC
S1ST 3B2 5
R 3B18J6
S2ST 3B2 16
T4
SCNT1 3A1 17
AL4 SEE SHEET 1
BFF 3B13LN
LAL4 3B3 10
AL6 SEE SHEET 1
BFF 3B14LN
LAL6 3B1 13
BFF 3B14LN
LAL5 3B3 11
AL7 SEE SHEET 1
BFF 3B15LN
LAL7 3B1 15
BFF 3B15LN
LPAL 3B2 18
T8
3A8AC
3B26AC
T9 3B34 19
T9
MONWT
3B25AC
MTO4 3A1 1
IR 3A6GE
R 3A4J6
T4
MT10 3B1 11
IR 3B6GE
R 3B4J6
T10 3B2 1
MRPTAL 3A2 11
IR 3A31GE
R 3A23J6
SALRES 3B34 18
BFF 3B12LN
LAL1 3B2 19
MCTRAL 3A2 12
IR 3A31GE
R 3B20J6
BFF 3B12LN
LAL2 3B3 7
MTCAL 3B2 7
IR 3A31GE
R 3B20J6
BFF 3B13LN
LAL3 3B3 9
C16 1uF 35V
T12
3A9AC
LT12 3A2 2
ST12L 3A1 13
C10 1uF 35V
MT12 3A1 4
IR 3A6GE
R 3A4J6
3A10AC
T12 3A2 5
MTO2 3A1 8
IR 3A6GE
R 3A4J6
T2 3A2 7
DRA 3B10MK
T121 3B34 3
T1
BLK2
MONWT
3B25AC
3A8AC
MSTPIT 3A1 7
IR 3A5GE
R 3A4J6
3A12LN
LSTPIT 3A1 18
SPRCD 3B34 12
3B32AC
C15 1uF 35V
3A32AC
STP1
STP1
CLC 3B34 14
TCC 3B34 16
CRC 3B34 15
SPRCD 3B34 13
3B32AC
A SEE SHEET 1
FF 3A27KH
STPO
STPO
BLK2C 3B1 1
DRA 3A17MK
BLK2 3A2 1
3B34 11
3B1 12
BLK2 3B1 10
3B34 10
3B1 9
MTO3 3B1 5
IR 3B56E
R 3B4J6
3B7AC
MTO5 3B1 7
IR 3B56E
R 3B4J6
3B29AC
DRA 3B10MK
T34 3B34 5
T3 3B1 17
MTO6 3B1 3
IR 3B56E
R 3B4J6
3B8AC
MTO8 3B1 8
IR 3B5GE
R 3B4J6
T8
3B25AC
DRA 3B10MK
T67 3B34 6
3B11AC
T7 3B2 2
T8
BLK2
3A7AC
MTO7 3B1 4
IR 3B6GE
R 3B4J6
3B9AC
MTO9 3B1 6
IR 3B6GE
R 3B4J6
T9
DRA 3B10MK
T78 3B34 7
3A32AC
DRA 3B31MK
STMST 3B34 9
MON 800 3A3 14
IR 3A28GE
R 3A23J6
3A26AC
800 3A3 18
3B29AC
Q2 3B3 17
Q2 3B35 7
SSTRCH 3B35 12
C17 1uF 35V
3A30AC
(Q2) (MRCH) 3A3 8
IR 3A28GE
R 3A23J6
MONWT 3A1 19
3B30AC
MONEXT 3B33 6
3A3 12 (MWCH) MB2
IR 3A28GE
R 3A23J6
SSTWCH 3B35 11
C18 1uF 35V
RS1 3B3 14
RS2 3B3 5
RS3 3B3 15
RS4 3B3 12
RS5 3B3 3
RS6 3B3 13
3B28AC
3B30AC
CHA
T12
BFF 3A14LN
T1
T12 3A2 8
MASTER

2016438 —

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 29320		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION.	FIN NC

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN [illegible] DATE 9 MAY 66
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
PLATE 3
PROGRAM & MONITOR
COMPUTER TEST SET

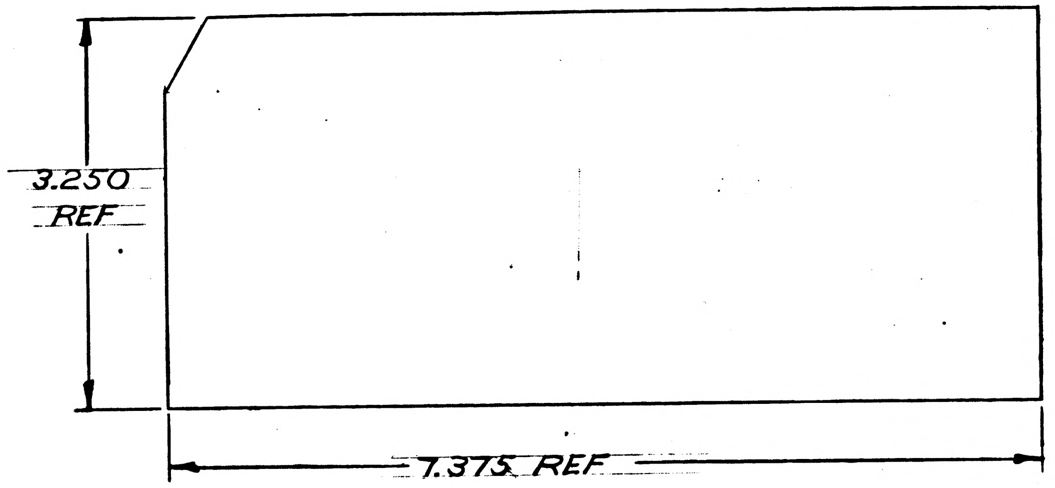
SIZE J CODE IDENT NO. 49956 NASA DRAWING NO. 2016438
SCALE NONE WT SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016438 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR29320		

NO. OF CARDS 703



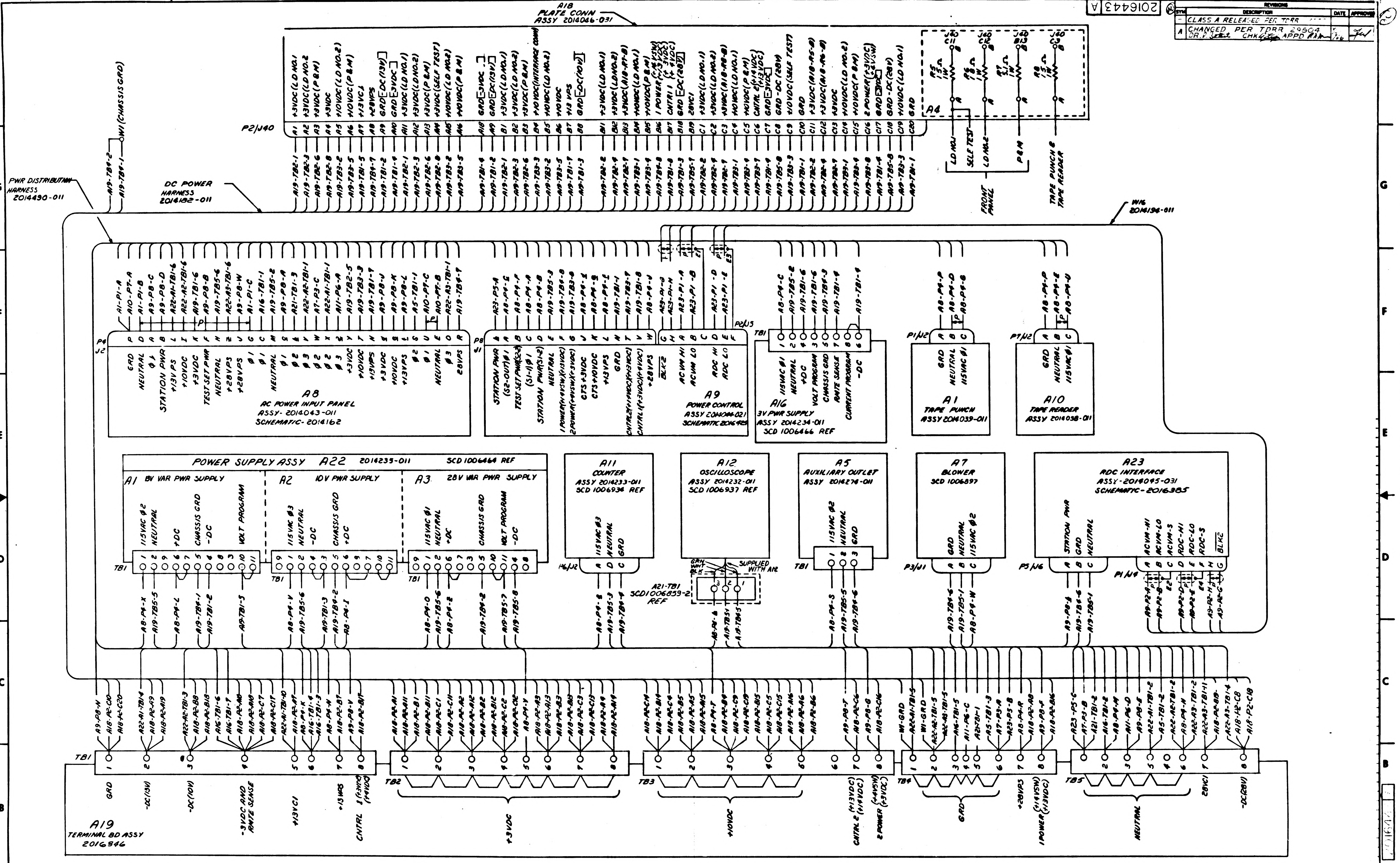
REFERENCE DRAWINGS
LOGIC DIAGRAM 2016438
MECH ASSY 2014336

NOTES
1. USE CARD FORM IBM U11897 OR EQUIVALENT
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

RAYTHEON CO. LEXINGTON, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
CONTRACT NO. NAS 9-497			
DRAWN R. Fleischer DATE 14 MAY 66	WIRE WRAP MACHINE CARDS LOGIC PLATE 3 PROGRAMMER & MONITOR COMPUTER TEST SET		
CHECKED 14 MAY 66			
APPROVAL 16 May 66			
APPROVAL 5/14/66			
APPROVAL 5/16/66			
NASA APPROVAL	SIZE B	CODE IDENT NO. 49956	NASA DRAWING NO. 2016439
MIT APPROVAL 6-3-66			
MIT APPROVAL 14 May 1966	SCALE 1/1	WT	SHEET 1 OF 1

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR		
A	CHANGED PER TDRR 29504 DR. P. Betket CHK APPD RA	7/66	



2016443 A
A18
PLATE CONN
ASSY 2014046-031
P2/J40
A4
J40 C11
J40 C12
J40 B13
J40 C3
R5 1.5K 1W
R6 1.5K 1W
R7 3.3K 1W
R8 1.5K 1W
LD NO.1
SELF TEST
LD NO.2
P&M
FRONT PANEL
TAPE PUNCH & TAPE READER
W1 (CHASSIS GRD)
PWR DISTRIBUTION HARNESS 2014430-011
DC POWER HARNESS 2014182-011
W16 2014136-011
A8
AC POWER INPUT PANEL
ASSY- 2014043-011
SCHEMATIC- 2014162
P4 J2
A9
POWER CONTROL
ASSY 2014044-021
SCHEMATIC 2016485
P8 J1
P2/J5
A16
3V PWR SUPPLY
ASSY 2014234-011
SCD 1006466 REF
TB1
A1
TAPE PUNCH
ASSY 2014039-011
P1/J2
A10
TAPE READER
ASSY 2014038-011
P1/J2
POWER SUPPLY ASSY A22 2014235-011 SCD 1006464 REF
A1 8V VAR PWR SUPPLY
A2 10V PWR SUPPLY
A3 28V VAR PWR SUPPLY
A11
COUNTER
ASSY 2014233-011
SCD 1006936 REF
P6/J2
A12
OSCILLOSCOPE
ASSY 2014232-011
SCD 1006937 REF
SUPPLIED WITH A12
A21-TB1
SCD 1006839-2 REF
A5
AUXILIARY OUTLET
ASSY 2014274-011
A7
BLOWER
SCD 1006897
P3/J1
A23
RDC INTERFACE
ASSY- 2014095-031
SCHEMATIC- 2016385
P5/J6
P1/J4
A19
TERMINAL BD ASSY
2016346
TB1
TB2
TB3
TB4
TB5
GRD
-DC(13V)
-DC(10V)
-3VDC AND RMTE SENSE
+13VC1
+13VPS
CNTRL 1 (+13VDC) (+10VDC)
+3VDC
+10VDC
CNTRL 2 (+13VDC) (+10VDC)
2 POWER (+10VSW) (+3VDC)
GRD
+28VPS
1 POWER (+10VSW) (+13VDC)
NEUTRAL
28VC1
-DC(28V)

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE.
1. ASSEMBLY 2014042-031
2. INTERCONNECTION DIAGRAM 2016444

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 19 MAY 66
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION DIAGRAM
AC & DC POWER DISTRIBUTION
COMPUTER TEST SET

CODE IDENT NO. 49956 SIZE J NASA DRAWING NO. 2016443
SCALE NONE WT SHEET 1 OF 1

2016443 A

MASTER

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
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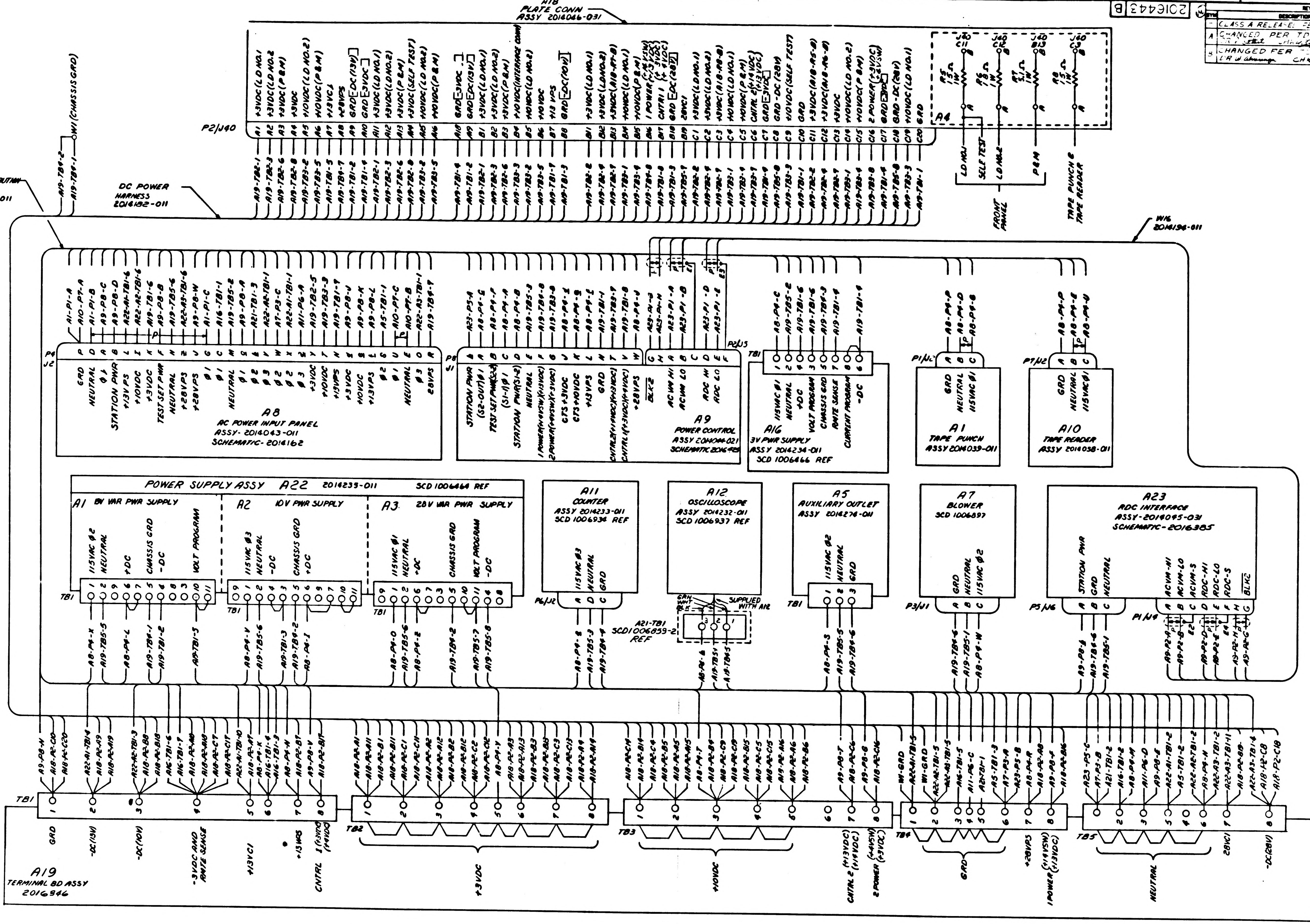
A	CHANGED PER TDRR 2430? DR ... CHK ... APPD ...		
B	CHANGED PER TDRR 33446 DR ... CHK ...		



A18 PLATE CONN ASSY 2014066-031
P2/J40
J40 C11
J40 C12
J40 B13
J40 C3
R5 15Ω 1W
R6 15Ω 1W
R7 15Ω 1W
R8 15Ω 1W
A4
LD NO.1
SELF TEST
LD NO.2
P&M
FRONT PANEL
TAPE PUNCH & TAPE READER
W1 (CHASSIS GRD)
PWR DISTRIBUTION HARNESS 2014490-011
DC POWER HARNESS 2014182-011
W16 2014196-011
A8 AC POWER INPUT PANEL ASSY- 2014043-011 SCHEMATIC- 2014162
P4 J2
A9 POWER CONTROL ASSY 2014044-021 SCHEMATIC 2016455
P8 J1
P2/J5
A16 3V PWR SUPPLY ASSY 2014234-011 SCD 1006466 REF
TB1
A1 TAPE PUNCH ASSY 2014039-011
P1/J2
A10 TAPE READER ASSY 2014038-011
P7/J2
POWER SUPPLY ASSY A22 2014239-011 SCD 1006464 REF
A1 8V VAR PWR SUPPLY
A2 10V PWR SUPPLY
A3 28V VAR PWR SUPPLY
A11 COUNTER ASSY 2014233-011 SCD 1006934 REF
P6/J2
A12 OSCILLOSCOPE ASSY 2014232-011 SCD 1006937 REF
SUPPLIED WITH A12
A21-TB1 SCD1006859-2 REF
A5 AUXILIARY OUTLET ASSY 2014274-011
A7 BLOWER SCD 1006897
P3/J1
A23 RDC INTERFACE ASSY-2014095-031 SCHEMATIC- 2016385
P5/J6
P1/J4
A19 TERMINAL BD ASSY 2016946
TB1
GRD
-DC(13V)
-DC(10V)
-3VDC AND RATE SENSE
+13VCI
+13 VPS
CNTRL 1
TB2
+3VDC
TB3
+10VDC
CNTRL 2
2 POWER
TB4
GRD
+28VPS
1 POWER
TB5
NEUTRAL
28VCI
-DC(28V)

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE
ASSEMBLY — INTERCONNECTION DIAGRAM
2014042-031 — 2016444
2014042-041 — 2016453
2014042-051 — 2016455
2014042-061 — 2016455

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN DATE 18 Nov
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

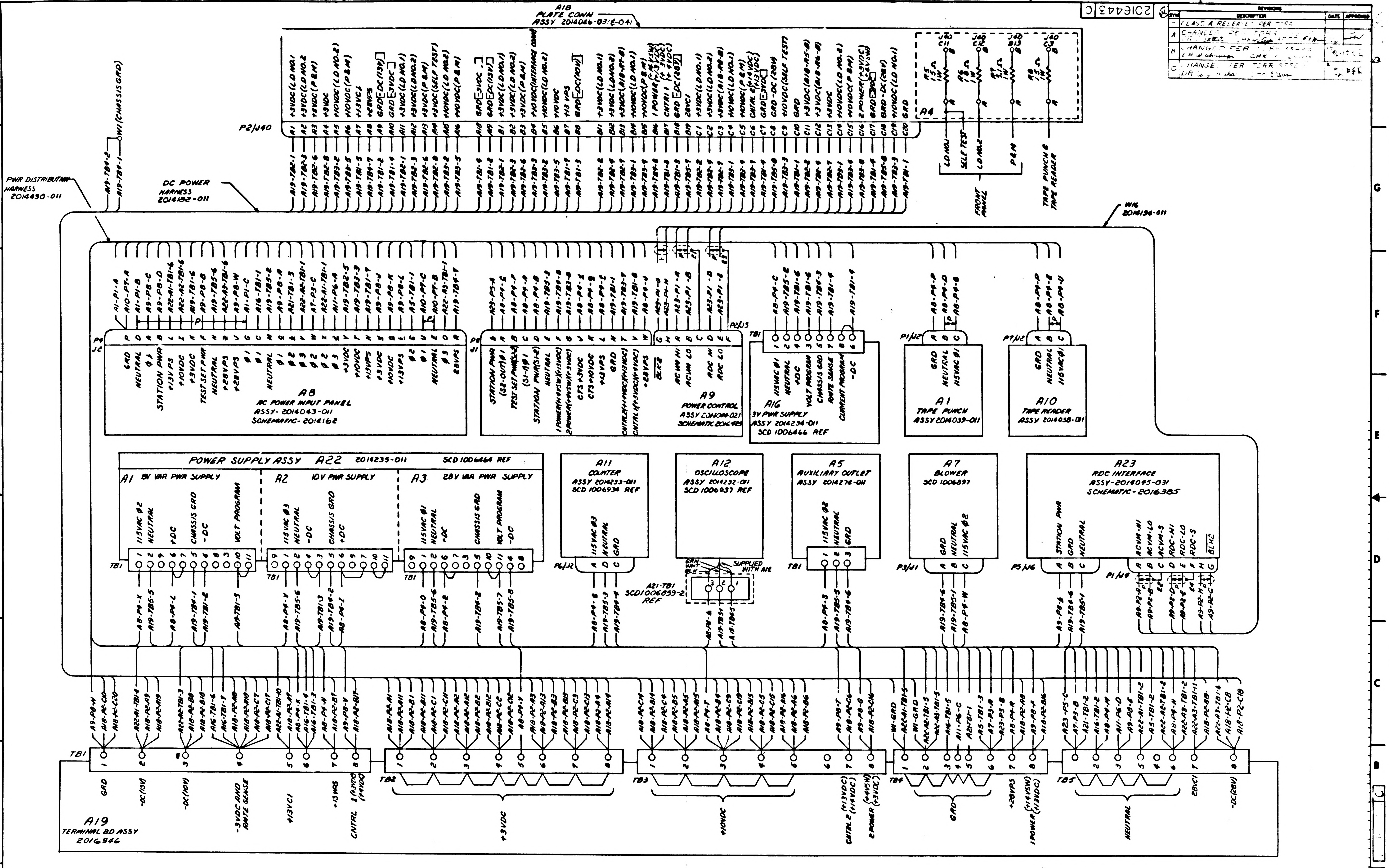
INTERCONNECTION DIAGRAM
AC & DC POWER DISTRIBUTION
COMPUTER TEST SET

CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	J	2016443

SCALE NONE WT SHEET 1 OF 1

2016443 B

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327


2016443 C
A18
PLATE CONN
ASSY 2014066-031 & -041
P2/J40
A4
PWR DISTRIBUTION HARNESS 2014490-011
DC POWER HARNESS 2014192-011
W16 2014196-011
FRONT PANEL
TAPE PUNCH & TAPE READER
A8
AC POWER INPUT PANEL
ASSY-2014043-011
SCHEMATIC-2014162
A9
POWER CONTROL
ASSY 2014044-021
SCHEMATIC 2016435
A16
3V PWR SUPPLY
ASSY 2014234-011
SCD 1006466 REF
A1
TAPE PUNCH
ASSY 2014039-011
A10
TAPE READER
ASSY 2014038-011
POWER SUPPLY ASSY A22 2014235-011 SCD 1006464 REF
A1 8V VAR PWR SUPPLY
A2 10V PWR SUPPLY
A3 28V VAR PWR SUPPLY
A11
COUNTER
ASSY 2014233-011
SCD 1006936 REF
A12
OSCILLOSCOPE
ASSY 2014232-011
SCD 1006937 REF
SUPPLIED WITH A12
A21-TB1
SCD 1006859-2 REF
A5
AUXILIARY OUTLET
ASSY 2014276-011
A7
BLOWER
SCD 1006897
A23
RDC INTERFACE
ASSY-2014095-031
SCHEMATIC-2016385
A19
TERMINAL BD ASSY
2016946
TB1
TB2
TB3
TB4
TB5
GRD
+3VDC
+10VDC
NEUTRAL
REVISIONS
CLASS A RELEASE PER

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE.
ASSEMBLY — INTERCONNECTION DIAGRAM
2014042-031 — 2016444
2014042-041 — 2016453
2014042-051 — 2016455
2014042-061 — 2016455
2014042-071 — 2016455

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN
DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

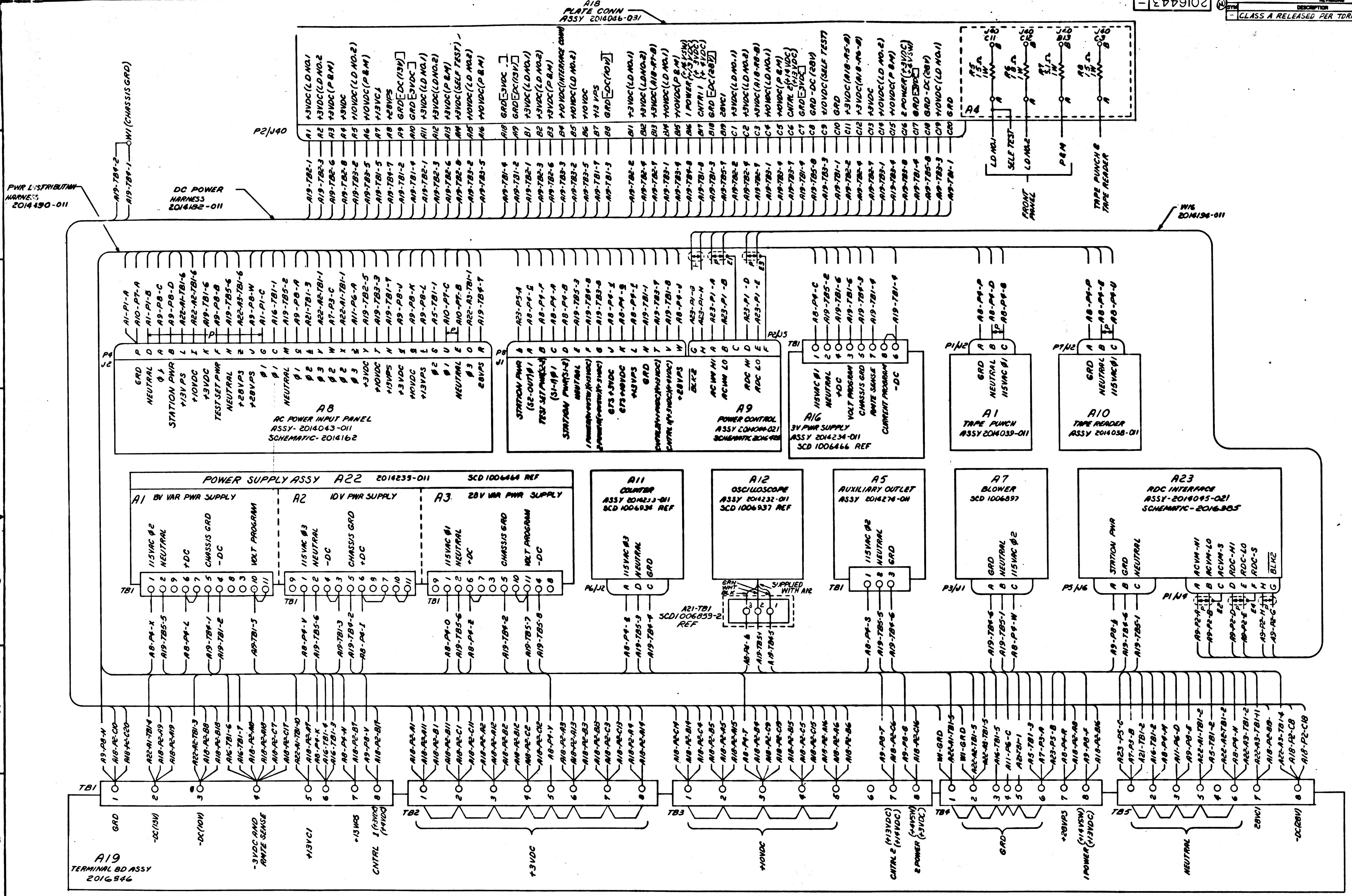
INTERCONNECTION DIAGRAM
AC & DC POWER DISTRIBUTION
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016443
SCALE NONE
WT
SHEET 1 OF 1

2016443 C

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
-	CLASS A RELEASED PER TDRR 29323		


A18 PLATE CONN ASSY 2014046-031
P2/J40
A4
J40 C11, J40 C12, J40 B13, J40 C3
R5 1.5K 1W, R6 1.5K 1W, R7 1.5K 1W, R8 1.5K 1W
LD NO.1, SELF TEST, LD NO.2, P&M
FRONT PANEL
TAPE PUNCH & TAPE READER
PWR DISTRIBUTION HARNESS 2014490-011
DC POWER HARNESS 2014182-011
W16 2014196-011
H1 (CHASSIS GRD)
A8 AC POWER INPUT PANEL ASSY-2014043-011 SCHEMATIC-2014162
P4 J2
P8 J1
A9 POWER CONTROL ASSY 2014044-021 SCHEMATIC 2016186
P2/J5
A16 3V PWR SUPPLY ASSY 2014234-011 SCD 1006466 REF
TB1
P1/J2
A1 TAPE PUNCH ASSY 2014039-011
P7/J2
A10 TAPE READER ASSY 2014038-011
POWER SUPPLY ASSY A22 2014235-011 SCD 1006464 REF
A1 8V VAR PWR SUPPLY
A2 10V PWR SUPPLY
A3 28V VAR PWR SUPPLY
A11 COUNTER ASSY 2014233-011 SCD 1006934 REF
P6/J2
A12 OSCILLOSCOPE ASSY 2014232-011 SCD 1006937 REF
GRN WHT BLK SUPPLIED WITH A12
A21-TB1 SCD 1006859-2 REF
A5 AUXILIARY OUTLET ASSY 2014274-011
A7 BLOWER SCD 1006897
P3/J1
A23 RDC INTERFACE ASSY-2014095-021 SCHEMATIC-2016385
P5/J6
P1/J4
A19 TERMINAL BD ASSY 2016346
TB1, TB2, TB3, TB4, TB5
GRD
-DC(13V)
-DC(10V)
-3VDC AND RMTE SENSE
+13VC1
+13VPS
CNTRL 1 (+3VDC)
+3VDC
+10VDC
CNTRL 2 (+13VDC)
2 POWER (+4V SW) (+3VDC)
GRD
+28VPS
1 POWER (+4V SW) (+13VDC)
NEUTRAL
28VC1
-DC(28V)

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE.
1. ASSEMBLY 2014042-031
2. INTERCONNECTION DIAGRAM 2016444

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 16 MAY 66
CHECKED 16 MAY 66
APPROVAL 16 May 66
APPROVAL 5/16/66
APPROVAL
NASA APPROVAL
MIT APPROVAL 6-3-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

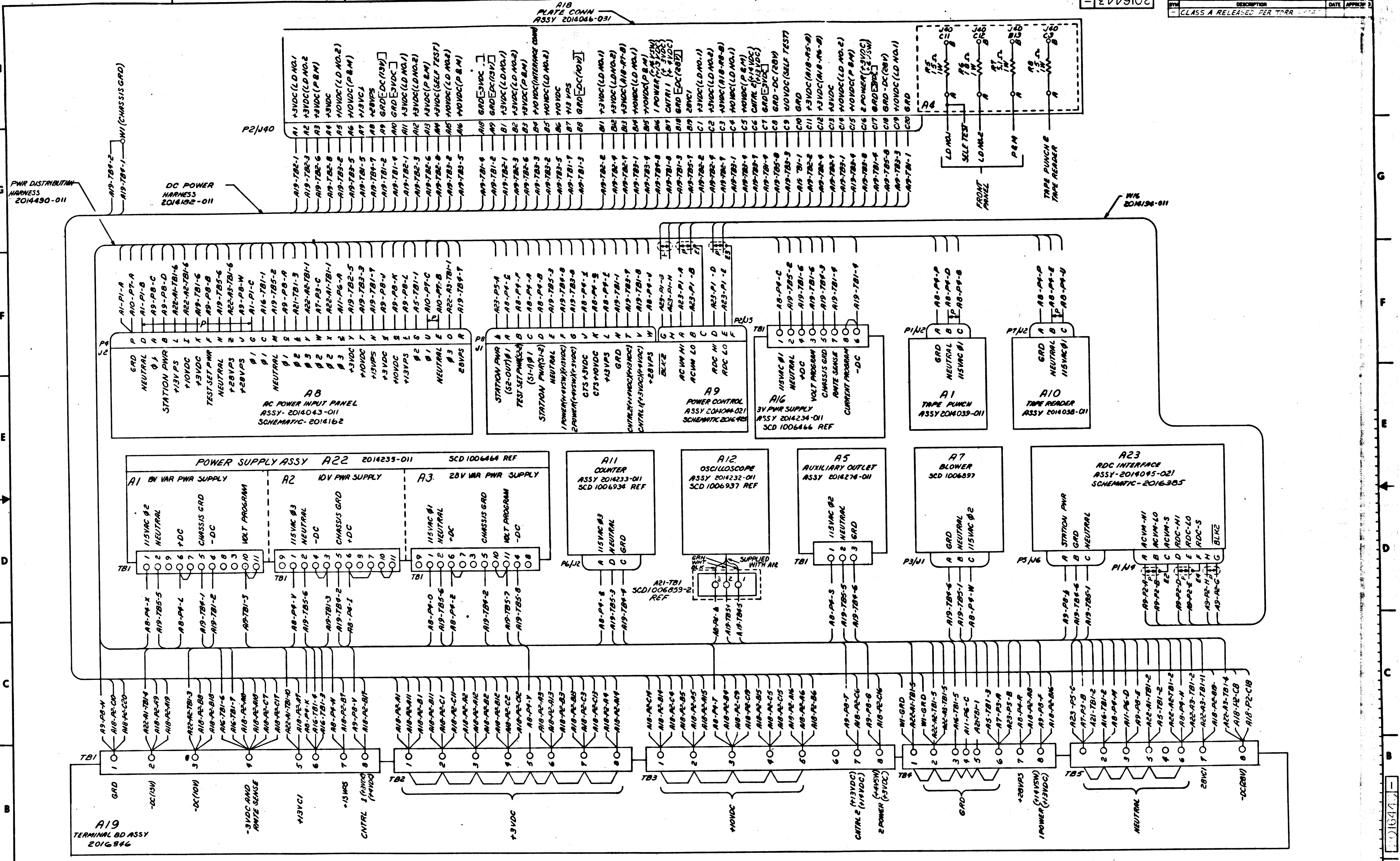
INTERCONNECTION DIAGRAM
AC & DC POWER DISTRIBUTION
COMPUTER TEST SET

CODE IDENT NO. 49956 SIZE J NASA DRAWING NO. 2016443
SCALE NONE WT SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

F2

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TCRR		



A18
PLATE CONN
ASSY 2014046-031
P2/J40
A4
LD NO.1
SELF TEST
LD NO.2
P&M
TAPE PUNCH & TAPE READER
FRONT PANEL
W16 2014196-011
W1 (CHASSIS GRD)
PWR DISTRIBUTION HARNESS 2014490-011
DC POWER HARNESS 2014182-011
A8
AC POWER INPUT PANEL
ASSY-2014043-011
SCHEMATIC-2014162
A9
POWER CONTROL
ASSY 2014044-021
SCHEMATIC 2016425
A16
3V PWR SUPPLY
ASSY 2014234-011
SCD 1006466 REF
A1
TAPE PUNCH
ASSY 2014039-011
A10
TAPE READER
ASSY 2014038-011
POWER SUPPLY ASSY A22 2014235-011 SCD 1006464 REF
A1 8V VAR PWR SUPPLY
A2 10V PWR SUPPLY
A3 28V VAR PWR SUPPLY
A11
COUNTER
ASSY 2014233-011
SCD 1006934 REF
A12
OSCILLOSCOPE
ASSY 2014232-011
SCD 1006937 REF
A21-TB1
SCD1006859-2
REF
SUPPLIED WITH A12
A5
AUXILIARY OUTLET
ASSY 2014274-011
A7
BLOWER
SCD 1006897
A23
RDC INTERFACE
ASSY-2014095-021
SCHEMATIC-2016385
A19
TERMINAL BD ASSY
2016946
TB1
TB2
TB3
TB4
TB5
GRD
-DC(13V)
-DC(10V)
-3VDC AND RMTE SENSE
+13VC1
+13VPS
CNTRL 1 (+3VDC) (+1VDC)
+3VDC
+10VDC
CNTRL 2 (+13VDC) (+1VDC)
2 POWER (+4VSW) (+3VDC)
GRD
+28VPS
1 POWER (+4VSW) (+13VDC)
NEUTRAL
28VC1
-DC(28V)

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE.
1. ASSEMBLY 2014042-031
2. INTERCONNECTION DIAGRAM 2016444

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 6 MAR 66
CHECKED 15 MAR 66
APPROVAL 16 Mar 66
APPROVAL 5/11/66
APPROVAL
NASA APPROVAL
MIT APPROVAL 6-3-66
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

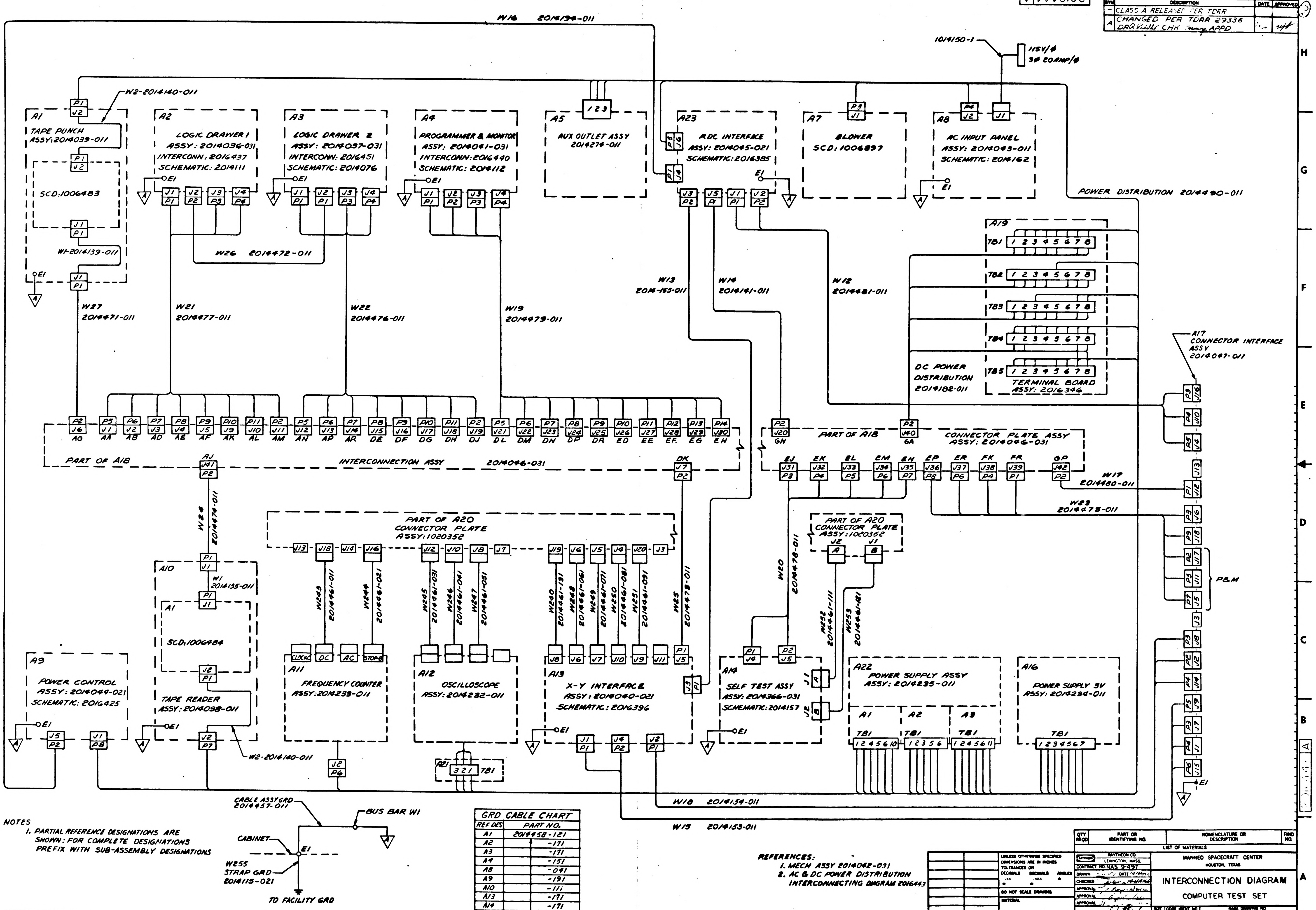
INTERCONNECTION DIAGRAM
AC & DC POWER DISTRIBUTION
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016443
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016444 A

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
–	CLASS A RELEASED PER TDRR		
A	CHANGED PER TDRR 29336 DRQ CHK APPD		


W16 2014134-011
1014150-1
115V/φ
3φ 20AMP/φ
W2-2014140-011
A1
TAPE PUNCH
ASSY: 2014039-011
P1 J2
SCD: 1006483
J1 P1
W1-2014139-011
E1
A2
LOGIC DRAWER 1
ASSY: 2014036-031
INTERCONN: 2016437
SCHEMATIC: 2014111
A3
LOGIC DRAWER 2
ASSY: 2014037-031
INTERCONN: 2016451
SCHEMATIC: 2014076
A4
PROGRAMMER & MONITOR
ASSY: 2014041-031
INTERCONN: 2016440
SCHEMATIC: 2014112
A5
AUX OUTLET ASSY
2014274-011
1 2 3
A23
ADC INTERFACE
ASSY: 2014045-021
SCHEMATIC: 2016385
A7
BLOWER
SCD: 1006897
A8
AC INPUT PANEL
ASSY: 2014043-011
SCHEMATIC: 2014162
POWER DISTRIBUTION 2014490-011
W26 2014472-011
W13 2014-155-011
W14 2014141-011
W12 2014481-011
W27 2014471-011
W21 2014477-011
W22 2014476-011
W19 2014479-011
A19
TB1 TB2 TB3 TB4 TB5
1 2 3 4 5 6 7 8
DC POWER DISTRIBUTION 2014182-011
TERMINAL BOARD ASSY: 2016346
A17
CONNECTOR INTERFACE ASSY
2014047-011
AG AA AB AD AE AF AK AL AM AN AP AR DE DF DG DH DJ DL DM DN DP DR ED EE EF EG EH
PART OF A18
INTERCONNECTION ASSY 2014046-031
AJ J41 P2
DK J7 P2
GN GA
PART OF A18
CONNECTOR PLATE ASSY
ASSY: 2014046-031
EJ EK EL EM EN EP ER FK FR GP
W17 2014480-011
W23 2014475-011
P&M
W24 2014474-011
PART OF A20
CONNECTOR PLATE
ASSY: 1020352
W243 2014461-011
W244 2014461-021
W245 2014461-031
W246 2014461-041
W247 2014461-051
W240 2014461-131
W248 2014461-061
W249 2014461-071
W250 2014461-081
W251 2014461-091
W25 2014478-011
W20 2014478-011
W252 2014461-111
W253 2014461-121
A10
W1 2014135-011
A1
SCD: 1006484
TAPE READER
ASSY: 2014038-011
A9
POWER CONTROL
ASSY: 2014044-021
SCHEMATIC: 2016425
A11
FREQUENCY COUNTER
ASSY: 2014233-011
CLOCK DC AC STOP
A12
OSCILLOSCOPE
ASSY: 2014232-011
A21 3 2 1 TB1
A13
X-Y INTERFACE
ASSY: 2014040-021
SCHEMATIC: 2016396
A14
SELF TEST ASSY
ASSY: 2014366-031
SCHEMATIC: 2014157
A22
POWER SUPPLY ASSY
ASSY: 2014235-011
A1 A2 A3
TB1 1 2 4 5 6 10
TB1 1 2 3 5 6
TB1 1 2 4 5 6 11
A16
POWER SUPPLY 3V
ASSY: 2014234-011
TB1 1 2 3 4 5 6 7
W2-2014140-011
W18 2014154-011
W15 2014153-011
CABLE ASSY GRD 2014457-011
BUS BAR W1
CABINET
E1
W255 STRAP GRD 2014115-021
TO FACILITY GRD

NOTES

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

GRD CABLE CHART	
REF DES	PART NO.
A1	2014458-121
A2	-171
A3	-171
A4	-151
A8	-091
A9	-191
A10	-111
A13	-171
A14	-171
A17	-061
A23	2014458-171

REFERENCES:
1. MECH ASSY 2014042-031
2. AC & DC POWER DISTRIBUTION INTERCONNECTING DIAGRAM 2016443

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY | USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION DIAGRAM
COMPUTER TEST SET

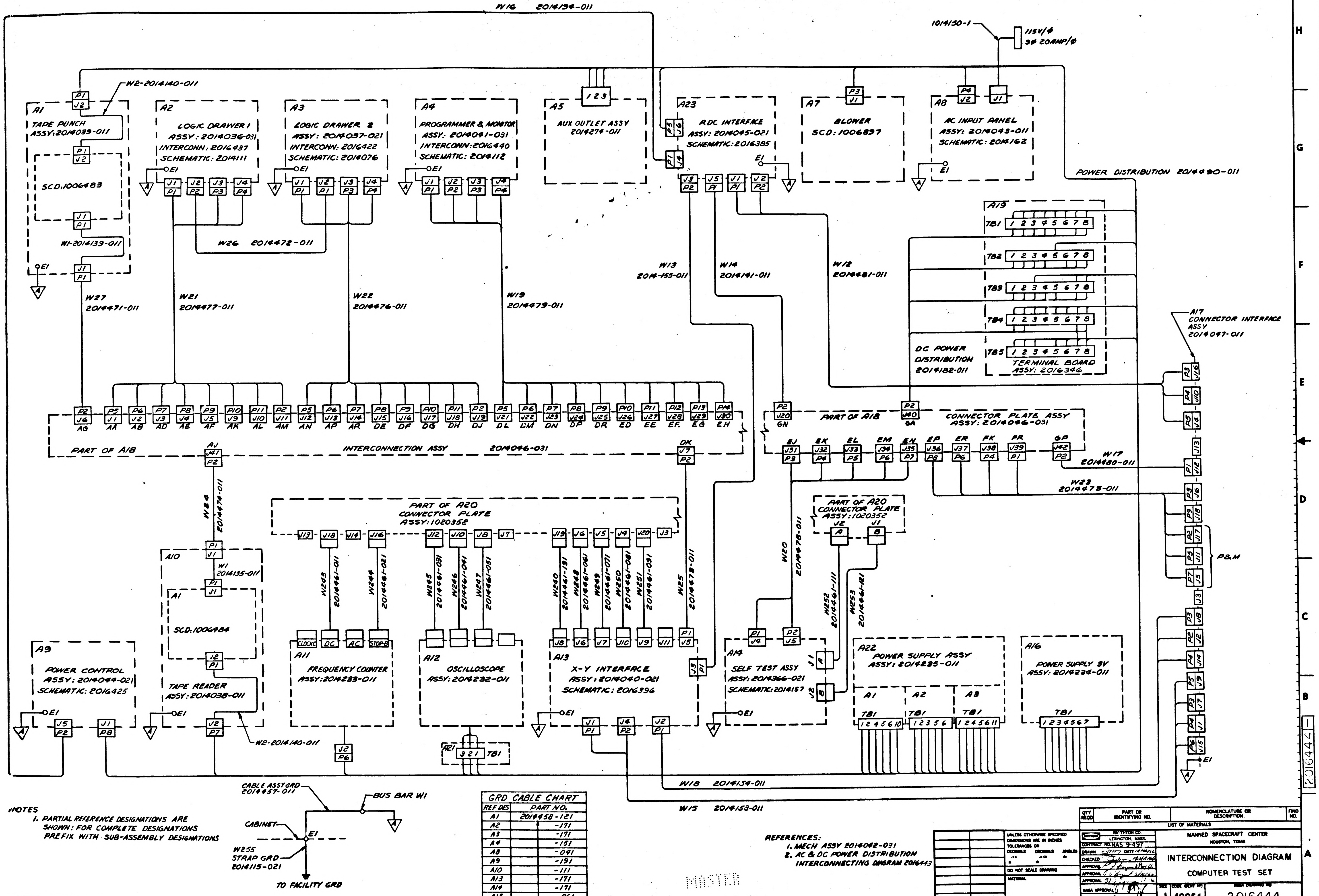
SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO 2016444

SCALE NONE | WT | SHEET 1 OF 1

2016444 A

2016444 -

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR		



W16 2014134-011
1014150-1
115V/ϕ
3ϕ 20AMP/ϕ
A1 TAPE PUNCH ASSY: 2014039-011
W2-2014140-011
SCD: 1006483
W1-2014139-011
A2 LOGIC DRAWER 1 ASSY: 2014036-031 INTERCONN: 2016437 SCHEMATIC: 2014111
A3 LOGIC DRAWER 2 ASSY: 2014037-021 INTERCONN: 2016422 SCHEMATIC: 2014076
A4 PROGRAMMER & MONITOR ASSY: 2014041-031 INTERCONN: 2016440 SCHEMATIC: 2014112
A5 AUX OUTLET ASSY 2014274-011
A23 ADC INTERFACE ASSY: 2014045-021 SCHEMATIC: 2016385
A7 BLOWER SCD: 1006897
A8 AC INPUT PANEL ASSY: 2014043-011 SCHEMATIC: 2014162
POWER DISTRIBUTION 2014490-011
W26 2014472-011
W13 2014-155-011
W14 2014141-011
W12 2014481-011
A19 TB1 TB2 TB3 TB4 TB5 1 2 3 4 5 6 7 8
DC POWER DISTRIBUTION 2014182-011
TERMINAL BOARD ASSY: 2016346
A17 CONNECTOR INTERFACE ASSY 2014097-011
W27 2014471-011
W21 2014477-011
W22 2014476-011
W19 2014479-011
PART OF A18 INTERCONNECTION ASSY 2014046-031
PART OF A18 CONNECTOR PLATE ASSY: 2014046-031
W17 2014480-011
W23 2014475-011
P&M
W24 2014474-011
PART OF A20 CONNECTOR PLATE ASSY: 1020352
W243 2014461-011
W244 2014461-021
W245 2014461-031
W246 2014461-041
W247 2014461-051
W240 2014461-131
W248 2014461-061
W249 2014461-071
W250 2014461-081
W251 2014461-091
W25 2014478-011
W20 2014478-011
W252 2014461-111
W253 2014461-181
A10
W1 2014135-011
A1 SCD: 1006484
TAPE READER ASSY: 2014038-011
A9 POWER CONTROL ASSY: 2014044-021 SCHEMATIC: 2016425
A11 FREQUENCY COUNTER ASSY: 2014233-011
CLOCK DC AC STOP
A12 OSCILLOSCOPE ASSY: 2014232-011
A21 3 2 1 TB1
A13 X-Y INTERFACE ASSY: 2014040-021 SCHEMATIC: 2016396
A14 SELF TEST ASSY ASSY: 2014366-021 SCHEMATIC: 2014157
A22 POWER SUPPLY ASSY ASSY: 2014235-011
A1 A2 A3 TB1
A16 POWER SUPPLY 3V ASSY: 2014234-011
W18 2014154-011
W15 2014153-011
E1
CABLE ASSY GRD 2014457-011
BUS BAR W1
CABINET
W255 STRAP GRD 2014115-021
TO FACILITY GRD

NOTES

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

GRD CABLE CHART

REF DES	PART NO.
A1	2014458-121
A2	-171
A3	-171
A4	-151
A8	-091
A9	-191
A10	-111
A13	-171
A14	-171
A17	-061
A23	2014458-171

REFERENCES:
1. MECH ASSY 2014042-031
2. AC & DC POWER DISTRIBUTION INTERCONNECTING DIAGRAM 2016443

MASTER

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 14 MAY 66
CHECKED 14 MAY 66
APPROVAL 14 May 66
APPROVAL 5/14/66
APPROVAL
NASA APPROVAL
MIT APPROVAL 5-2-66
MIT APPROVAL 14 May 66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION DIAGRAM
COMPUTER TEST SET

SIZE J CODE IDENT NO. 49956 NASA DRAWING NO 2016444
SCALE NONE WT SHEET 1 OF 1

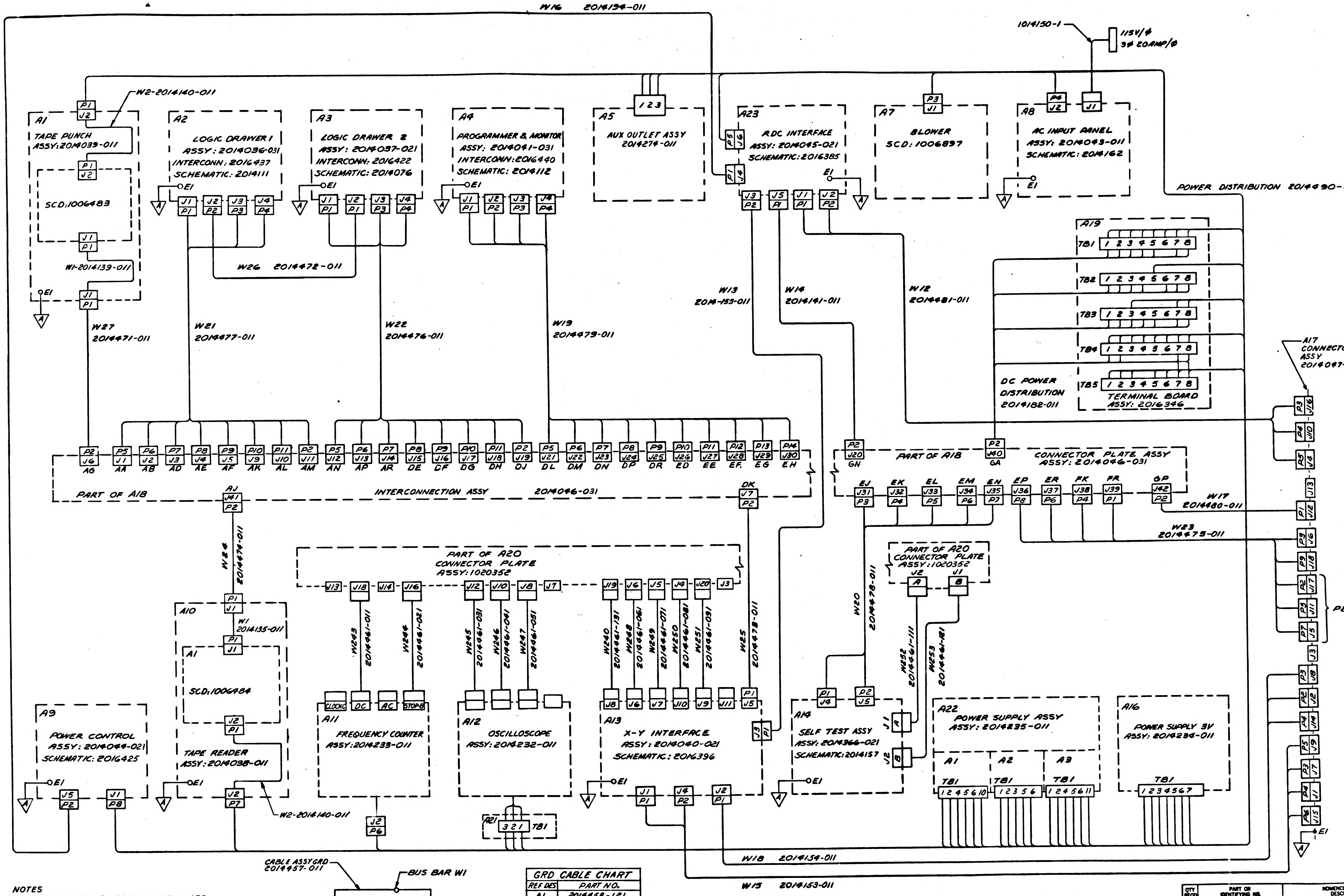
2016444 -

2016444 -

E2

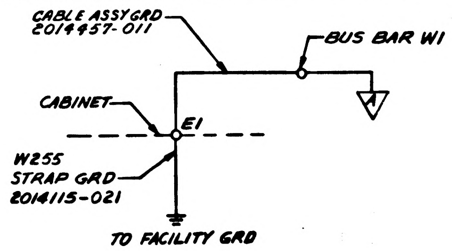
2016444 -

SYM	DESCRIPTION	DATE	APPROVED
	CLASS A RELEASED PER TDRR		



W16 2014134-011
10/4150-1
115V/ϕ 3ϕ 20AMP/ϕ
W2-2014140-011
A1 TAPE PUNCH ASSY: 2014039-011
SCD: 1006483
W1-2014139-011
A2 LOGIC DRAWER 1 ASSY: 2014036-031 INTERCONN: 2016437 SCHEMATIC: 2014111
A3 LOGIC DRAWER 2 ASSY: 2014037-021 INTERCONN: 2016422 SCHEMATIC: 2014076
A4 PROGRAMMER & MONITOR ASSY: 2014041-031 INTERCONN: 2016440 SCHEMATIC: 2014112
A5 AUX OUTLET ASSY 2014274-011
A23 RDC INTERFACE ASSY: 2014045-021 SCHEMATIC: 2016385
A7 BLOWER SCD: 1006897
A8 AC INPUT PANEL ASSY: 2014043-011 SCHEMATIC: 2014162
POWER DISTRIBUTION 2014490-011
W26 2014472-011
W27 2014471-011
W21 2014477-011
W22 2014476-011
W19 2014479-011
W13 2014-155-011
W14 2014141-011
W12 2014481-011
A19
TB1 TB2 TB3 TB4 TB5 1 2 3 4 5 6 7 8
DC POWER DISTRIBUTION 2014182-011
TERMINAL BOARD ASSY: 2016346
A17 CONNECTOR INTERFACE ASSY 2014097-011
PART OF A18 INTERCONNECTION ASSY 2014096-031
PART OF A18 CONNECTOR PLATE ASSY 2014046-031
W17 2014480-011
W23 2014475-011
W24 2014474-011
PART OF A20 CONNECTOR PLATE ASSY: 1020352
PART OF A20 CONNECTOR PLATE ASSY: 1020352
P&M
A10 TAPE READER ASSY: 2014038-011
W1 2014135-011
SCD: 1006484
A9 POWER CONTROL ASSY: 2014044-021 SCHEMATIC: 2016425
W243 2014461-011
W244 2014461-021
W245 2014461-031
W246 2014461-041
W247 2014461-051
W240 2014461-131
W248 2014461-061
W249 2014461-071
W250 2014461-081
W251 2014461-091
W25 2014478-011
W20 2014478-011
W252 2014461-111
W253 2014461-181
A11 FREQUENCY COUNTER ASSY: 2014233-011
CLOCKS DC AC STOP
A12 OSCILLOSCOPE ASSY: 2014232-011
A21 3 2 1 TB1
A13 X-Y INTERFACE ASSY: 2014040-021 SCHEMATIC: 2016396
A14 SELF TEST ASSY ASSY: 2014366-021 SCHEMATIC: 2014157
A22 POWER SUPPLY ASSY ASSY: 2014235-011
A1 A2 A3 TB1
A16 POWER SUPPLY 3V ASSY: 2014234-011
W18 2014154-011
W15 2014153-011
E1

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS



CABLE ASSY GRD 2014457-011
BUS BAR W1
CABINET
E1
W255 STRAP GRD 2014115-021
TO FACILITY GRD

GRD CABLE CHART	
REF DES	PART NO.
A1	2014458-121
A2	-171
A3	-171
A4	-151
A8	-091
A9	-191
A10	-111
A13	-171
A14	-171
A17	-061
A23	2014458-171

REFERENCES:
1. MECH ASSY 2014042-031
2. AC & DC POWER DISTRIBUTION INTERCONNECTING DIAGRAM 2016443

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION.	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 4 MAY 66
CHECKED 14 MAY 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION DIAGRAM
COMPUTER TEST SET

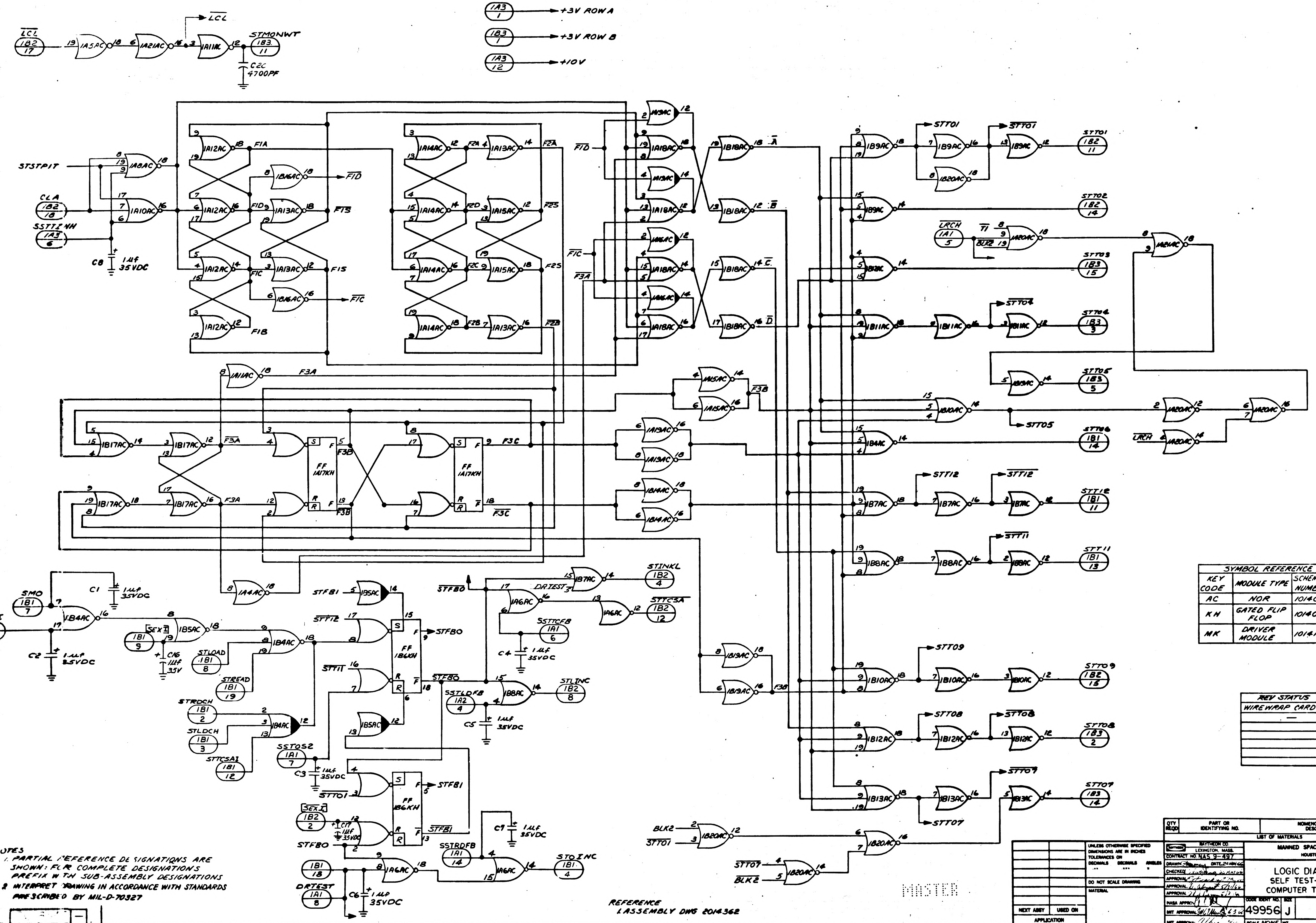
SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO 2016444
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016444 -

2016447 -

SYM	DESCRIPTION	DATE	APPROVED
REVISIONS			
-	CLASS A RELEASED PER TDRR 69341		


LCL
1B2 / 17
1A5AC
1A21AC
1A11AC
STMONWT
1B3 / 11
C2C 4700PF
1A3 / 1 → +3V ROW A
1B3 / 1 → +3V ROW B
1A3 / 12 → +10V
STSTPIT
CLA
1B2 / 18
SSTTZHH
1A3 / 6
C8 1µf 35VDC
1A8AC
1A10AC
1A12AC
1A13AC
1A16AC
1A14AC
1A15AC
F1A
F1D
F1S
F1C
F1B
F2A
F2D
F2S
F2C
F2B
F3A
F3B
F3C
1A18AC
1B18AC
A
B
C
D
1B9AC
1B20AC
STTO1
1B2 / 11
STTO2
1B2 / 14
LRCH
1A1 / 5
T1
BLK2
1A20AC
STTO3
1B3 / 15
1B11AC
STTO4
1B3 / 3
STTO6
1B3 / 5
1A15AC
1B10AC
STTO5
1A13AC
1B4AC
1B1 / 14
1B14AC
1B7AC
STT12
1B1 / 11
1B8AC
STT11
1B1 / 13
1B17AC
FF 1A17KH
1A11AC
1A4AC
1B13AC
STTO9
1B2 / 15
1B12AC
STTO8
1B3 / 2
1B13AC
STTO7
1B3 / 14
1B20AC
BLK2
STTO1
STTO7
SMO
1B1 / 7
C1 1µf 35VDC
1B4AC
C2 1µf 35VDC
SEX I
1B1 / 9
1B5AC
C16 1µf 35V
STLOAD
1B1 / 8
STREAD
1B1 / 19
STRDCH
1B1 / 2
STLDCH
1B1 / 3
STTCSA1
1B1 / 12
1B4AC
STFB1
1B5AC
STT12
STT11
FF 1B6KH
STFBO
SSTOS2
1A1 / 7
C3 1µf 35VDC
STTO1
FF 1B6KH
STFB1
SEX I
1B2 / 2
C17 1µf 35VDC
STFBO
1B1 / 18
DRTEST
1A1 / 8
C6 1µf 35VDC
1A6AC
SSTRDFB
1A1 / 14
C7 1µf 35VDC
STOINC
1B1 / 4
STFBO
1B7AC
STINKL
1B2 / 4
DRTEST
1A6AC
STTCSA
1B2 / 12
SSTTCFB
1A1 / 6
C4 1µf 35VDC
1B8AC
STLINC
1B1 / 8
SSTLDFB
1A2 / 4
C5 1µf 35VDC

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
AC	NOR	1014036
KH	GATED FLIP FLOP	1014072
MK	DRIVER MODULE	1014123

REV STATUS
WIREWRAP CARD REV
—

1H

UTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REFERENCE
1.ASSEMBLY DWG 2014362

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX DECIMALS .XXX ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 24 MAY 66
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROV
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

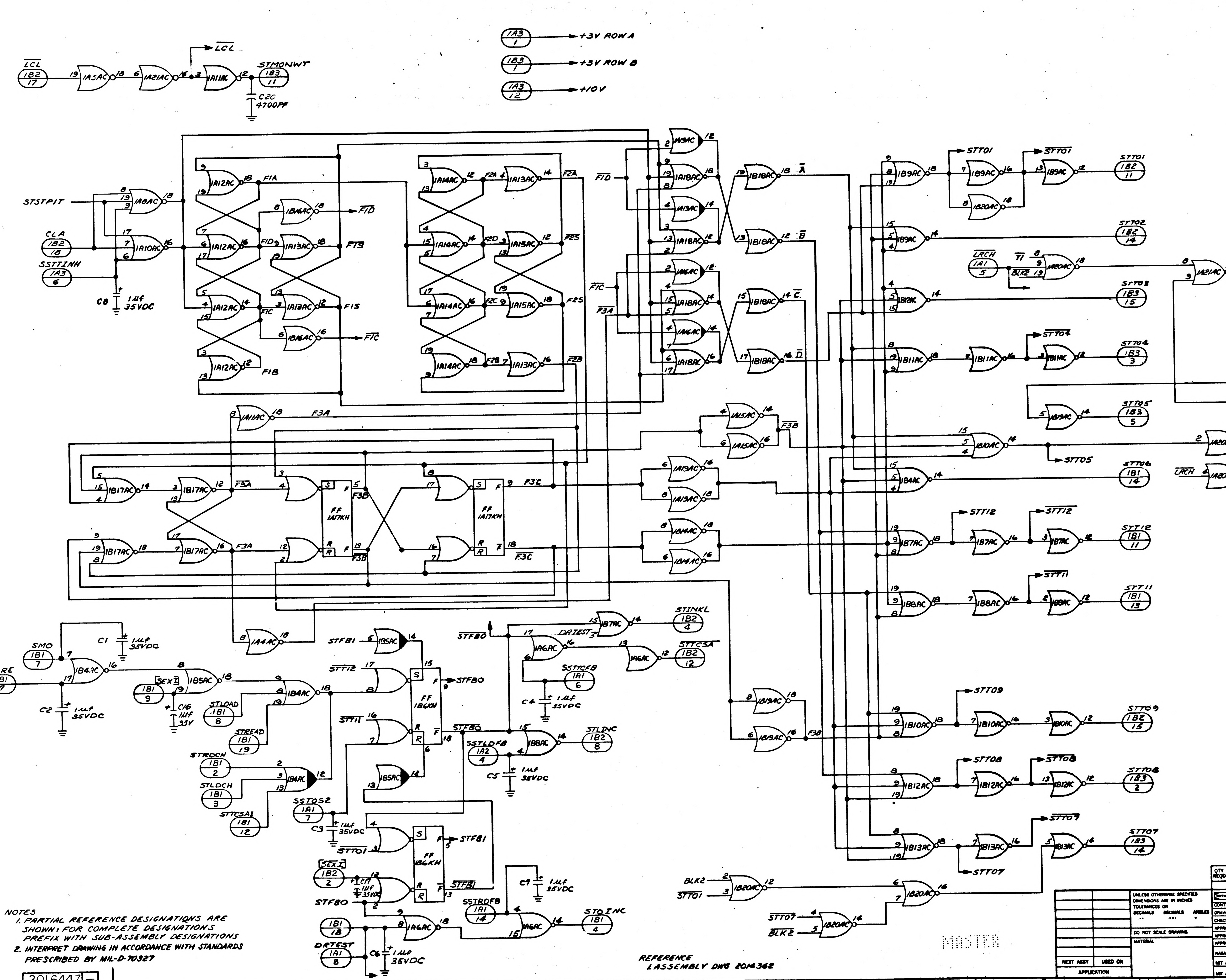
LOGIC DIAGRAM
SELF TEST-PLATE I
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016447 -
SCALE NONE
WT
SHEET 1 OF 2

2016447

REVISIONS			
SYM	DESCRIPTION	DATE	APPR
-	CLASS A RELEASED PER EORR 64341		

2016447 -



+3V ROW A
+3V ROW B
+10V
LCL
STMONWT
C20 4700PF
STSTPIT
CLA
SSTTINH
C8 1μf 35VDC
F1A
F1D
F1S
F1C
F1B
F2A
F2D
F2S
F2C
F2B
F2S
F3A
F3B
F3C
FF 1A17KH
A
B
C
D
STT01
STT02
STT03
STT04
STT05
STT06
STT07
STT08
STT09
STT11
STT12
LRCH
T1
BLK2
SMO
SRE
C1 1μf 35VDC
C2 1μf 35VDC
SEX I
C16 1μf 35V
STLOAD
STREAD
STRDCH
STLDCH
STTCSA1
STFB1
STFB0
FF 1B6KH
STINKL
DRTEST
STTCSA
SSTTCFB
C4 1μf 35VDC
STLINC
SSTLDFB
C5 1μf 35VDC
SSTOS2
C3 1μf 35VDC
SEX II
C17 1μf 35VDC
C7 1μf 35VDC
SSTRDFB
STOINC
C6 1μf 35VDC

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
AC	NOR	1014036
KH	GATED FLIP FLOP	1014072
MK	DRIVER MODULE	1014023

REV STATUS
WIREWRAP CARD REV
—

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016447 -

REFERENCE
ASSEMBLY DWG 2014362

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX DECIMALS .XXX ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

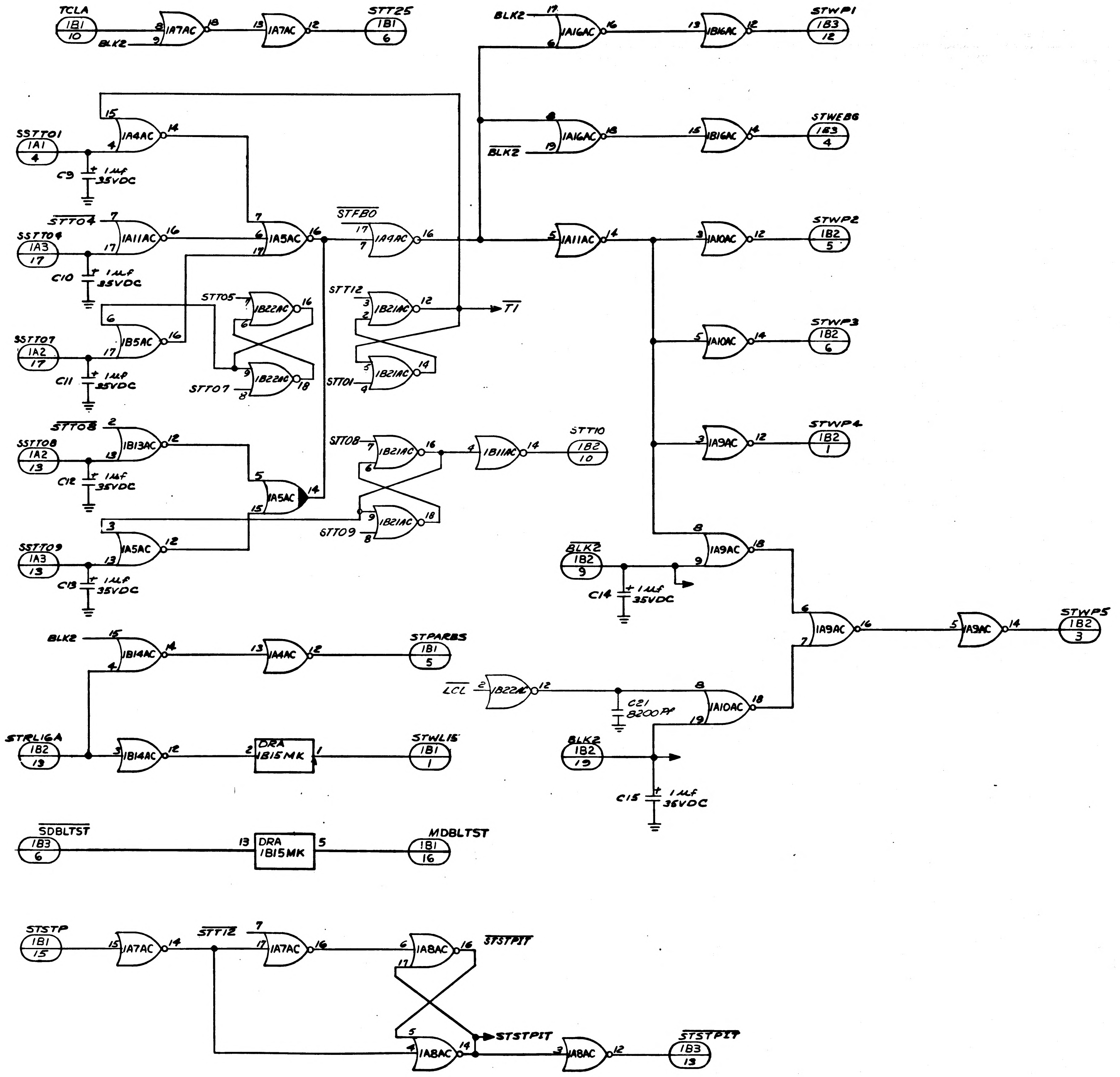
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
SELF TEST PLATE I
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016447
SCALE NONE
WT
SHEET

2016447 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 29341		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1B1 10
BLK2
1A7AC
1A7AC
STT25
1B1 6
BLK2
1A16AC
1B16AC
STWP1
1B3 12
1A16AC
BLK2
1B16AC
STWEB6
1B3 4
SSTT01
1A1 4
1A4AC
C9
1µf 35VDC
STT04
SSTT04
1A3 17
1A11AC
1A5AC
STFB0
1A9AC
1A11AC
1A10AC
STWP2
1B2 5
C10
1µf 35VDC
STT05
1B22AC
STT12
1B21AC
T1
SSTT07
1A2 17
1B5AC
1B22AC
STT07
STT01
1B21AC
1A10AC
STWP3
1B2 6
C11
1µf 35VDC
STT08
SSTT08
1A2 13
1B13AC
STT08
1B21AC
1B11AC
STT10
1B2 10
1A9AC
STWP4
1B2 1
C12
1µf 35VDC
1A5AC
1B21AC
STT09
SSTT09
1A3 13
1A5AC
C13
1µf 35VDC
BLK2
1B2 9
1A9AC
C14
1µf 35VDC
1A9AC
1A9AC
STWP5
1B2 3
BLK2
1B14AC
1A4AC
STPARBS
1B1 5
LCL
1B22AC
C21
8200pf
1A10AC
STRLIGA
1B2 13
1B14AC
DRA
1B15MK
STWL15
1B1 1
BLK2
1B2 19
C15
1µf 35VDC
SDBLTST
1B3 6
DRA
1B15MK
MDBLTST
1B1 16
STSTP
1B1 15
1A7AC
STT12
1A7AC
1A8AC
STSTPIT
1A8AC
STSTPIT
1A8AC
STSTPIT
1B3 13

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 24 MAY 66
CHECKED 25 May 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

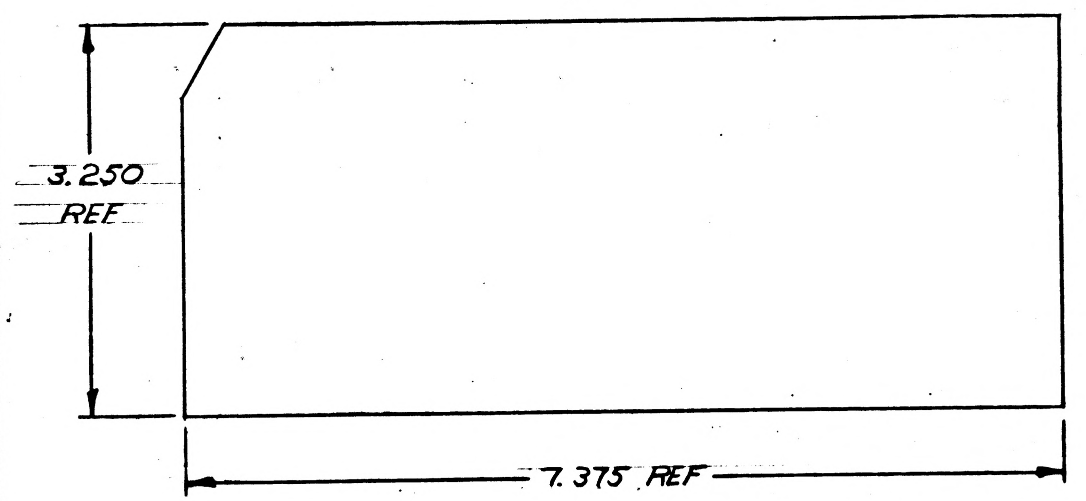
LOGIC DIAGRAM
SELF TEST-PLATE I
COMPUTER TEST SET

CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	J	2016447
SCALE NONE	WT	SHEET 2 OF 2

2016447 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 29341		

NO. OF CARDS 457



REFERENCE DRAWINGS
LOGIC DIAGRAM 2016447
MECH ASSY 2014362

NOTES
1. USE CARD FORM IBM U11897
OR EQUIVALENT
2. INTERPRET DRAWING IN ACCORDANCE
WITH STANDARDS PRESCRIBED
BY MIL-D-70327

MASTER

RAYTHEON
RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 24 MAY 66
CHECKED 25 May 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 6/1/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

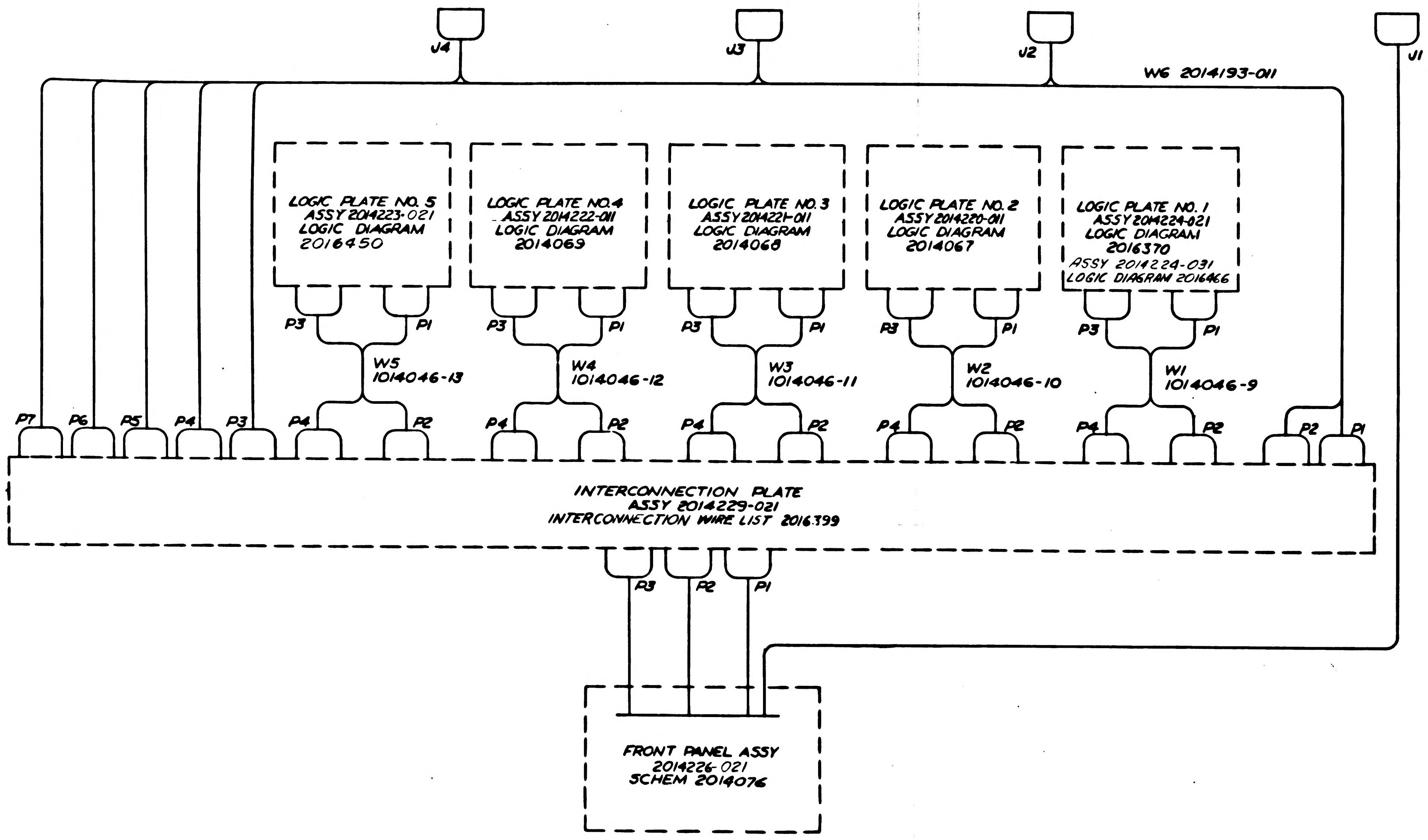
WIRE WRAP MACHINE CARDS
SELF TEST PLATE I
COMPUTER TEST SET

SIZE	CODE IDENT NO.	NASA DRAWING NO.
B	49956	2016448

SCALE 1/1 WT SHEET 1 OF 1

2016451 A

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TORR 29338		
A	CHANGED PER TORR 33448 DR CHK	4/25/67	T.S.K



J4
J3
J2
J1
W6 2014193-011
LOGIC PLATE NO. 5
ASSY 2014223-021
LOGIC DIAGRAM
2016450
LOGIC PLATE NO.4
ASSY 2014222-011
LOGIC DIAGRAM
2014069
LOGIC PLATE NO.3
ASSY 2014221-011
LOGIC DIAGRAM
2014068
LOGIC PLATE NO. 2
ASSY 2014220-011
LOGIC DIAGRAM
2014067
LOGIC PLATE NO. 1
ASSY 2014224-021
LOGIC DIAGRAM
2016370
ASSY 2014224-031
LOGIC DIAGRAM 2016466
P3
P1
W5
1014046-13
W4
1014046-12
W3
1014046-11
W2
1014046-10
W1
1014046-9
P7
P6
P5
P4
P3
P4
P2
P2
P1
INTERCONNECTION PLATE
ASSY 2014229-021
INTERCONNECTION WIRE LIST 2016399
P3
P2
P1
FRONT PANEL ASSY
2014226-021
SCHEM 2014076

NOTE
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE
1. MAIN ASSY 2014037-0318-041

2016451 A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN DATE 25 MAY 66
CHECKED 25 MAY 66
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

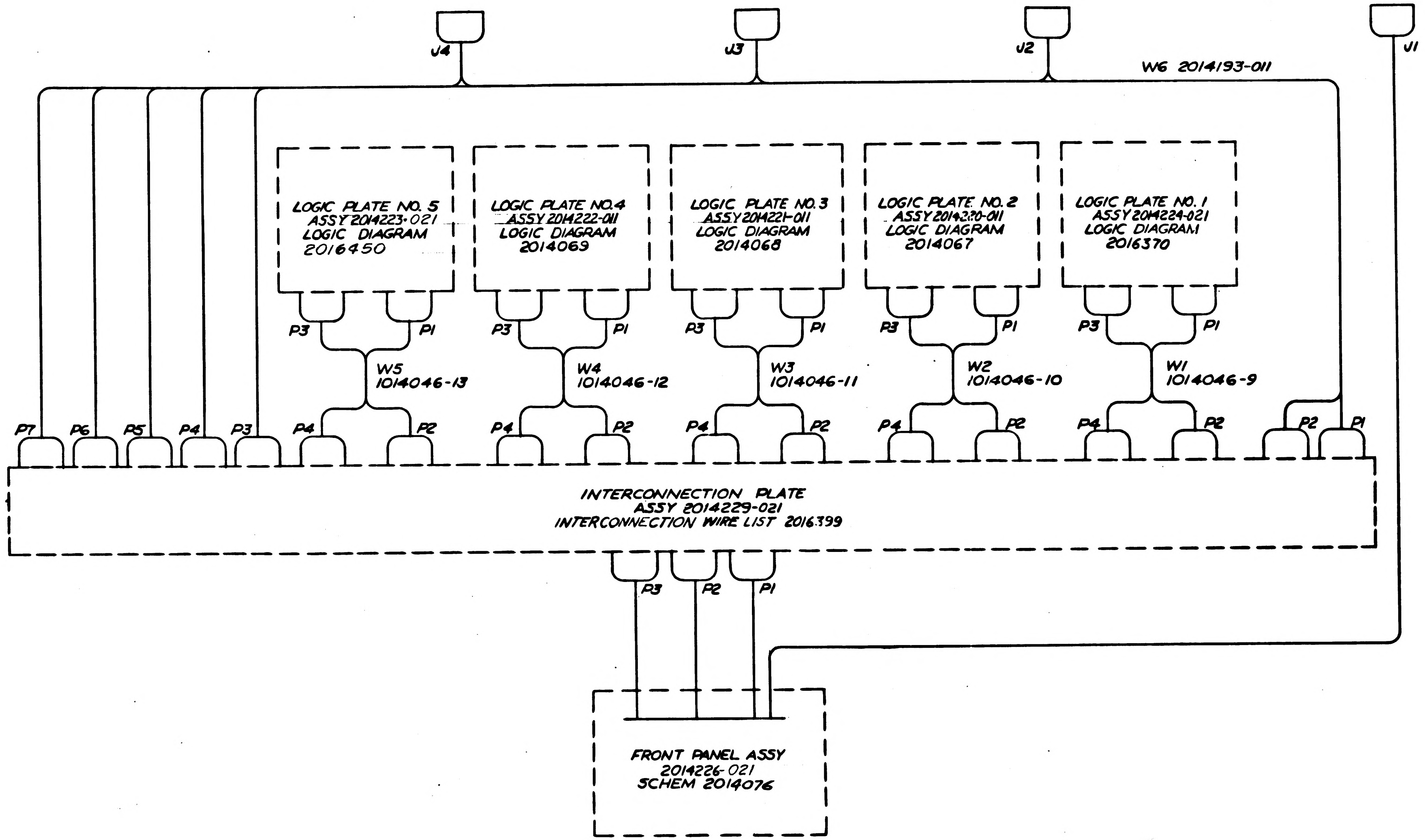
INTERCONNECTION DIAGRAM
LOGIC DRAWER NO. 2
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE D
NASA DRAWING NO. 2016451
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

—	2016451

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TORR 29338		



J4
J3
J2
J1
W6 2014193-011
LOGIC PLATE NO. 5
ASSY 2014223-021
LOGIC DIAGRAM
2016450
LOGIC PLATE NO. 4
ASSY 2014222-011
LOGIC DIAGRAM
2014069
LOGIC PLATE NO. 3
ASSY 2014221-011
LOGIC DIAGRAM
2014068
LOGIC PLATE NO. 2
ASSY 2014220-011
LOGIC DIAGRAM
2014067
LOGIC PLATE NO. 1
ASSY 2014224-021
LOGIC DIAGRAM
2016370
P3
P1
W5
1014046-13
W4
1014046-12
W3
1014046-11
W2
1014046-10
W1
1014046-9
P7
P6
P5
P4
P3
P4
P2
P2
P1
INTERCONNECTION PLATE
ASSY 2014229-021
INTERCONNECTION WIRE LIST 2016399
P3
P2
P1
FRONT PANEL ASSY
2014226-021
SCHEM 2014076

NOTE

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE

1. MAIN ASSY 2014037-031

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS9-497
DRAWN DATE 25 MAY 66
CHECKED 25 MAY 66
APPROVAL
APPROVAL 5/31/66
APPROVAL
NASA APPROVAL
MIT APPROVAL 6-3-66
MIT APPROVAL 6/1/66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

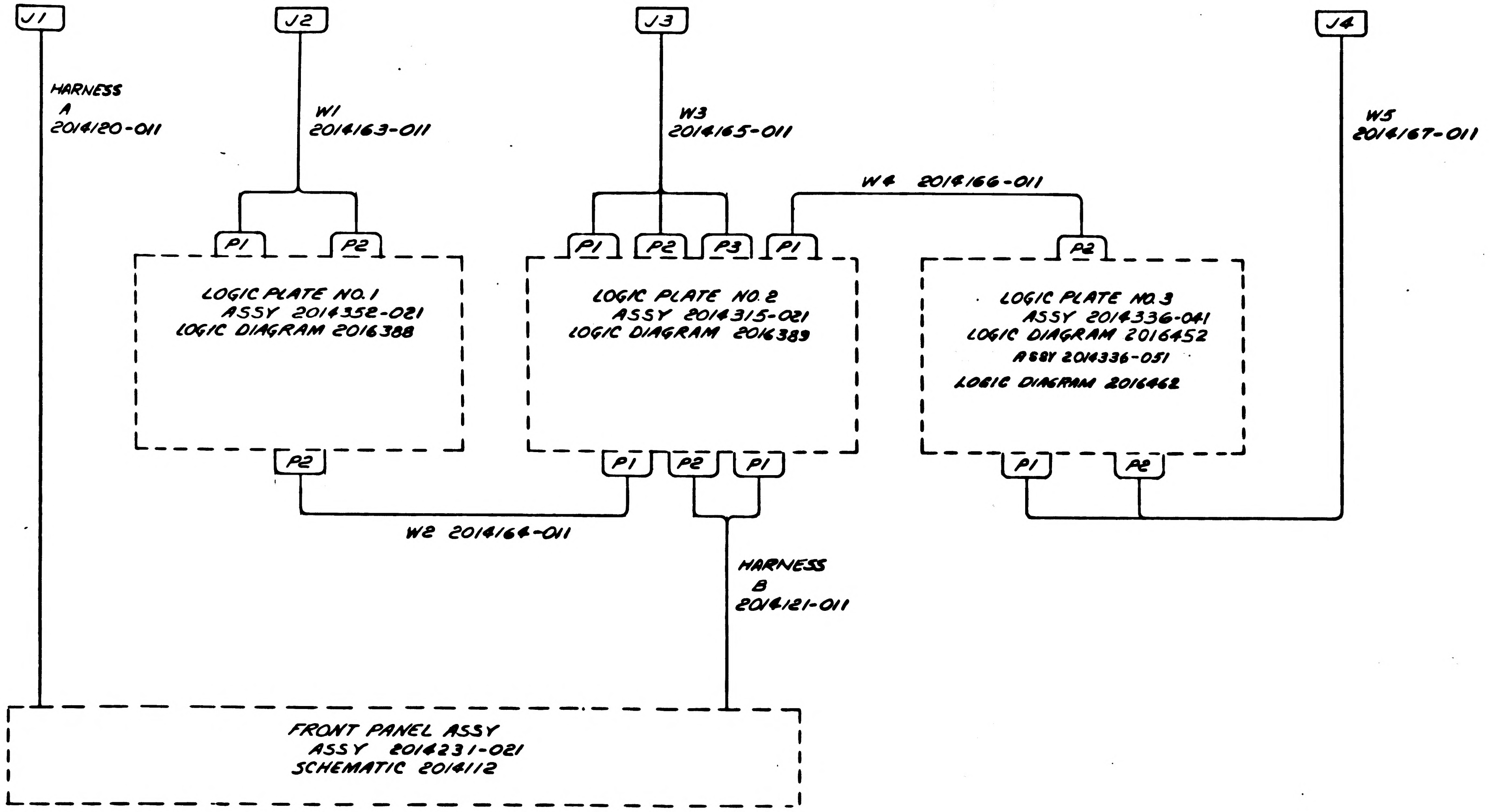
INTERCONNECTION DIAGRAM
LOGIC DRAWER NO. 2
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE D
NASA DRAWING NO. 2016451
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016454 A

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 30171	12/1/66	
A	CHANGED PER TDRR 33448 DR J Valentino CHK L. Sirois	7/25/67	



J1
J2
J3
J4
HARNESS A 2014120-011
W1 2014163-011
W3 2014165-011
W4 2014166-011
W5 2014167-011
P1
P2
P1
P2
P3
P1
P2
LOGIC PLATE NO. 1
ASSY 2014352-021
LOGIC DIAGRAM 2016388
LOGIC PLATE NO. 2
ASSY 2014315-021
LOGIC DIAGRAM 2016389
LOGIC PLATE NO. 3
ASSY 2014336-041
LOGIC DIAGRAM 2016452
ASSY 2014336-051
LOGIC DIAGRAM 2016462
P2
P1
P2
P1
P1
P2
W2 2014164-011
HARNESS B 2014121-011
FRONT PANEL ASSY
ASSY 2014231-021
SCHEMATIC 2014112

2016454 A

NOTE

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE

1. MAIN ASSY 2014041-0418-051

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION DIAGRAM
PROGRAMMER & MONITOR
CTS

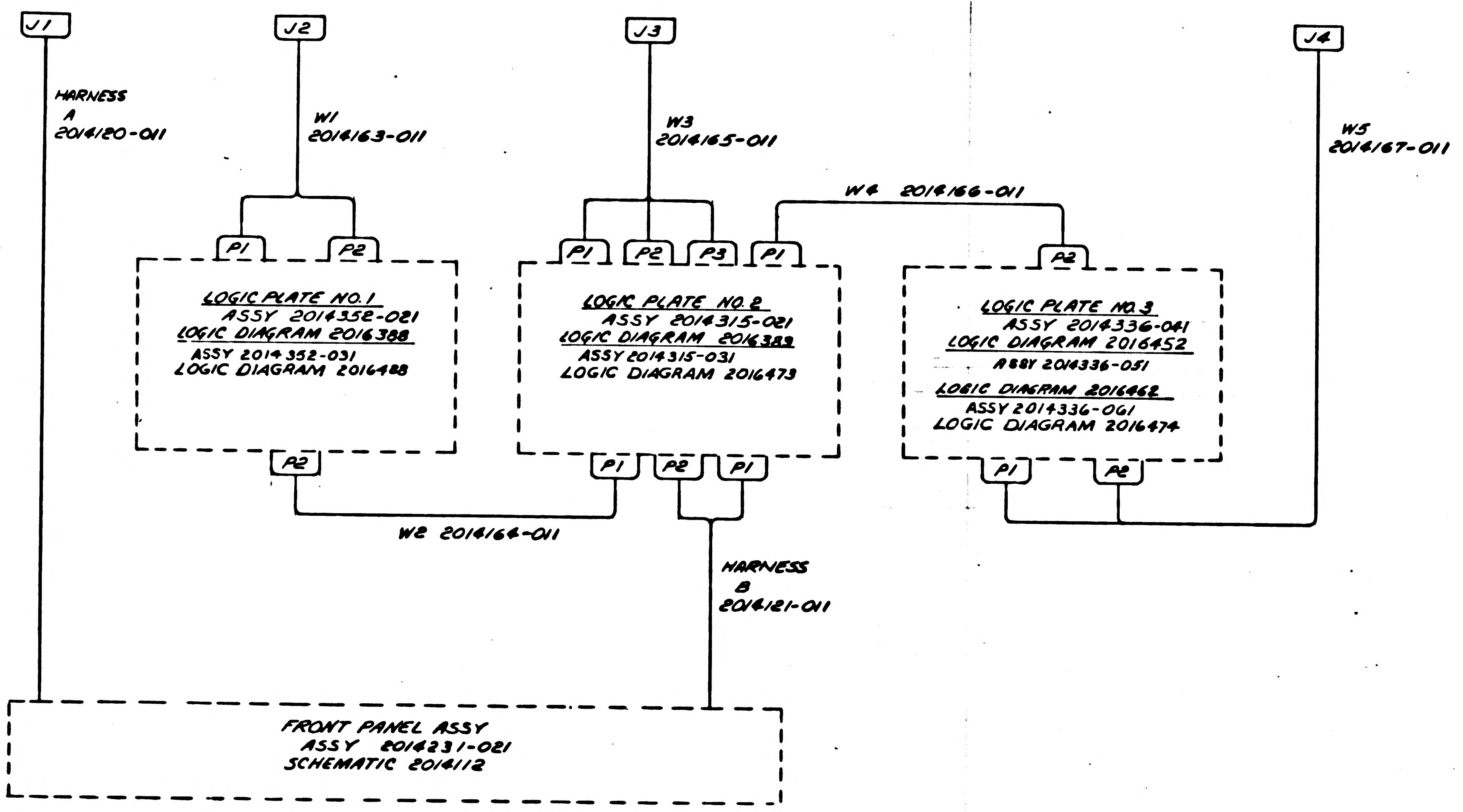
CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	D	2016454

SCALE NONE WT SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016454 B

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 36171	31/66	
A	CHANGED PER TDRR 33948 DR J Valentine CHK L. Sirois	7/25/67	JSR
B	CHANGED PER TDRR 35533 DR BB CHK Urban	2/10/68	JSR


J1
HARNESS A 2014120-011
J2
W1 2014163-011
J3
W3 2014165-011
W4 2014166-011
J4
W5 2014167-011
P1
P2
LOGIC PLATE NO. 1
ASSY 2014352-021
LOGIC DIAGRAM 2016388
ASSY 2014352-031
LOGIC DIAGRAM 2016488
P1
P2
P3
P1
LOGIC PLATE NO. 2
ASSY 2014315-021
LOGIC DIAGRAM 2016389
ASSY 2014315-031
LOGIC DIAGRAM 2016473
P2
LOGIC PLATE NO. 3
ASSY 2014336-041
LOGIC DIAGRAM 2016452
ASSY 2014336-051
LOGIC DIAGRAM 2016462
ASSY 2014336-061
LOGIC DIAGRAM 2016474
P2
P1
P2
P1
P1
P2
W2 2014164-011
HARNESS B 2014121-011
FRONT PANEL ASSY
ASSY 2014231-021
SCHEMATIC 2014112

NOTE

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE

1. MAIN ASSY 2014041-041, 051, & 061

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN
DATE
CHECKED 12-1-1966
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL M. L. Brandenburg
APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

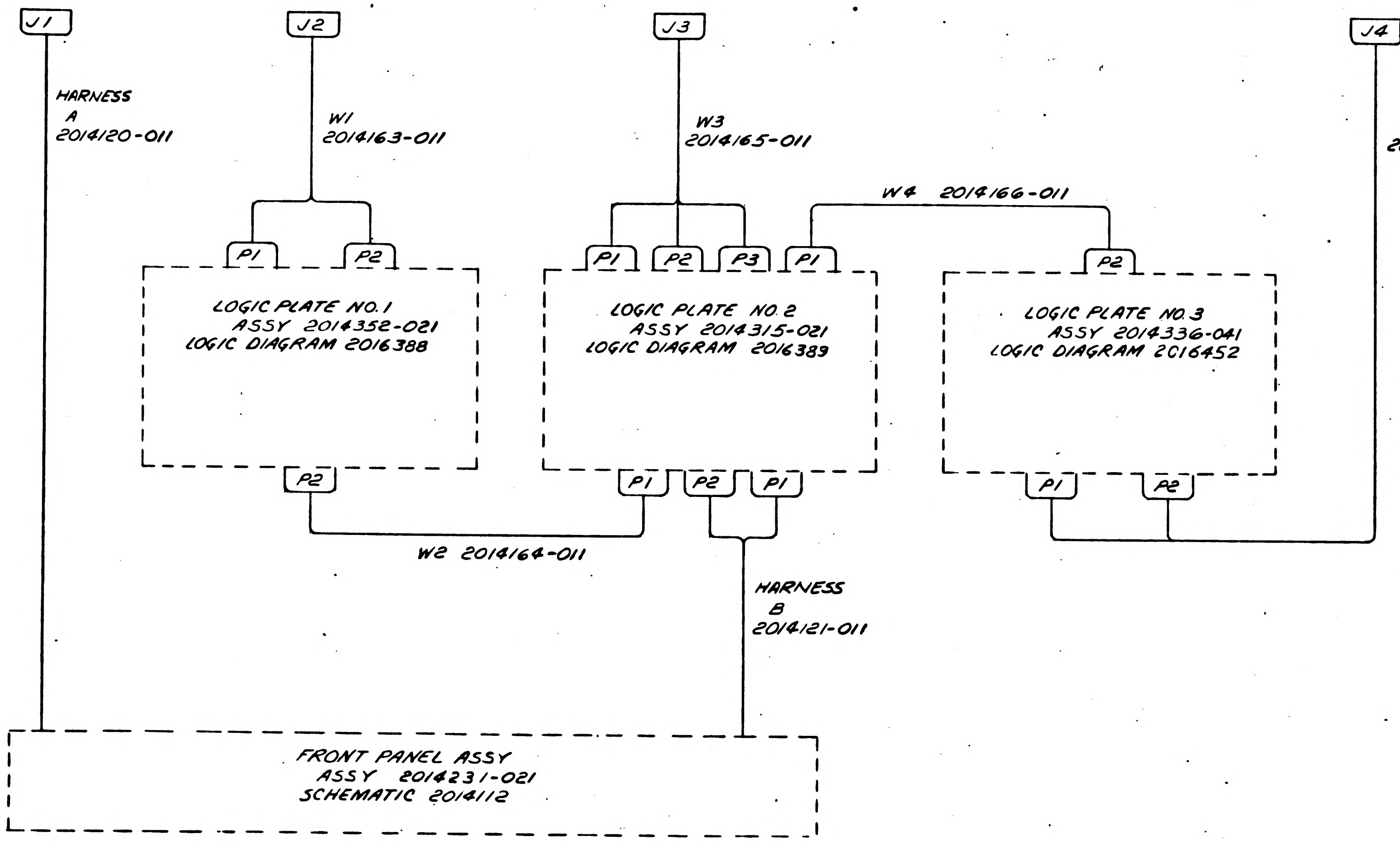
INTERCONNECTION DIAGRAM
PROGRAMMER & MONITOR
CTS

CODE IDENT NO. 49956
SIZE D
NASA DRAWING NO. 2016454
SCALE NONE
WT
SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

-	2016454

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 30171	[illegible]	



J1
HARNESS A 2014120-011
J2
W1 2014163-011
J3
W3 2014165-011
J4
W5 2014167-011
W4 2014166-011
P1
P2
P3
LOGIC PLATE NO. 1 ASSY 2014352-021 LOGIC DIAGRAM 2016388
LOGIC PLATE NO. 2 ASSY 2014315-021 LOGIC DIAGRAM 2016389
LOGIC PLATE NO. 3 ASSY 2014336-041 LOGIC DIAGRAM 2016452
W2 2014164-011
HARNESS B 2014121-011
FRONT PANEL ASSY ASSY 2014231-021 SCHEMATIC 2014112

NOTE
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE
1. MAIN ASSY 2014041-041

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON RAYTHEON CO. LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
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CHECKED [illegible]
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APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION DIAGRAM
PROGRAMMER & MONITOR
CTS

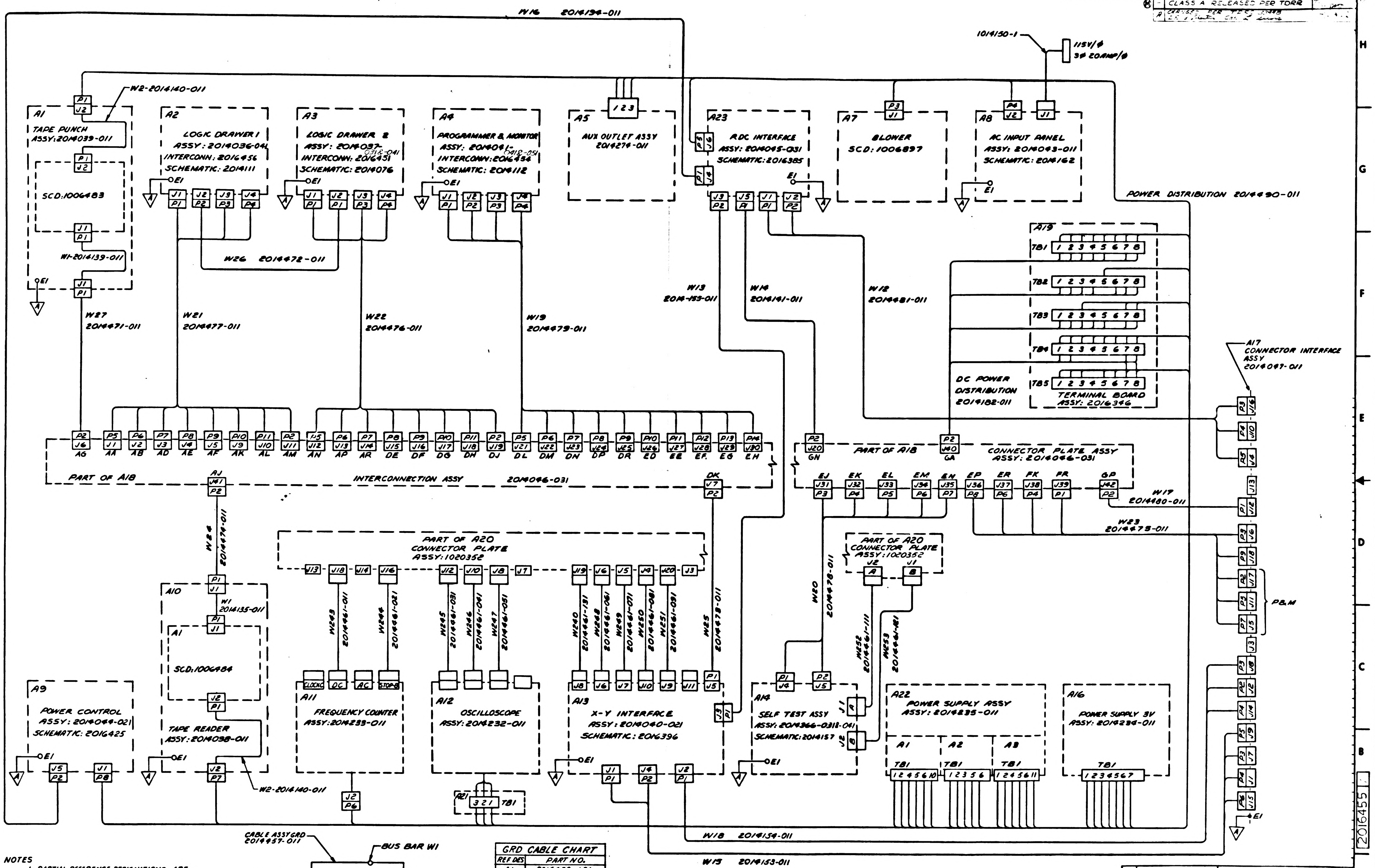
CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	D	2016454
SCALE NONE	WT	SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

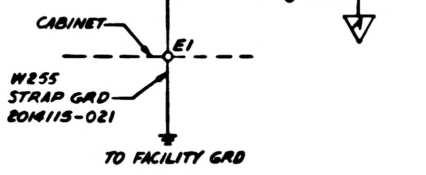
2016454	-

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR		
A	CHANGED PER TDRR [illegible]		

2016455 A



W16 2014154-011
1014150-1
115V/φ
3φ 20AMP/φ
W2-2014140-011
A1 TAPE PUNCH ASSY: 2014039-011
SCD:1006483
W1-2014139-011
A2 LOGIC DRAWER 1 ASSY: 2014036-041 INTERCONN: 2016456 SCHEMATIC: 2014111
A3 LOGIC DRAWER 2 ASSY: 2014037-031 & -041 INTERCONN: 2016451 SCHEMATIC: 2014076
A4 PROGRAMMER & MONITOR ASSY: 2014041-041 & -051 INTERCONN: 2016454 SCHEMATIC: 2014112
A5 AUX OUTLET ASSY 2014274-011
A23 RDC INTERFACE ASSY: 2014045-031 SCHEMATIC: 2016385
A7 BLOWER SCD: 1006897
A8 AC INPUT PANEL ASSY: 2014043-011 SCHEMATIC: 2014162
POWER DISTRIBUTION 2014490-011
W26 2014472-011
W27 2014471-011
W21 2014477-011
W22 2014476-011
W19 2014479-011
W13 2014155-011
W14 2014141-011
W12 2014481-011
A19
TB1 1 2 3 4 5 6 7 8
TB2 1 2 3 4 5 6 7 8
TB3 1 2 3 4 5 6 7 8
TB4 1 2 3 4 5 6 7 8
TB5 1 2 3 4 5 6 7 8
DC POWER DISTRIBUTION 2014182-011
TERMINAL BOARD ASSY: 2016346
A17 CONNECTOR INTERFACE ASSY 2014047-011
PART OF A18 INTERCONNECTION ASSY 2014046-031
AG AA AB AD AE AF AK AL AM AN AP AR DE DF DG DH DJ DL DM DN DP DR ED EE EF EG EH
AJ DK
PART OF A18 CONNECTOR PLATE ASSY 2014046-031
GN GA
EJ EK EL EM EN EP ER FK FR GP
W17 2014480-011
W23 2014473-011
P&M
W24 2014474-011
PART OF A20 CONNECTOR PLATE ASSY: 1020352
W243 2014461-011
W244 2014461-021
W245 2014461-031
W246 2014461-041
W247 2014461-051
W240 2014461-131
W248 2014461-101
W249 2014461-071
W250 2014461-081
W251 2014461-091
W25 2014478-011
W20 2014478-011
PART OF A20 CONNECTOR PLATE ASSY: 1020352
W252 2014461-111
W253 2014461-181
A10
W1 2014135-011
A1 SCD: 1006484
TAPE READER ASSY: 2014098-011
W2-2014140-011
A9 POWER CONTROL ASSY: 2014044-021 SCHEMATIC: 2016425
A11 FREQUENCY COUNTER ASSY: 2014233-011
CLOCK DC AC STOP
A12 OSCILLOSCOPE ASSY: 2014232-011
A21 3 2 1 TB1
A13 X-Y INTERFACE ASSY: 2014040-021 SCHEMATIC: 2016396
A14 SELF TEST ASSY ASSY: 2014366-031 & -041 SCHEMATIC: 2014157
A22 POWER SUPPLY ASSY ASSY: 2014235-011
A1 TB1 1 2 4 5 6 10
A2 TB1 1 2 3 5 6
A3 TB1 1 2 4 5 6 11
A16 POWER SUPPLY 3V ASSY: 2014234-011
TB1 1 2 3 4 5 6 7
E1
W18 2014154-011
W15 2014153-011
CABLE ASSY GRD 2014457-011
BUS BAR W1



CABINET
E1
W255 STRAP GRD 2014115-021
TO FACILITY GRD

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

GRD CABLE CHART	
REF DES	PART NO.
A1	2014458-121
A2	-171
A3	-171
A4	-151
A8	-091
A9	-191
A10	-111
A13	-171
A14	-171
A17	-061
A23	2014458-171

REFERENCES:
1. MECH ASSY 2014042-051& -061
2. AC & DC POWER DISTRIBUTION INTERCONNECTING DIAGRAM 2016443

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-1000

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON MASS.
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APPROVAL
APPROVAL
NASA APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION DIAGRAM
COMPUTER TEST SET

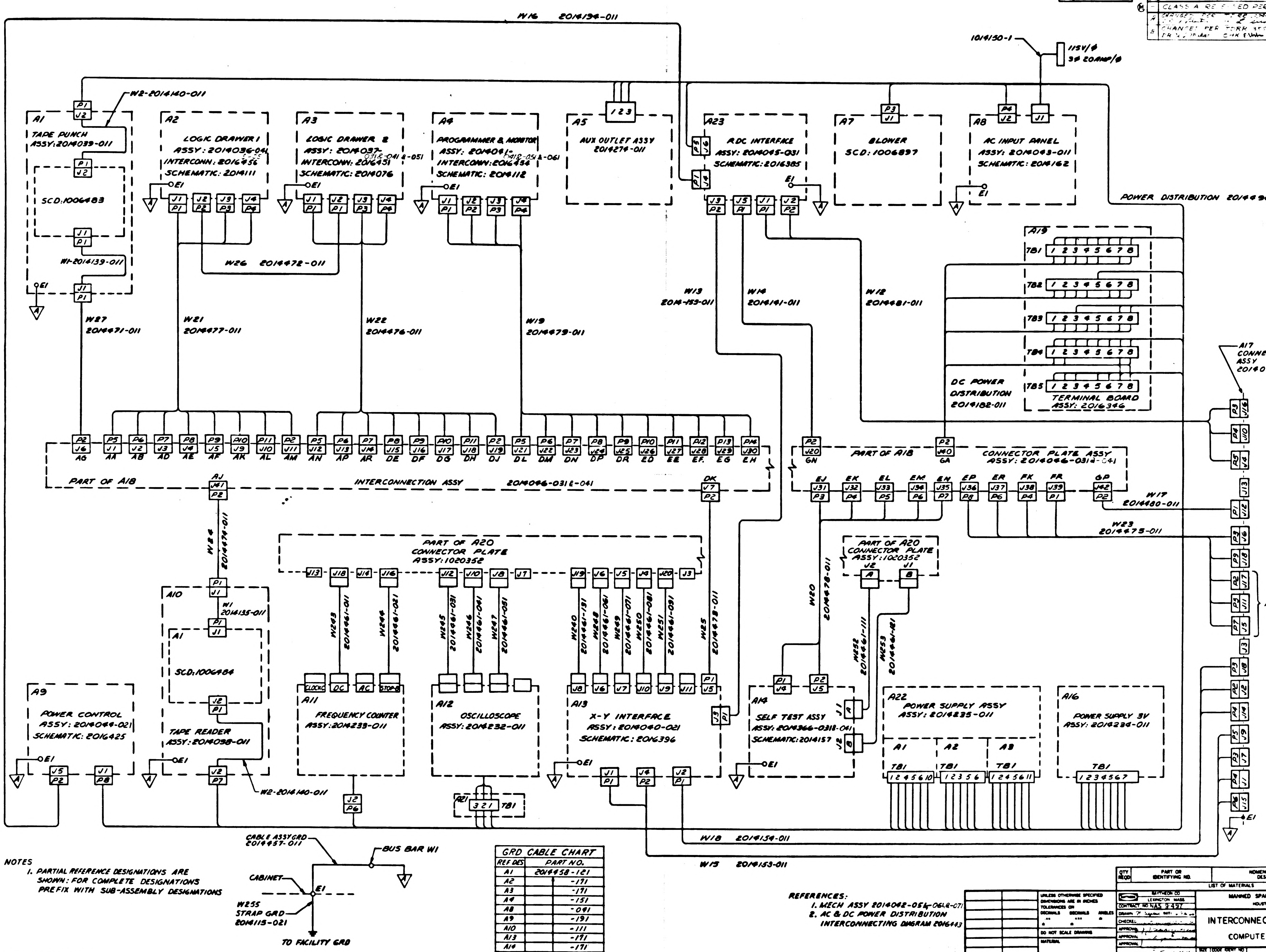
SIZE J
CODE IDENT NO 49956
NASA DRAWING NO 2016455
SCALE NONE
WT
SHEET 1 OF 1

2016455 ⌐

2016455

2016455 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TORR		
A	CHANGED PER TORR [illegible]		
B	CHANGED PER TORR 35528 DR [illegible] CHK [illegible]		



W16 2014134-011
W2-2014140-011
A1
TAPE PUNCH
ASSY:2014039-011
P1 J2
SCD:1006483
J1 P1
W1-2014139-011
E1
A2
LOGIC DRAWER 1
ASSY: 2014036-041 &-05
INTERCONN: 2016456
SCHEMATIC: 2014111
A3
LOGIC DRAWER 2
ASSY: 2014037-031&-041&-051
INTERCONN: 2016451
SCHEMATIC: 2014076
A4
PROGRAMMER & MONITOR
ASSY: 2014041-041&-051&-061
INTERCONN: 2016454
SCHEMATIC: 2014112
A5
AUX OUTLET ASSY
2014274-011
1 2 3
A23
ADC INTERFACE
ASSY: 2014045-031
SCHEMATIC: 2016385
A7
BLOWER
SCD: 1006897
A8
AC INPUT PANEL
ASSY: 2014043-011
SCHEMATIC: 2014162
1014150-1
115V/ϕ
3ϕ 20AMP/ϕ
POWER DISTRIBUTION 2014490-011
W26 2014472-011
W27 2014471-011
W21 2014477-011
W22 2014476-011
W19 2014479-011
W13 2014-153-011
W14 2014141-011
W12 2014481-011
A19
TB1 1 2 3 4 5 6 7 8
TB2 1 2 3 4 5 6 7 8
TB3 1 2 3 4 5 6 7 8
TB4 1 2 3 4 5 6 7 8
TB5 1 2 3 4 5 6 7 8
TERMINAL BOARD ASSY: 2016346
DC POWER DISTRIBUTION 2014182-011
A17 CONNECTOR INTERFACE ASSY 2014097-011
AG AA AB AD AE AF AK AL AM AN AP AR DE DF DG DH DJ DL DM DN DP DR ED EE EF. EG EH
PART OF A18
INTERCONNECTION ASSY 2014096-031&-041
AJ J41 P2
DK J7 P2
GN J20 P2
GA J40 P2
PART OF A18
CONNECTOR PLATE ASSY ASSY: 2014096-031&-041
EJ EK EL EM EN EP ER FK FR GP
W17 2014480-011
W23 2014475-011
P&M
W24 2014474-011
PART OF A20 CONNECTOR PLATE ASSY:1020352
J13 J18 J14 J16 J12 J10 J8 J7 J19 J6 J5 J4 J20 J3
W243 2014461-011
W244 2014461-021
W245 2014461-031
W246 2014461-041
W247 2014461-051
W240 2014461-131
W248 2014461-061
W249 2014461-071
W250 2014461-081
W251 2014461-091
W25 2014478-011
W20 2014478-011
PART OF A20 CONNECTOR PLATE ASSY:1020352
J2 A J1 B
W252 2014461-111
W253 2014461-121
A10
W1 2014135-011
A1
SCD:1006484
TAPE READER
ASSY:2014038-011
W2-2014140-011
A9
POWER CONTROL
ASSY: 2014044-021
SCHEMATIC: 2016425
A11
FREQUENCY COUNTER
ASSY:2014233-011
CLOCKS DC AC STOP
J2 P6
A12
OSCILLOSCOPE
ASSY: 2014232-011
A21 3 2 1 TB1
A13
X-Y INTERFACE
ASSY: 2014040-021
SCHEMATIC: 2016396
A14
SELF TEST ASSY
ASSY: 2014366-031&-041
SCHEMATIC: 2014157
A22
POWER SUPPLY ASSY
ASSY: 2014235-011
A1 A2 A3
TB1 1 2 4 5 6 10
TB1 1 2 3 5 6
TB1 1 2 4 5 6 11
A16
POWER SUPPLY 3V
ASSY: 2014234-011
TB1 1 2 3 4 5 6 7
W18 2014154-011
W15 2014153-011
CABLE ASSY GRD 2014457-011
BUS BAR W1
CABINET
E1
W255 STRAP GRD 2014115-021
TO FACILITY GRD

NOTES

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

GRD CABLE CHART	
REF DES	PART NO.
A1	2014458-121
A2	-171
A3	-171
A4	-151
A8	-091
A9	-191
A10	-111
A13	-171
A14	-171
A17	-061
A23	2014458-171

REFERENCES:
1. MECH ASSY 2014042-051-061&-071
2. AC & DC POWER DISTRIBUTION INTERCONNECTING DIAGRAM 2016443

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-1000

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
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NASA APPROVAL
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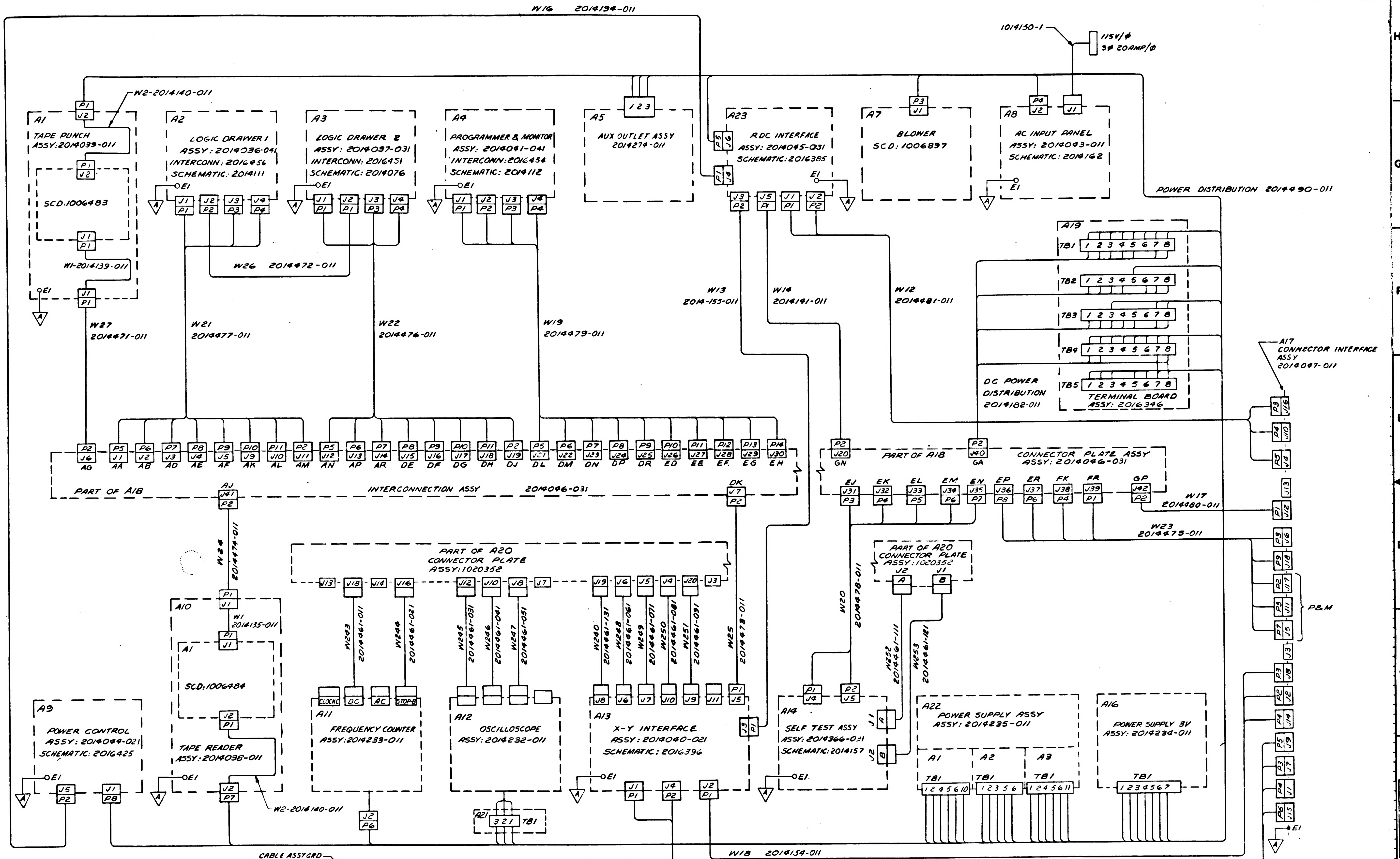
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION DIAGRAM
COMPUTER TEST SET

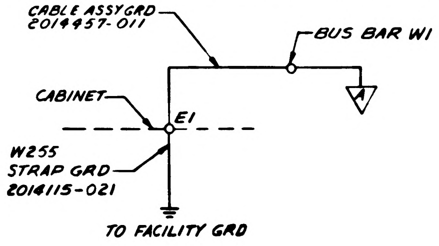
SIZE J | CODE IDENT NO 49956 | NASA DRAWING NO 2016455
SCALE NONE | WT | SHEET 1 OF 1

2016455 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
	RELEASED PER TORR		


W16 2014134-011
1014150-1
115V/φ
3φ 20AMP/φ
W2-2014140-011
A1
TAPE PUNCH
ASSY: 2014039-011
SCD: 1006483
W1-2014139-011
A2
LOGIC DRAWER 1
ASSY: 2014036-041
INTERCONN: 2016456
SCHEMATIC: 2014111
A3
LOGIC DRAWER 2
ASSY: 2014037-031
INTERCONN: 2016451
SCHEMATIC: 2014076
A4
PROGRAMMER & MONITOR
ASSY: 2014041-041
INTERCONN: 2016454
SCHEMATIC: 2014112
A5
AUX OUTLET ASSY
2014274-011
A23
RDC INTERFACE
ASSY: 2014045-031
SCHEMATIC: 2016385
A7
BLOWER
SCD: 1006897
A8
AC INPUT PANEL
ASSY: 2014043-011
SCHEMATIC: 2014162
POWER DISTRIBUTION 2014490-011
W26 2014472-011
W27 2014471-011
W21 2014477-011
W22 2014476-011
W19 2014479-011
W13 2014-155-011
W14 2014141-011
W12 2014481-011
A19
TB1 TB2 TB3 TB4 TB5
1 2 3 4 5 6 7 8
DC POWER DISTRIBUTION 2014182-011
TERMINAL BOARD ASSY: 2016346
A17 CONNECTOR INTERFACE ASSY 2014047-011
PART OF A18
INTERCONNECTION ASSY 2014046-031
AG AA AB AD AE AF AK AL AM AN AP AR DE DF DG DH DJ DL DM DN DP DR ED EE EF EG EH
AJ DK
PART OF A18
CONNECTOR PLATE ASSY 2014046-031
GN GA
EJ EK EL EM EN EP ER FK FR GP
W17 2014480-011
W23 2014475-011
P&M
W24 2014474-011
PART OF A20
CONNECTOR PLATE
ASSY: 1020352
PART OF A20
CONNECTOR PLATE
ASSY: 1020352
W20 2014478-011
W243 2014461-011
W244 2014461-021
W245 2014461-031
W246 2014461-041
W247 2014461-051
W240 2014461-131
W248 2014461-061
W249 2014461-071
W250 2014461-081
W251 2014461-091
W25 2014478-011
W252 2014461-111
W253 2014461-121
A10
W1 2014135-011
A1
SCD: 1006484
TAPE READER
ASSY: 2014038-011
W2-2014140-011
A9
POWER CONTROL
ASSY: 2014044-021
SCHEMATIC: 2016425
A11
FREQUENCY COUNTER
ASSY: 2014233-011
CLOCK DC AC STOP
A12
OSCILLOSCOPE
ASSY: 2014232-011
A21 TB1 3 2 1
A13
X-Y INTERFACE
ASSY: 2014040-021
SCHEMATIC: 2016396
A14
SELF TEST ASSY
ASSY: 2014366-051
SCHEMATIC: 2014157
A22
POWER SUPPLY ASSY
ASSY: 2014235-011
A1 A2 A3
TB1 1 2 4 5 6 10
TB1 1 2 3 5 6
TB1 1 2 4 5 6 11
A16
POWER SUPPLY 3V
ASSY: 2014234-011
TB1 1 2 3 4 5 6 7
W18 2014154-011
W15 2014153-011
E1
A

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS


CABLE ASSY GRD 2014457-011
BUS BAR W1
CABINET
E1
W255 STRAP GRD 2014115-021
TO FACILITY GRD
A

GRD CABLE CHART	
REF DES	PART NO.
A1	2014458-121
A2	-171
A3	-171
A4	-151
A8	-091
A9	-191
A10	-111
A13	-171
A14	-171
A17	-061
A23	2014458-171

REFERENCES:
1. MECH ASSY 2014042-051
2. AC & DC POWER DISTRIBUTION INTERCONNECTING DIAGRAM 2016443

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON MASS.
CONTRACT NO NAS 9-497
DRAWN
CHECK
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

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INTERCONNECTION DIAGRAM
COMPUTER TEST SET

SIZE J | CODE IDENT NO 49956 | NASA DRAWING NO 2016455
SCALE NONE | WT | SHEET 1 OF 1

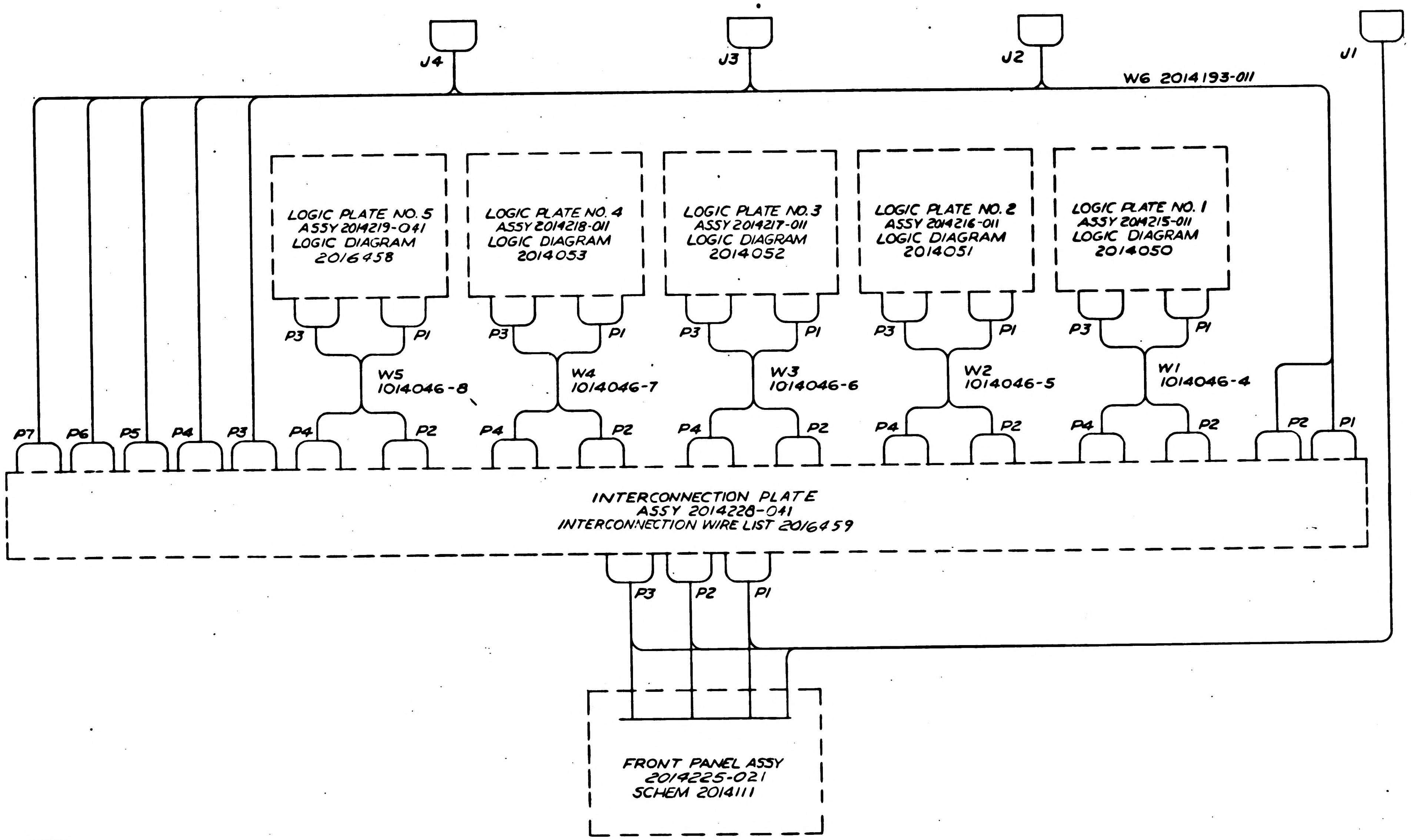
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-1000

2016455

2016455

1/2016455

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR		


J4
J3
J2
J1
W6 2014193-011
LOGIC PLATE NO. 5
ASSY 2014219-041
LOGIC DIAGRAM
2016458
LOGIC PLATE NO. 4
ASSY 2014218-011
LOGIC DIAGRAM
2014053
LOGIC PLATE NO. 3
ASSY 2014217-011
LOGIC DIAGRAM
2014052
LOGIC PLATE NO. 2
ASSY 2014216-011
LOGIC DIAGRAM
2014051
LOGIC PLATE NO. 1
ASSY 2014215-011
LOGIC DIAGRAM
2014050
P3
P1
W5
1014046-8
W4
1014046-7
W3
1014046-6
W2
1014046-5
W1
1014046-4
P7
P6
P5
P4
P3
P4
P2
P1
INTERCONNECTION PLATE
ASSY 2014228-041
INTERCONNECTION WIRE LIST 2016459
P3
P2
P1
FRONT PANEL ASSY
2014225-021
SCHEM 2014111

NOTE
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE
1. MAIN ASSY 2014036-041

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION DIAGRAM
LOGIC DRAWER NO.1
COMPUTER TEST SET

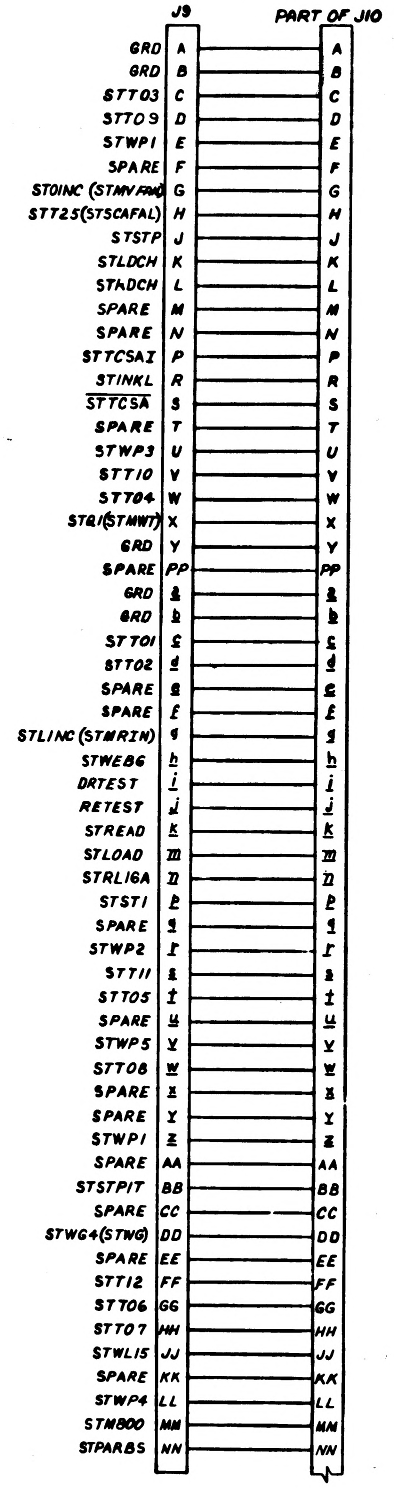
CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	D	2016456

SCALE NONE WT SHEET 1 OF 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-1000

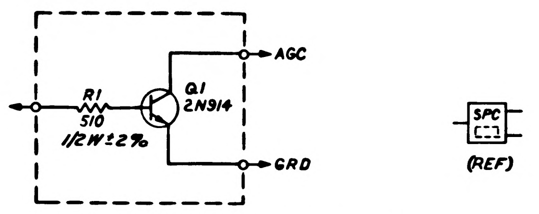
2016456

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 32635		

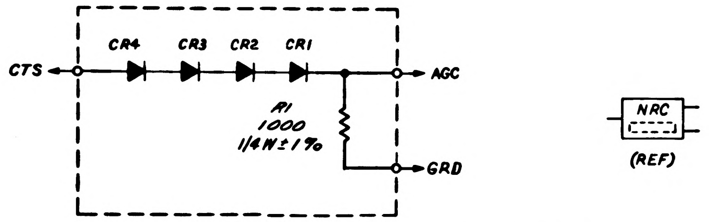

J9
PART OF J10
GRD A A
GRD B B
STT03 C C
STT09 D D
STWP1 E E
SPARE F F
STOINC (STMVFAIL) G G
STT25(STSCAFAL) H H
STSTP J J
STLDCH K K
STADCH L L
SPARE M M
SPARE N N
STTCSAI P P
STINKL R R
STTCSA S S
SPARE T T
STWP3 U U
STT10 V V
STT04 W W
STQ1(STMWT) X X
GRD Y Y
SPARE PP PP
GRD a a
GRD b b
STT01 c c
STT02 d d
SPARE e e
SPARE f f
STLINC (STMRIN) g g
STWEBG h h
DRTEST i i
RETEST j j
STREAD k k
STLOAD m m
STRL16A n n
STST1 p p
SPARE q q
STWP2 r r
STT11 s s
STT05 t t
SPARE u u
STWP5 v v
STT08 w w
SPARE x x
SPARE y y
STWP1 z z
SPARE AA AA
STSTPIT BB BB
SPARE CC CC
STWG4(STWG) DD DD
SPARE EE EE
STT12 FF FF
STT06 GG GG
STT07 HH HH
STWL15 JJ JJ
SPARE KK KK
STWP4 LL LL
STM800 MM MM
STPARBS NN NN

FOR REFERENCE ONLY

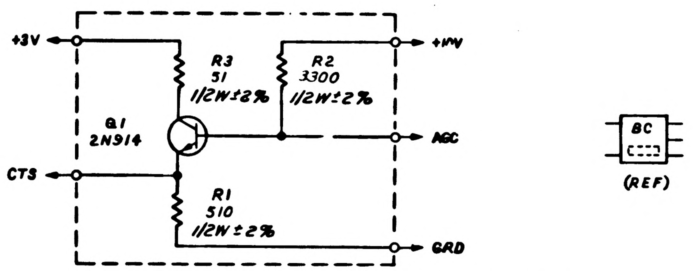
REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
A3C1 THRU A3C8	1006755-36	CAP.	47uf	±15%	20V
A3C9 THRU A3C12 A4C2 THRU A4C4	CS13AF010K	CAP.	1.0 uf	±10%	35V
CR1 THRU CR4	1006751	DIODE			
J1	MS3120E-24-61-SX	CONN			
J2	MS3120E-24-61-SZ				
J3	MS3120E-24-61-SY				
J4	MS3120E-24-61-SX				
J5	MS3120E-24-61-SZ				
J6	MS3120E-24-61-SY				
J7 J8	MS35179-1094A				
J9 J10	MS3120E-24-61SW	CONN			
Q1	1006752	TRANS			
R1 (BC & SPC)	1006760-25	RES	510	±2%	½W
R1 (NRC)	1006750-32		1000	±1%	¼W
R2 (BC)	1006760-44		3300	±2%	½W
R3 (BC)	1006760-1	RES	51	±2%	½W
S1	MS35059-23	SWITCH			
S2	MS35059-23	SWITCH			
TB1	1006678-3	TERM. BD			
TB2	1006678-4	TERM. BD			
A5R1	1006760-25	RES	510	±2%	½W


AGC
R1
510
1/2W±2%
Q1
2N914
GRD
SPC
(REF)

SPECIAL CIRCUIT


CR4
CR3
CR2
CR1
CTS
AGC
R1
1000
1/4W±1%
GRD
NRC
(REF)

NOISE REJECTION CIRCUIT


+3V
+HV
R3
51
1/2W±2%
R2
3300
1/2W±2%
Q1
2N914
AGC
CTS
R1
510
1/2W±2%
GRD
BC
(REF)

BUFFER CIRCUIT

NOTES
1. UNLESS OTHERWISE SPECIFIED ALL RESISTOR VALUES ARE EXPRESSED IN OHMS
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS.

REFERENCE:

1. ASSEMBLY DWG		2014254
2. HARNESS	A	2014126
3. HARNESS	B	2014127
4. HARNESS	C	2014128
5. HARNESS	D	2014129
6. HARNESS	E	2014130
7. HARNESS	F	2014131
8. HARNESS	G	2014197

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES
.XX .XXX
± ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 10 DEC 66
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APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRICAL SCHEMATIC
BUFFER CIRCUIT

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016464
SCALE NONE
WT
SHEET 1 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

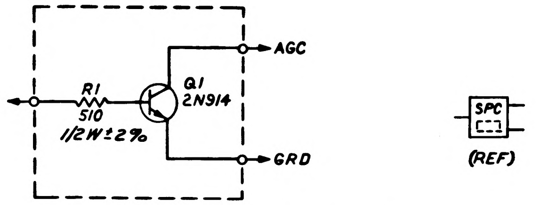
2016464 -

REVISIONS SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 32635	12 JAN 67	

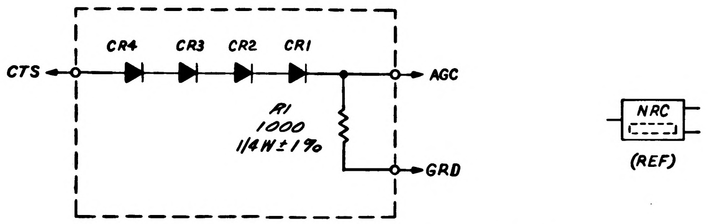
	J9	PART OF J10
GRD	A	A
GRD	B	B
STT03	C	C
STT09	D	D
STWP1	E	E
SPARE	F	F
ST0INC (STMVFAIL)	G	G
STT25(STSCAFAL)	H	H
STSTP	J	J
STLDCH	K	K
STRDCH	L	L
SPARE	M	M
SPARE	N	N
STTCSA1	P	P
STINKL	R	R
$\overline{\text{STTCSA}}$	S	S
SPARE	T	T
STWP3	U	U
STT10	V	V
STT04	W	W
STQ1(STMWT)	X	X
GRD	Y	Y
SPARE	PP	PP
GRD	a	a
GRD	b	b
STT01	c	c
STT02	d	d
SPARE	e	e
SPARE	f	f
STLINC (STMRIN)	g	g
STWEBG	h	h
DRTEST	i	i
RETEST	j	j
STREAD	k	k
STLOAD	m	m
STRL16A	n	n
STST1	p	p
SPARE	q	q
STWP2	r	r
STT11	s	s
STT05	t	t
SPARE	u	u
STWP5	v	v
STT08	w	w
SPARE	x	x
SPARE	y	y
STWP1	z	z
SPARE	AA	AA
STSTPIT	BB	BB
SPARE	CC	CC
STWG4(STWG)	DD	DD
SPARE	EE	EE
STT12	FF	FF
STT06	GG	GG
STT07	HH	HH
STWL15	JJ	JJ
SPARE	KK	KK
STWP4	LL	LL
STM800	MM	MM
STPARBS	NN	NN

FOR REFERENCE ONLY

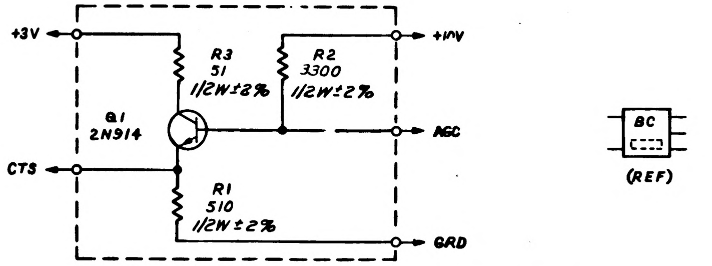
REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
A3C1 THRU A3C8	1006755-36	CAP.	47uf	±15%	20V
A3C9 THRU A3C12 A4C2 THRU A4C4	CS13AF010K	CAP.	1.0 uf	±10%	35V
CR1 THRU CR4	1006751	DIODE			
J1	MS3120E-24-61-SX	CONN			
J2	MS3120E-24-61-SZ	↕			
J3	MS3120E-24-61-SY				
J4	MS3120E-24-61-SX				
J5	MS3120E-24-61-SZ				
J6	MS3120E-24-61-SY				
J7 J8	MS35179-1094A				
J9 J10	MS3120E-24-61SW	CONN			
Q1	1006752	TRANS			
R1 (BC & SPC)	1006760-25	RES	510	±2%	½W
R1 (NRC)	1006750-32	↕	1000	±1%	¼W
R2 (BC)	1006760-44		3300	±2%	½W
R3 (BC)	1006760-1	RES	51	±2%	½W
S1	MS35059-23	SWITCH			
S2	MS35059-23	SWITCH			
TB1	1006678-3	TERM. BD			
TB2	1006678-4	TERM. BD			
A5R1	1006760-25	RES	510	±2%	½W



SPECIAL CIRCUIT



NOISE REJECTION CIRCUIT



BUFFER CIRCUIT

NOTES
1. UNLESS OTHERWISE SPECIFIED ALL RESISTOR VALUES ARE EXPRESSED IN OHMS
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS.

REFERENCE:

1. ASSEMBLY	DWG	2014254
2. HARNESS	A	2014126
3. HARNESS	B	2014127
4. HARNESS	C	2014128
5. HARNESS	D	2014129
6. HARNESS	E	2014130
7. HARNESS	F	2014131
8. HARNESS	G	2014197

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 16DEC66
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 12-27-66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRICAL SCHEMATIC
BUFFER CIRCUIT

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016464
SCALE NONE
WT
SHEET 1 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 32635	12 JAN 67	

	J9	PART OF J10
GRD	A	A
GRD	B	B
STT03	C	C
STT09	D	D
STWP1	E	E
SPARE	F	F
STOINC (STMVFAIL)	G	G
STT25(STSCAFAL)	H	H
STSTP	J	J
STLDCH	K	K
STRDCH	L	L
SPARE	M	M
SPARE	N	N
STTCSAI	P	P
STINKL	R	R
$\overline{\text{STTCSA}}$	S	S
SPARE	T	T
STWP3	U	U
STT10	V	V
STT04	W	W
STQI(STMWT)	X	X
GRD	Y	Y
SPARE	PP	PP
GRD	a	a
GRD	b	b
STT01	c	c
STT02	d	d
SPARE	e	e
SPARE	f	f
STLINC (STMRIN)	g	g
STWEBG	h	h
DRTEST	i	i
RETEST	j	j
STREAD	k	k
STLOAD	m	m
STRL16A	n	n
STST1	p	p
SPARE	q	q
STWP2	r	r
STT11	s	s
STT05	t	t
SPARE	u	u
STWP5	v	v
STT08	w	w
SPARE	x	x
SPARE	y	y
STWP1	z	z
SPARE	AA	AA
STSTPIT	BB	BB
SPARE	CC	CC
STWG4(STWG)	DD	DD
SPARE	EE	EE
STT12	FF	FF
STT06	GG	GG
STT07	HH	HH
STWL15	JJ	JJ
SPARE	KK	KK
STWP4	LL	LL
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STPARBS	NN	NN

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J4	MS3120E-24-61-SX				
J5	MS3120E-24-61-SZ				
J6	MS3120E-24-61-SY				
J7 J8	MS35179-1094A				
J9 J10	MS3120E-24-61SW	CONN			
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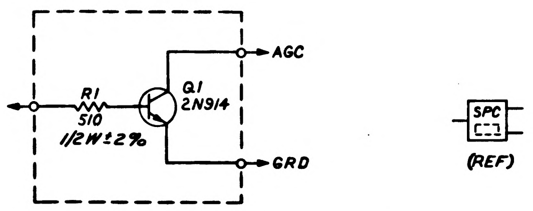
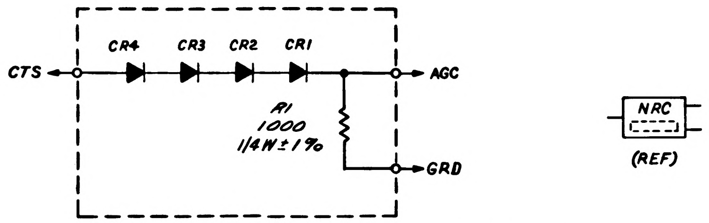
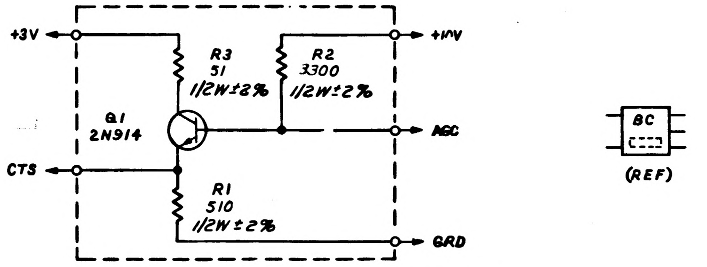
S2	MS35059-23	SWITCH			
TB1	1006678-3	TERM. BD			
TB2	1006678-4	TERM. BD			
A5R1	1006760-25	RES	510	±2%	½ W



SPECIAL CIRCUIT



NOISE REJECTION CIRCUIT



BUFFER CIRCUIT

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LIST OF MATERIALS

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DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 16 DEC 66
CHECKED
APPROVAL 20 DEC 66
APPROVAL
APPROVAL 12/20/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 12-27-66

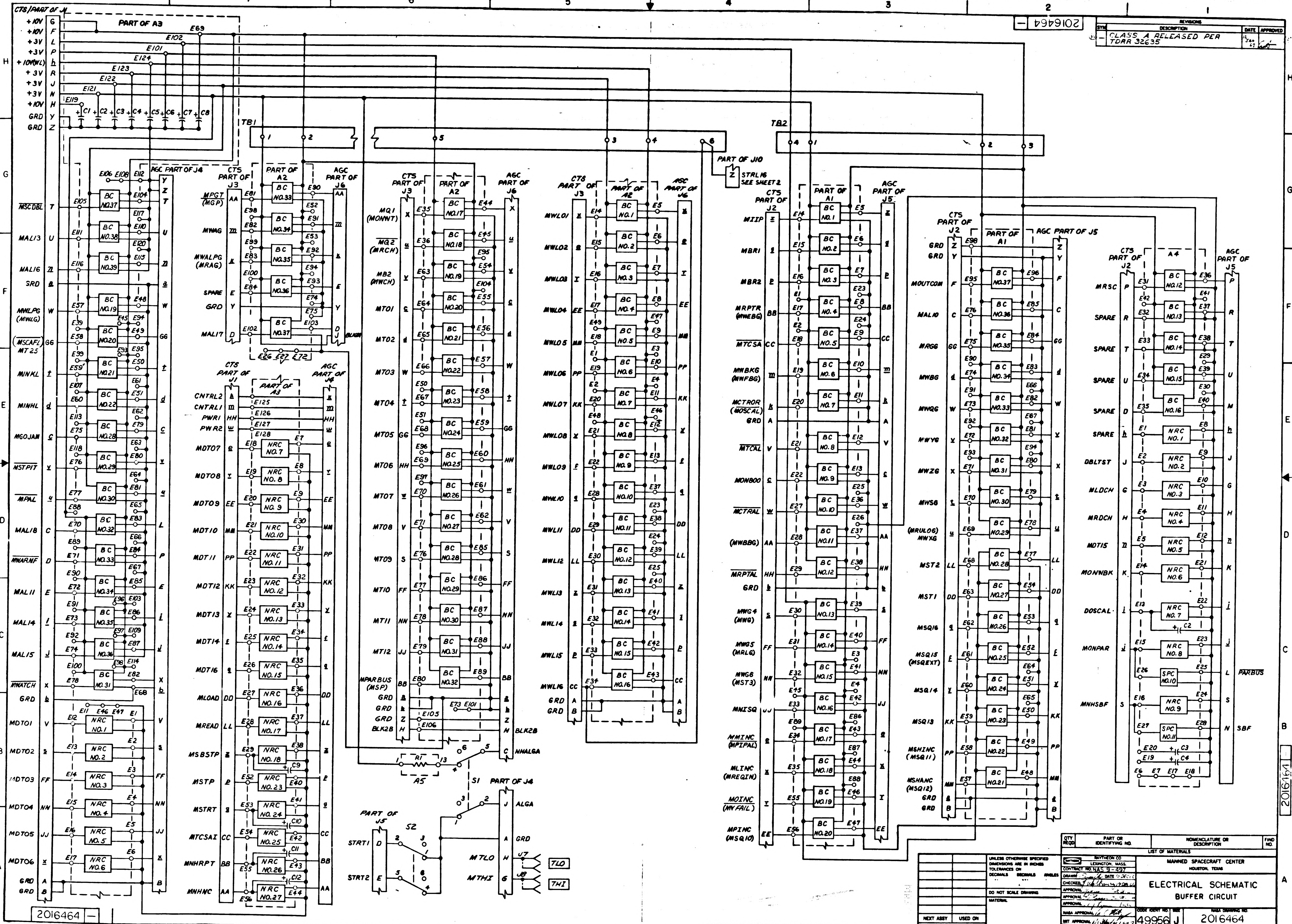
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRICAL SCHEMATIC
BUFFER CIRCUIT

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016464
SCALE NONE
WT
SHEET 1 OF 2

INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 32635	12 JAN 67	



CTS/PART OF J4
PART OF A3
+10V G
+10V F
+3V L
+3V P
+10V(WL) h
+3V R
+3V J
+3V N
+10V H
GRD Y
GRD Z
C1 C2 C3 C4 C5 C6 C7 C8
E119 E121 E122 E123 E124 E101 E102 E69
TB1
TB2
AGC PART OF J4
BC NO.37
BC NO.38
BC NO.39
BC NO.19
BC NO.20
BC NO.21
BC NO.22
BC NO.28
BC NO.29
BC NO.30
BC NO.32
BC NO.33
BC NO.34
BC NO.35
BC NO.36
BC NO.31
MSCDBL
MAL13
MAL16
GRD
MWLPG (MWLG)
(MSCAFL) MT25
MINKL
MINHL
MGOJAM
MSTPIT
MPAL
MAL18
MWARNF
MAL11
MAL14
MAL15
MWATCH
GRD
MDTO1
MDTO2
MDTO3
MDTO4
MDTO5
MDTO6
GRD
GRD
NRC NO.1
NRC NO.2
NRC NO.3
NRC NO.4
NRC NO.5
NRC NO.6
CTS PART OF J3
PART OF A2
AGC PART OF J6
MPGT (MGP)
MWAG
MWALPG (MRAG)
SPARE
GRD
MAL17
BUGH
E26 E27 E72
CTS PART OF J1
PART OF A3
AGC PART OF J4
CNTRL2
CNTRL1
PWR1
PWR2
MDTO7
MDTO8
MDTO9
MDTO10
MDT11
MDT12
MDT13
MDT14
MDT16
MLOAD
MREAD
MSBSTP
MSTP
MSTRT
MTCSAI
MNHRPT
MNHNC
NRC NO.7
NRC NO.8
NRC NO.9
NRC NO.10
NRC NO.11
NRC NO.12
NRC NO.13
NRC NO.14
NRC NO.15
NRC NO.16
NRC NO.17
NRC NO.18
NRC NO.23
NRC NO.24
NRC NO.25
NRC NO.26
NRC NO.27
C9 C10 C11 C12
CTS PART OF J3
PART OF A2
AGC PART OF J6
MQ1 (MONWT)
MQ2 (MRCH)
MB2 (MWCH)
MT01
MT02
MT03
MT04
MT05
MT06
MT07
MT08
MT09
MT10
MT11
MT12
MPARBUS (MSP)
GRD
GRD
GRD
BLK2B
BLK2B
NHALGA
BC NO.17
BC NO.18
BC NO.19
BC NO.20
BC NO.21
BC NO.22
BC NO.23
BC NO.24
BC NO.25
BC NO.26
BC NO.27
BC NO.28
BC NO.29
BC NO.30
BC NO.31
BC NO.32
E105 E106 E73 E101
R1
A5
S1
PART OF J4
ALGA
GRD
MTLO
MTHI
U7
U8
TLO
THI
PART OF J5
S2
STRT1
STRT2
CTS PART OF J3
PART OF A2
AGC PART OF J6
MWL01
MWL02
MWL03
MWL04
MWL05
MWL06
MWL07
MWL08
MWL09
MWL10
MWL11
MWL12
MWL13
MWL14
MWL15
MWL16
GRD
GRD
BC NO.1
BC NO.2
BC NO.3
BC NO.4
BC NO.5
BC NO.6
BC NO.7
BC NO.8
BC NO.9
BC NO.10
BC NO.11
BC NO.12
BC NO.13
BC NO.14
BC NO.15
BC NO.16
PART OF J10
STRL16 SEE SHEET 2
CTS PART OF J2
PART OF A1
AGC PART OF J5
M11P
MBR1
MBR2
MRPTR (MWEBG)
MTCSA
MWBKG (MWFBG)
MCTROR (MOSCAL)
GRD
MTCAL
MON800
MCTRAL
(MWBBG)
MRPTAL
GRD
MWG4 (MWG)
MWG5 (MRLG)
MWG6 (MST3)
MNISQ
MMINC (MPIPAL)
MLINC (MREQIN)
MOINC (MWFAIL)
MPINC (MSQ10)
CTS PART OF J2
PART OF A1
AGC PART OF J5
GRD
GRD
MOUTCOM
MAL10
MRGG
MWBG
MWQG
MWYG
MWZG
MWSG
(MRUL06) MWXG
MST2
MST1
MSQ16
MSQ15 (MSQEXT)
MSQ14
MSQ13
MSHINC (MSQ11)
MSHANC (MSQ12)
GRD
GRD
CTS PART OF J2
A4
AGC PART OF J5
MRSC
SPARE
SPARE
SPARE
SPARE
SPARE
DBLTST
MLDCH
MRDCH
MOTIS
MONWBK
DOSCAL
MONPAR
MNHSBF
PARBUS
SBF
NRC NO.1
NRC NO.2
NRC NO.3
NRC NO.4
NRC NO.5
NRC NO.6
NRC NO.7
NRC NO.8
NRC NO.9
SPC NO.10
SPC NO.11
C2 C3 C4
E20 E19 E6 E7 E17 E18
2016464 —
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

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LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES
.. ... .

DO NOT SCALE DRAWING

MATERIAL

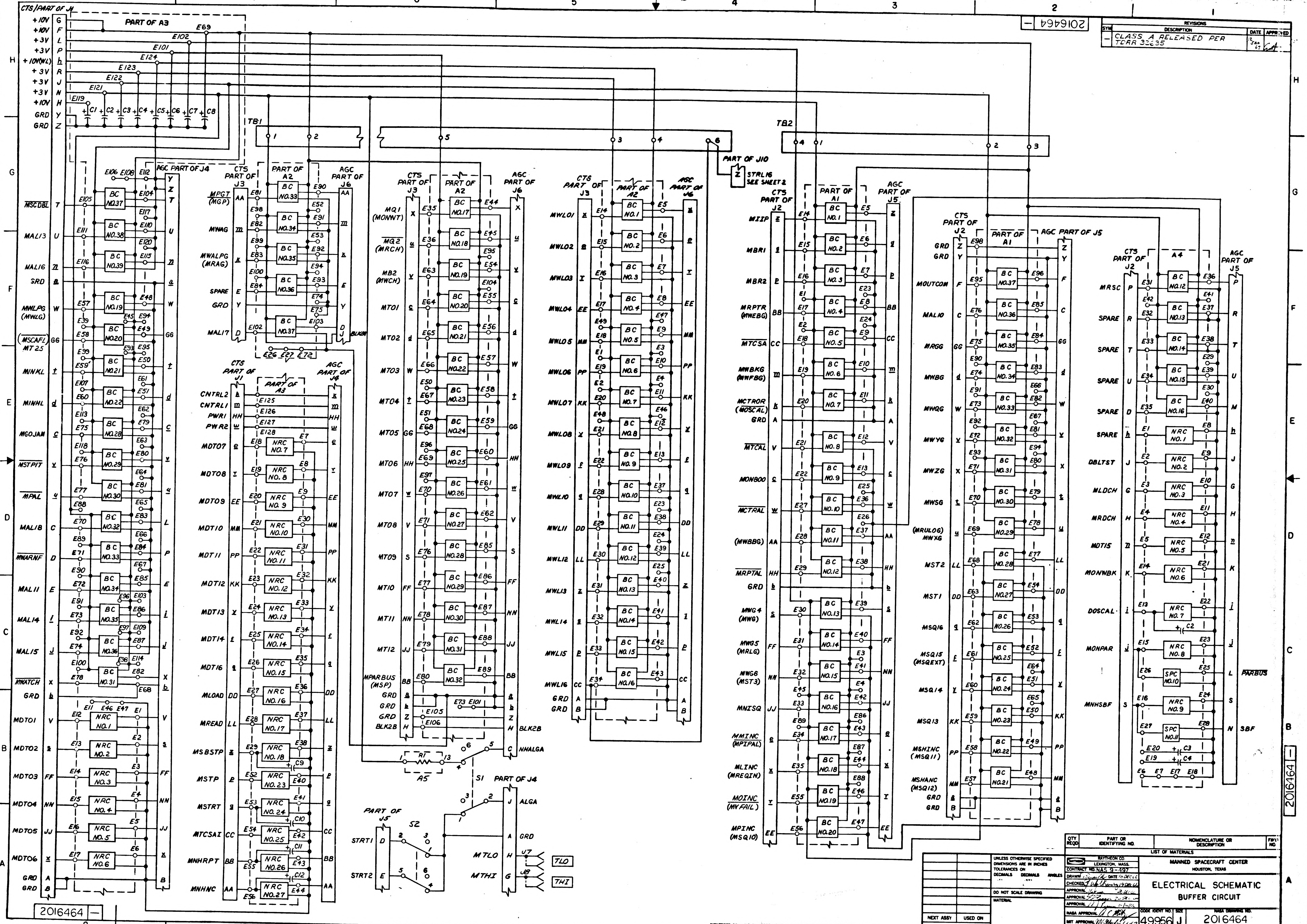
RAYTHEON CO
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 16 DEC 66
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRICAL SCHEMATIC
BUFFER CIRCUIT

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016464
SCALE NONE
WT
SHEET 2 OF 2

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 32635	12 JAN 67	Gott



CTS/PART OF J1
PART OF A3
+10V G
+10V F
+3V L
+3V P
+10V(WL) h
+3V R
+3V J
+3V N
+10V H
GRD Y
GRD Z
C1 C2 C3 C4 C5 C6 C7 C8
TB1
TB2
AGC PART OF J4
CTS PART OF J3
PART OF A2
AGC PART OF J6
CTS PART OF J2
PART OF A1
AGC PART OF J5
A4
PART OF J10
STRL16 SEE SHEET 2
MSCDBL
MAL13
MAL16
MWLPG (MWLG)
MSCAFL MT25
MINKL
MINHL
MGOJAM
MSTPIT
MPAL
MAL18
MWARNF
MAL11
MAL14
MAL15
MWATCH
MDT01
MDT02
MDT03
MDT04
MDT05
MDT06
MPGT (MGP)
MWAG
MWALPG (MRAG)
SPARE
MAL17
CNTRL2
CNTRL1
PWR1
PWR2
MDT07
MDT08
MDT09
MDT10
MDT11
MDT12
MDT13
MDT14
MDT16
MLOAD
MREAD
MSBSTP
MSTP
MSTRT
MTCSAI
MNHRPT
MNHNC
MQ1 (MONWT)
MQ2 (MRCH)
MB2 (MWCH)
MT01
MT02
MT03
MT04
MT05
MT06
MT07
MT08
MT09
MT10
MT11
MT12
MPARBUS (MSP)
BLK2B
NHALGA
MWL01
MWL02
MWL03
MWL04
MWL05
MWL06
MWL07
MWL08
MWL09
MWL10
MWL11
MWL12
MWL13
MWL14
MWL15
MWL16
MIIP
MBR1
MBR2
MRPTR (MWEBG)
MTCSA
MWBKG (MWFBG)
MCTROR (MOSCAL)
MTCAL
MON800
MCTRAL
(MWBBG)
MRPTAL
MWG4 (MWG)
MWG5 (MRLG)
MWG6 (MST3)
MNISQ
MMINC (MPIPAL)
MLINC (MREQIN)
MOINC (MVFAIL)
MPINC (MSQ10)
MOUTCOM
MAL10
MRGG
MWBG
MWQG
MWYG
MWZG
MWSG
(MRULOG) MWXG
MST2
MST1
MSQ16
MSQ15 (MSQEXT)
MSQ14
MSQ13
MSHINC (MSQ11)
MSHANC (MSQ12)
MRSC
DBLTST
MLDCH
MRDCH
MOT15
MONWBK
DOSCAL
MONPAR
MNHSBF
PARBUS
SBF
BC
NRC
SPC
R1
A5
S1
S2
PART OF J4
PART OF J5
STRT1
STRT2
ALGA
MTLO
MTHI
TLO
THI

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RAYTHEON CO.
LEXINGTON, MASS.
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DRAWN Smith DATE 10 DEC 66
CHECKED 19 DEC 66
APPROVAL 20 DEC 66
APPROVAL 20 DEC 66
APPROVAL 12/20/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 12-21-66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

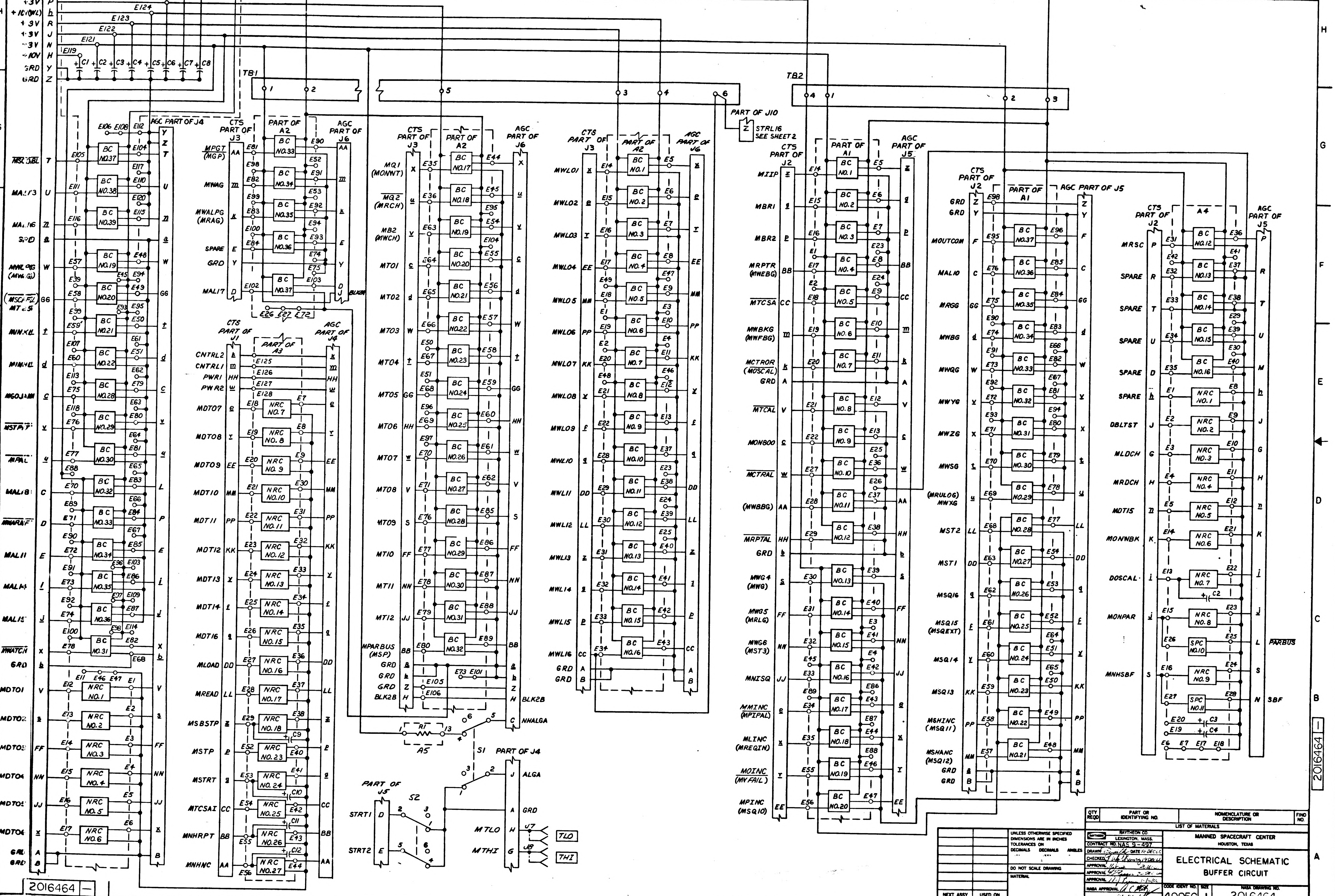
ELECTRICAL SCHEMATIC
BUFFER CIRCUIT

CODE IDENT NO. 49956 SIZE J NASA DRAWING NO. 2016464
SCALE NONE WT SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 32635	12 JAN 67	

2016464 —



CTS PART OF J4
+10V G
+10V F
+3V L
+3V P
+10(WL) h
+3V R
+3V J
-3V N
-10V H
GRD Y
GRD Z
PART OF A3
E69
E102
E101
E124
E123
E122
E121
E119
C1 C2 C3 C4 C5 C6 C7 C8
TB1
TB2
AGC PART OF J4
CTS PART OF J3
PART OF A2
AGC PART OF J6
CTS PART OF J1
PART OF A3
CTS PART OF J2
PART OF A1
AGC PART OF J5
A4
PART OF J10
STRL16 SEE SHEET 2
MSCSBL
MAL13
MAL16
SPD
MWLPG (MWLG)
MSCAFL MTAS
MNKH
MNNL
MGOJAM
MSTRT
MPAL
MAL18
MNRAF
MAL11
MAL14
MAL15
MNATCH
GRD
MDT01
MDT02
MDT03
MDT04
MDT05
MDT06
MPGT (MGP)
MWAG
MWALPG (MRAG)
SPARE
MAL17
CNTRL2
CNTRL1
PWR1
PWR2
MDT07
MDT08
MDT09
MDT10
MDT11
MDT12
MDT13
MDT14
MDT16
MLOAD
MREAD
MSBSTP
MSTP
MSTRT
MTCSAI
MNHRPT
MNHNC
MQ1 (MONNT)
MQ2 (MRCH)
MB2 (MWCH)
MT01
MT02
MT03
MT04
MT05
MT06
MT07
MT08
MT09
MT10
MT11
MT12
MPARBUS (MSP)
BLK28
BLK2B
NHALGA
R1
A5
S1
S2
PART OF J4
ALGA
PART OF J5
STRT1
STRT2
MTLO
MTHI
J7
J8
TLO
THI
MWL01
MWL02
MWL03
MWL04
MWL05
MWL06
MWL07
MWL08
MWL09
MWL10
MWL11
MWL12
MWL13
MWL14
MWL15
MWL16
M11P
MBR1
MBR2
MRPTR (MWEBG)
MTCSA
MWBKG (MWFBG)
MCTROR (MOSCAL)
MTCAL
MON800
MCTRAL
(MWBBG)
MRPTAL
MWG4 (MWG)
MWG5 (MRLG)
MWG6 (MST3)
MNISQ
MMINC (MPIPAL)
MLINC (MREQIN)
MOINC (MVFAIL)
MPINC (MSQ10)
MOUTCOM
MAL10
MRGG
MWBG
MWQG
MWYG
MWZG
MWSG
(MRULOG) MWXG
MST2
MST1
MSQ16
MSQ15 (MSQEXT)
MSQ14
MSQ13
MSHINC (MSQ11)
MSHANC (MSQ12)
MRSC
DBLTST
MLDCH
MRDCH
MDT15
MONWBK
DOSCAL
MONPAR
MNHSBF
PARBUS
SBF
BC
NRC
SPC

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN Smith DATE 10 DEC 66
CHECKED 19 DEC 66
APPROVAL 20 DEC 66
APPROVAL 20 DEC 66
APPROVAL 12/20/66
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL 12-21-66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRICAL SCHEMATIC
BUFFER CIRCUIT

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016464
SCALE NONE
WT
SHEET 2 OF 2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016464 —

2016464 —

2 / 2016464

2016465	—

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 32635	13 JAN 67	

NOISE REJECTION CIRCUIT
CIRCUIT SUFFIX NO.'S 1 THRU 9

REFERENCE DESIGNATION	
SYMBOL	FIND NO.
CR1-1 THRU CR4-9	8
R1-1 THRU R1-9	3

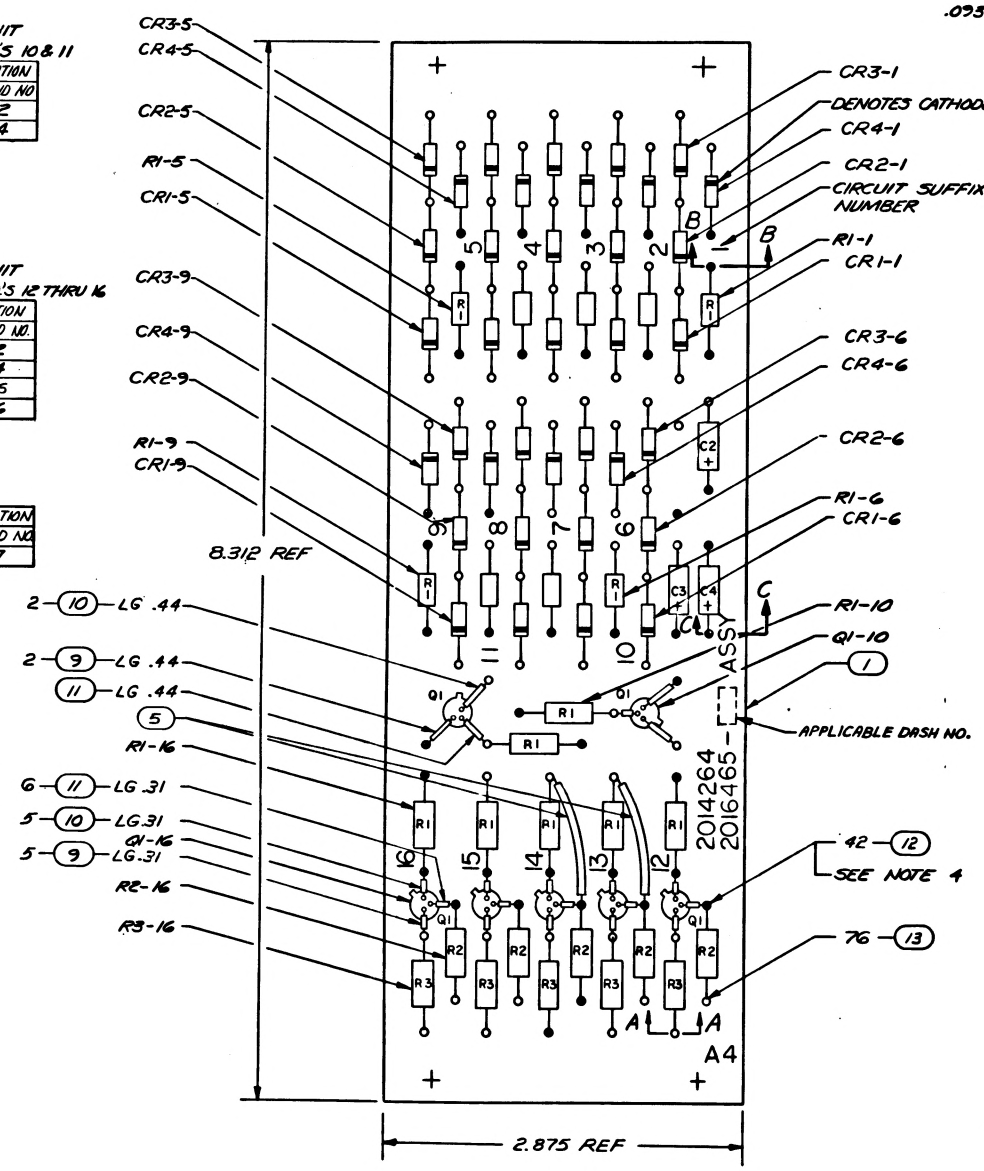
SPECIAL CIRCUIT
CIRCUIT SUFFIX NO.'S 10 & 11

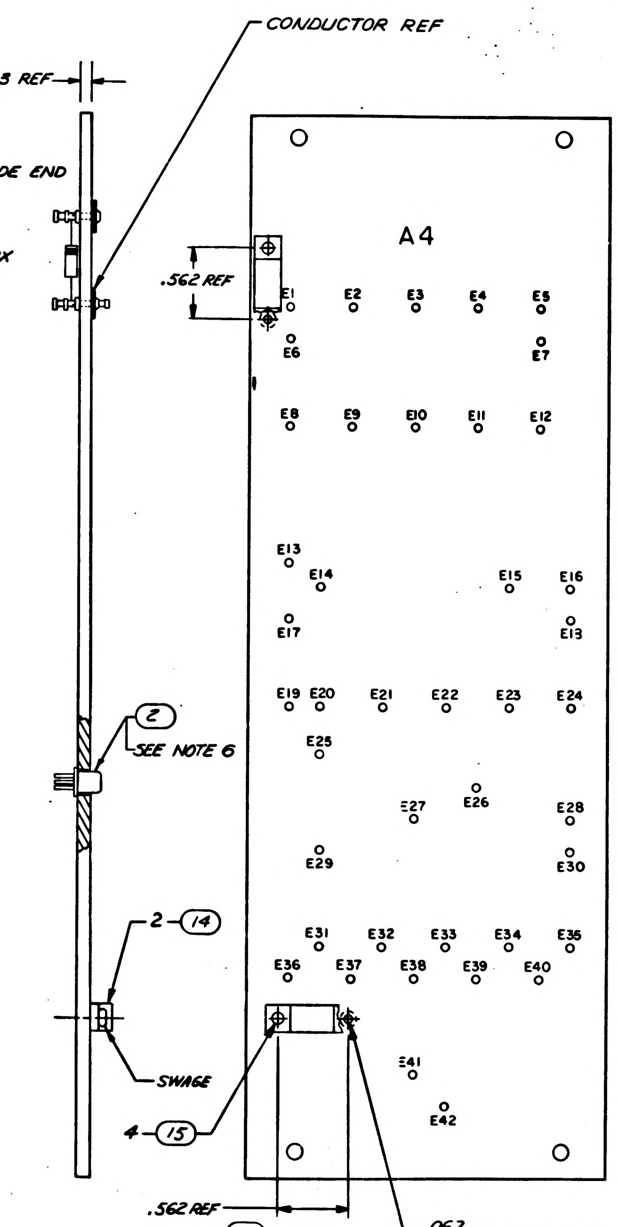
REFERENCE DESIGNATION	
SYMBOL	FIND NO
Q1-10 & Q1-11	2
R1-10 & R1-11	4

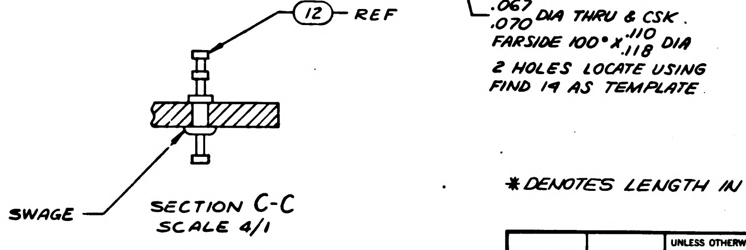
BUFFER CIRCUIT
CIRCUIT SUFFIX NO.'S 12 THRU 16

REFERENCE DESIGNATION	
SYMBOL	FIND NO.
Q1-12 THRU Q1-16	2
R1-12 THRU R1-16	4
R2-12 THRU R2-16	16
R3-12 THRU R3-16	6

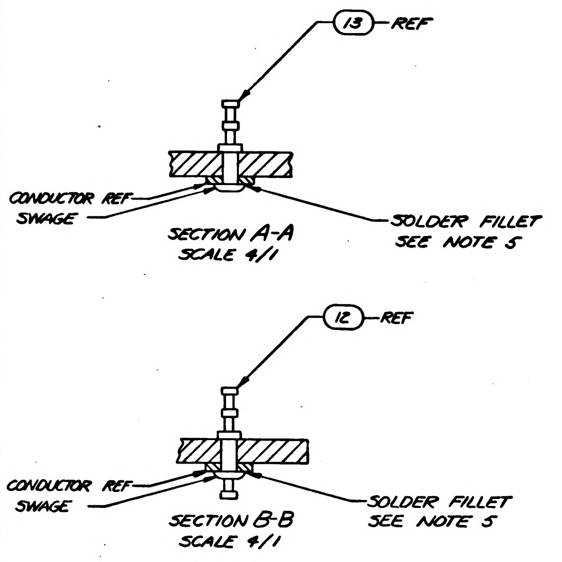
REFERENCE DESIGNATION	
SYMBOL	FIND NO
C2 THRU C4	7


CR3-5
CR4-5
CR2-5
R1-5
CR1-5
CR3-9
CR4-9
CR2-9
R1-9
CR1-9
8.312 REF
2-(10)-LG .44
2-(9)-LG .44
(11)-LG .44
(5)
R1-16
6-(11)-LG .31
5-(10)-LG .31
Q1-16
5-(9)-LG .31
R2-16
R3-16
CR3-1
DENOTES CATHODE END
CR4-1
CR2-1
CIRCUIT SUFFIX NUMBER
R1-1
CR1-1
CR3-6
CR4-6
CR2-6
R1-6
CR1-6
R1-10
Q1-10
(1)
APPLICABLE DASH NO.
42-(12)
SEE NOTE 4
76-(13)
B
C
A
A4
ASSY
2014264
2016465-
2.875 REF


.093 REF
CONDUCTOR REF
.562 REF
A4
E1
E2
E3
E4
E5
E6
E7
E8
E9
E10
E11
E12
E13
E14
E15
E16
E17
E13
E19
E20
E21
E22
E23
E24
E25
E26
E27
E28
E29
E30
E31
E32
E33
E34
E35
E36
E37
E38
E39
E40
E41
E42
(2)
SEE NOTE 6
2-(14)
SWAGE
4-(15)


.562 REF
(12)-REF
SWAGE
SECTION C-C
SCALE 4/1

.067
.070 DIA THRU & CSK.
FARSIDE 100° X .110 .118 DIA
2 HOLES LOCATE USING FIND 14 AS TEMPLATE


(13)-REF
CONDUCTOR REF
SWAGE
SECTION A-A
SCALE 4/1
SOLDER FILLET
SEE NOTE 5
(12)-REF
CONDUCTOR REF
SWAGE
SECTION B-B
SCALE 4/1
SOLDER FILLET
SEE NOTE 5

NOTES
1. FOR MASTER DRAWING SEE DRAWING NO. 2014266
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S)
3. AR DENOTES AS REQUIRED
4. ● DESIGNATES FEED THRU TERMINALS (FIND NO. 12)
5. SOLDER PER ND1002071
6. ASSEMBLE FIND NO.2 TO FIND NO.1 PER ND1002004 TYPE II RIGID
7. NUMBERS PRECEDING BALLOONS DENOTE QUANTITY

*DENOTES LENGTH IN FEET

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
☒	2016464	SCHEMATIC	REF
5	1006760-44	RESISTOR, 3300Ω ±2%, 1/2W	16
4	MS20426AD2-4	RIVET, CSK FLAT HD	15
2	1006906-1	BRACKET, CABLE SUPPORT	14
76	SE12XC02(MIL-T-55155/12)	TERMINAL STANDOFF	13
42	SE14XC02(MIL-T-55155/14)	TERMINAL FEEDTHRU	12
* 0.3	1006776-172	SLEEVING	11
* 0.3	1006776-147	SLEEVING	10
* 0.3	1006776-197	SLEEVING	9
36	1006751	DIODE	8
3	CS13AF010K	CAPACITOR 1μF 10% 35V	7
5	1006760-1	RESISTOR 51Ω ±2%, 1/2W	6
AR	MIL-W-16878/4 E22	WIRE, ELECTRICAL, WHITE	5
7	1006760-25	RESISTOR 510Ω ±2%, 1/2W	4
9	1006750-32	RESISTOR 1000Ω ±2%, 1/4W	3
7	1006752	TRANSISTOR 2N914	2
1	2014264	COMPONENT BOARD A4	1
-011	LIST OF MATERIALS		

2014267	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 DECIMALS .XXX ± ANGLES ±1°
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 16 DEC 66
CHECKED 19 Dec 66
APPROVAL
APPROVAL 26 Dec 66
APPROVAL
NASA APPROVAL
MIT APPROVAL 1-6-67
MIT APPROVAL D. 12-27-66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COMPONENT BOARD ASSEMBLY
PRINTED CIRCUIT BOARD A4

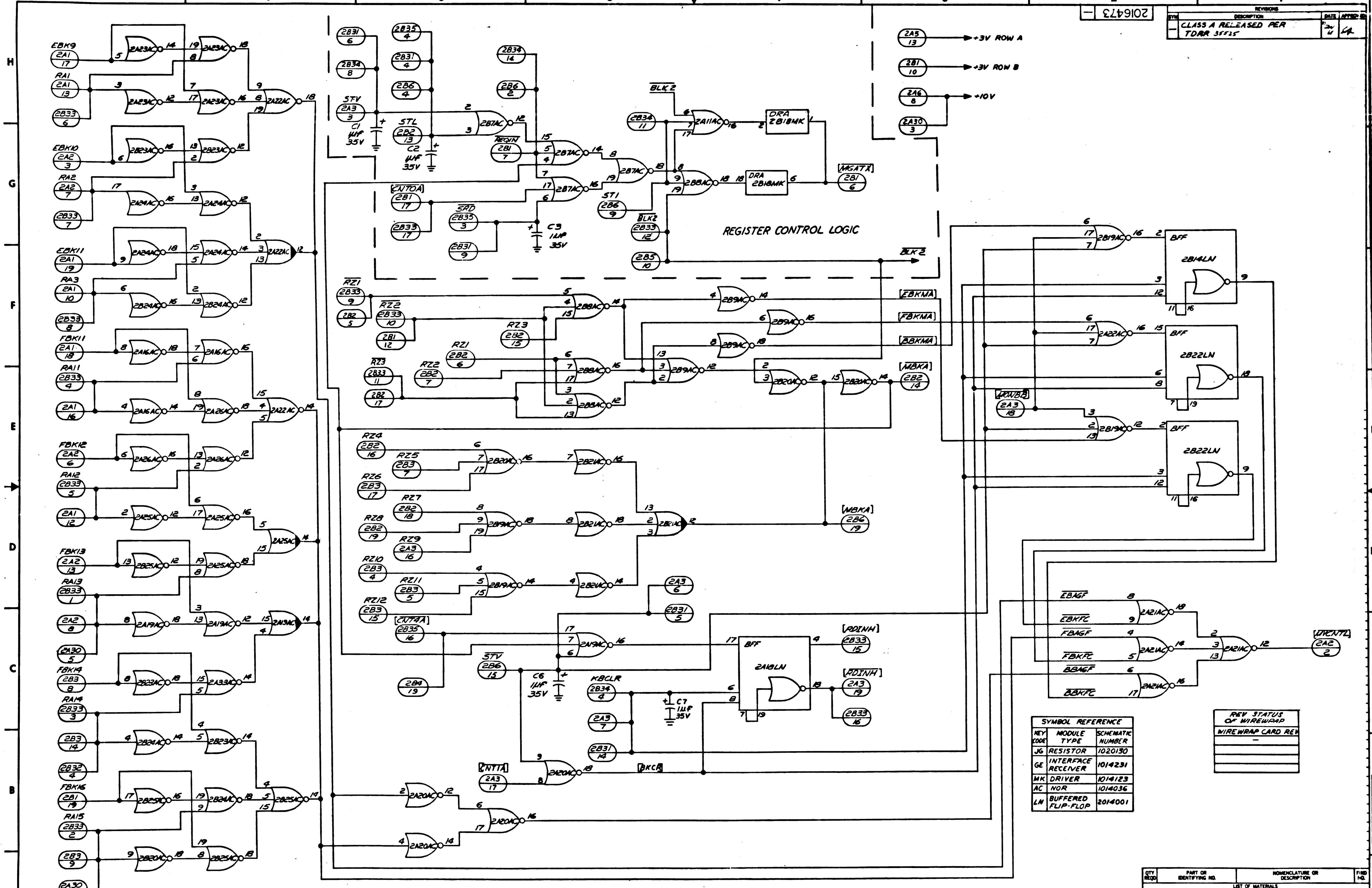
CODE IDENT NO. 49956
SIZE F
NASA DRAWING NO. 2016465
SCALE 2/1
WT
SHEET 1 OF 1

2016465 — 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SYM	DESCRIPTION	DATE	APPR
—	CLASS A RELEASED PER TDRR 35525	31 Jan 66	

2016473 —



MEMORY VERIFY CONTROL
REGISTER CONTROL LOGIC
EBK9
RA1
EBK10
RA2
EBK11
RA3
FBK11
RA11
FBK12
RA12
FBK13
RA13
FBK14
RA14
FBK16
RA15
STV
STL
REQIN
CNTOA
SRD
STI
BLK2
DRA 2B18MK
MGATX
+3V ROW A
+3V ROW B
+10V
C1 1μF 35V
C2 1μF 35V
C3 1μF 35V
C6 1μF 35V
C7 1μF 35V
RZ1
RZ2
RZ3
RZ4
RZ5
RZ6
RZ7
RZ8
RZ9
RZ10
RZ11
RZ12
EBKMA
FBKMA
BBKMA
MBKA
BFF 2B14LN
BFF 2B22LN
POWBE
CNT4A
BFF 2A18LN
RDINH
KBCLR
CNTTA
BKCR
EBAGF
EBKFC
FBAGF
FBKFC
BBAGF
BBKFC
UPCNTL

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
JG	RESISTOR	1020130
GE	INTERFACE RECEIVER	1014231
MK	DRIVER	1014123
AC	NOR	1014036
LN	BUFFERED FLIP-FLOP	2014001

REV STATUS OF WIREWRAP
WIREWRAP CARD REV
—

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE
1. ASSEMBLY DWG 2014315

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-547
DRAWN
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC PLATE NO.2
PROGRAM AND MONITOR
COMPUTER TEST SET

SIZE J CODE IDENT NO. 49956 NASA DRAWING NO. 2016473
SCALE NONE WT SHEET 1 OF 3

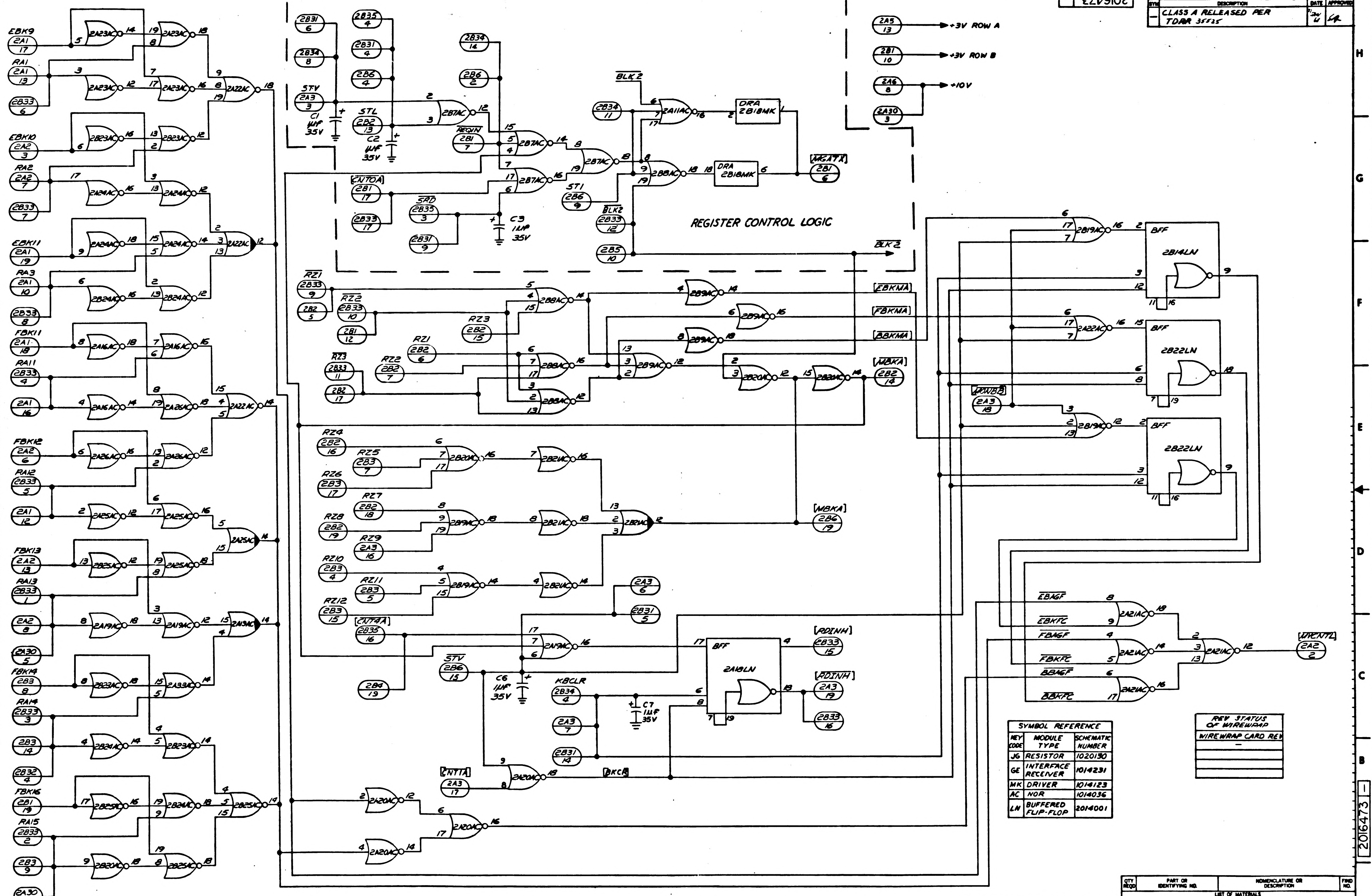
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016473 —

1/2016473

2016473 | —

SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 35525	31 Jan '67	



REGISTER CONTROL LOGIC
+3V ROW A
+3V ROW B
+10V
EBK9
RA1
EBK10
RA2
EBK11
RA3
FBK11
RA11
FBK12
RA12
FBK13
RA13
FBK14
RA14
FBK16
RA15
STV
STL
C1 1µF 35V
C2 1µF 35V
C3 1µF 35V
C6 1µF 35V
C7 1µF 35V
REQIN
CNTOA
SRD
ST1
BLK2
DRA 2B18MK
MGATX
RZ1
RZ2
RZ3
RZ4
RZ5
RZ6
RZ7
RZ8
RZ9
RZ10
RZ11
RZ12
EBKNA
FBKMA
BBKMA
MBKA
PDWBB
BFF
2B14LN
2B22LN
2A18LN
CNT4A
PDINH
KBCLR
CNTTA
BKCR
EBAGF
EBKFC
FBAGF
FBKFC
BBAGF
BBKFC
UPCNTL

MEMORY VERIFY CONTROL

NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS

REFERENCE
1. ASSEMBLY DWG 2014315

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
JG	RESISTOR	1020130
GE	INTERFACE RECEIVER	1014231
MK	DRIVER	1014123
AC	NOR	1014036
LN	BUFFERED FLIP-FLOP	2014001

REV STATUS OF WIREWRAP
WIREWRAP CARD REV
—

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±
DECIMALS .XXX ±
ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-1947
DRAWN
CHECKED
APPROVAL 18 Nov 67
APPROVAL
APPROVAL
NASA APPROVAL
APPROVAL
APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC PLATE NO.2
PROGRAM AND MONITOR
COMPUTER TEST SET

SIZE J | CODE IDENT NO 49956 | NASA DRAWING NO. 2016473
SCALE NONE | WT | SHEET 1 OF 3

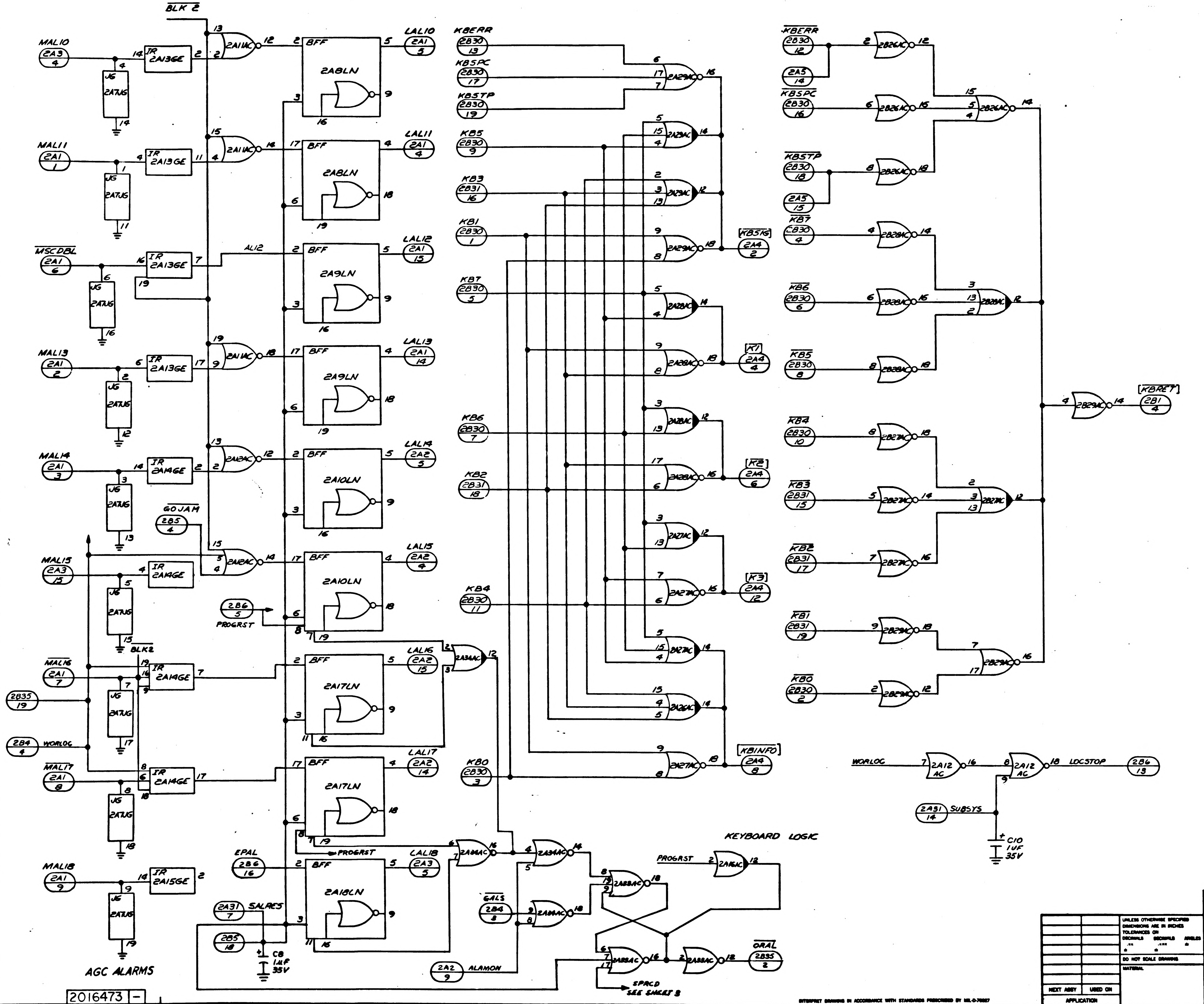
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016473 | —

2/2016473

2016473 -

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 35525	31 Mar 66	GA


BLK 2
MAL10
2A3 4
IR 2A13GE
JG 2A7JG
2A11AC
BFF 2A8LN
LAL10 2A1 5
MAL11
2A1 1
LAL11 2A1 4
MSCDBL
2A1 6
AL12
BFF 2A9LN
LAL12 2A1 15
MAL13
2A1 2
LAL13 2A1 14
MAL14
2A1 3
IR 2A14GE
2A12AC
BFF 2A10LN
LAL14 2A2 5
GOJAM
2B5 4
MAL15
2A3 15
LAL15 2A2 4
2B6 5
PROGRST
BLK2
MAL16
2A1 7
2B35 19
2B4 4 WORLOG
MAL17
2A1 8
BFF 2A17LN
LAL16 2A2 15
LAL17 2A2 14
2A34AC
MAL18
2A1 9
IR 2A15GE
EPAL
2B6 16
BFF 2A18LN
LAL18 2A3 5
2A31 7 SALRES
2B5 18
C8 1MF 35V
AGC ALARMS
GALS
2B4 8
2A2 9 ALAMON
2A33AC
ORAL
2B35 2
SPRCD SEE SHEET 3
KEYBOARD LOGIC
PROGRST
2A16AC
KBERR
2B30 13
KBSPC
2B30 17
KBSTP
2B30 19
KB5
2B30 9
KB3
2B31 16
KB1
2B30 1
KB7
2B30 5
KB6
2B30 7
KB2
2B31 18
KB4
2B30 11
KB0
2B30 3
2A29AC
2A28AC
2A27AC
2A26AC
KBSTG
2A4 2
K1
2A4 4
K2
2A4 6
K3
2A4 12
KBINFO
2A4 8
KBERR
2B30 12
2A5 14
KBSPC
2B30 16
KBSTP
2B30 18
2A5 15
KB7
2B30 4
KB6
2B30 6
KB5
2B30 8
KB4
2B30 10
KB3
2B31 15
KB2
2B31 17
KB1
2B31 19
KB0
2B30 2
2B26AC
2B28AC
2B27AC
2B29AC
KBRET
2B1 4
WORLOG
2A12 AC
LOCSTOP
2B6 13
2A31 14 SUBSYS
C10 1UF 35V

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN DATE 22 Jan 65
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
S&A APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC PLATE NO.2
PROGRAM AND MONITOR
COMPUTER TEST SET

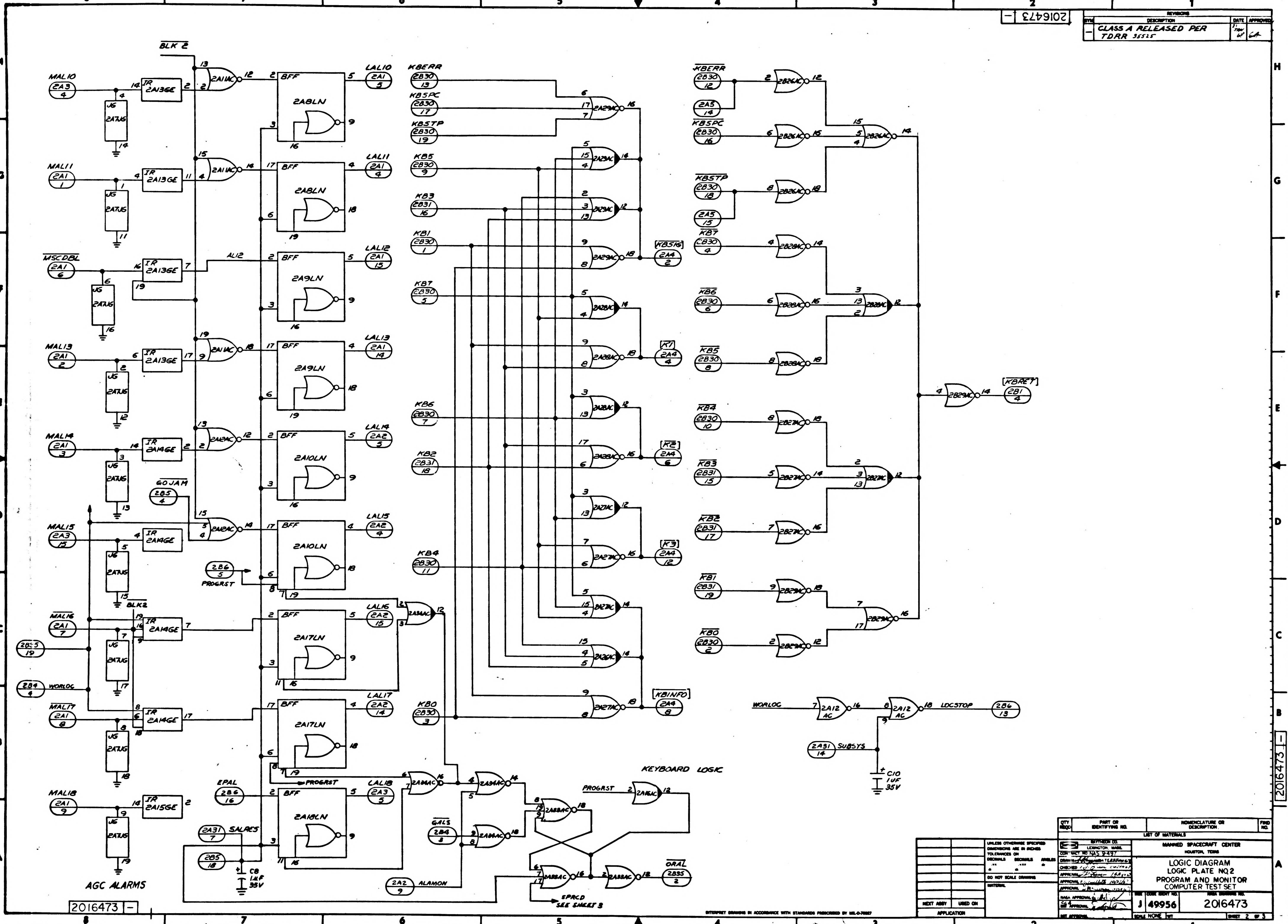
SIZE	CODE IDENT NO.	NASA DRAWING NO.
J	49956	2016473

SCALE NONE WT SHEET 2 OF 3

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016473 -

1/2016473


BLK 2
MAL10 2A3 4
IR 2A13GE
JG 2ATJG
2A11AC
BFF 2A8LN
LAL10 2A1 5
MAL11 2A1 1
LAL11 2A1 4
MSCDBL 2A1 6
AL12
BFF 2A9LN
LAL12 2A1 15
MAL13 2A1 2
LAL13 2A1 14
MAL14 2A1 3
IR 2A14GE
2A12AC
BFF 2A10LN
LAL14 2A2 3
GOJAM 2B5 4
MAL15 2A3 15
LAL15 2A2 4
2B6 5 PROGRST
BLK2
MAL16 2A1 7
2B5 19
2B4 4 WORLOG
MAL17 2A1 8
BFF 2A17LN
2A34AC
LAL16 2A2 15
LAL17 2A2 14
PROGRST
EPAL 2B6 16
BFF 2A18LN
LAL18 2A3 5
MAL18 2A1 9
IR 2A15GE
2A31 7 SALRES
2B5 18
C8 1UF 35V
AGC ALARMS
GALS 2B4 8
2A2 9 ALAMON
SPRCD SEE SHEET 3
ORAL 2B35 2
KEYBOARD LOGIC
PROGRST 2A16AC
2A38AC
KBERR 2B30 13
KBSPC 2B30 17
KBSTP 2B30 19
KB5 2B30 9
KB3 2B31 16
KB1 2B30 1
KB7 2B30 5
KB6 2B30 7
KB2 2B31 18
KB4 2B30 11
KB0 2B30 3
2A29AC
2A28AC
2A27AC
2A26AC
KB5IG 2A4 2
K1 2A4 4
K2 2A4 6
K3 2A4 12
KBINFO 2A4 8
KBERR 2B30 12
2A5 14
KBSPC 2B30 16
KBSTP 2B30 18
2A5 15
KB7 2B30 4
KB6 2B30 6
KB5 2B30 8
KB4 2B30 10
KB3 2B31 15
KB2 2B31 17
KB1 2B31 19
KB0 2B30 2
2B26AC
2B28AC
2B27AC
2B29AC
KBRET 2B1 4
WORLOG 2A12 AC
LOCSTOP 2B6 13
2A31 14 SUBSYS
C10 1UF 35V
2016473 -

SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 35525	2 Nov 67	GA

REVISIONS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

NEXT ASSY | USED ON

APPLICATION

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC PLATE NO 2
PROGRAM AND MONITOR
COMPUTER TEST SET

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016473

SCALE NONE | WT | SHEET 2 OF 3

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

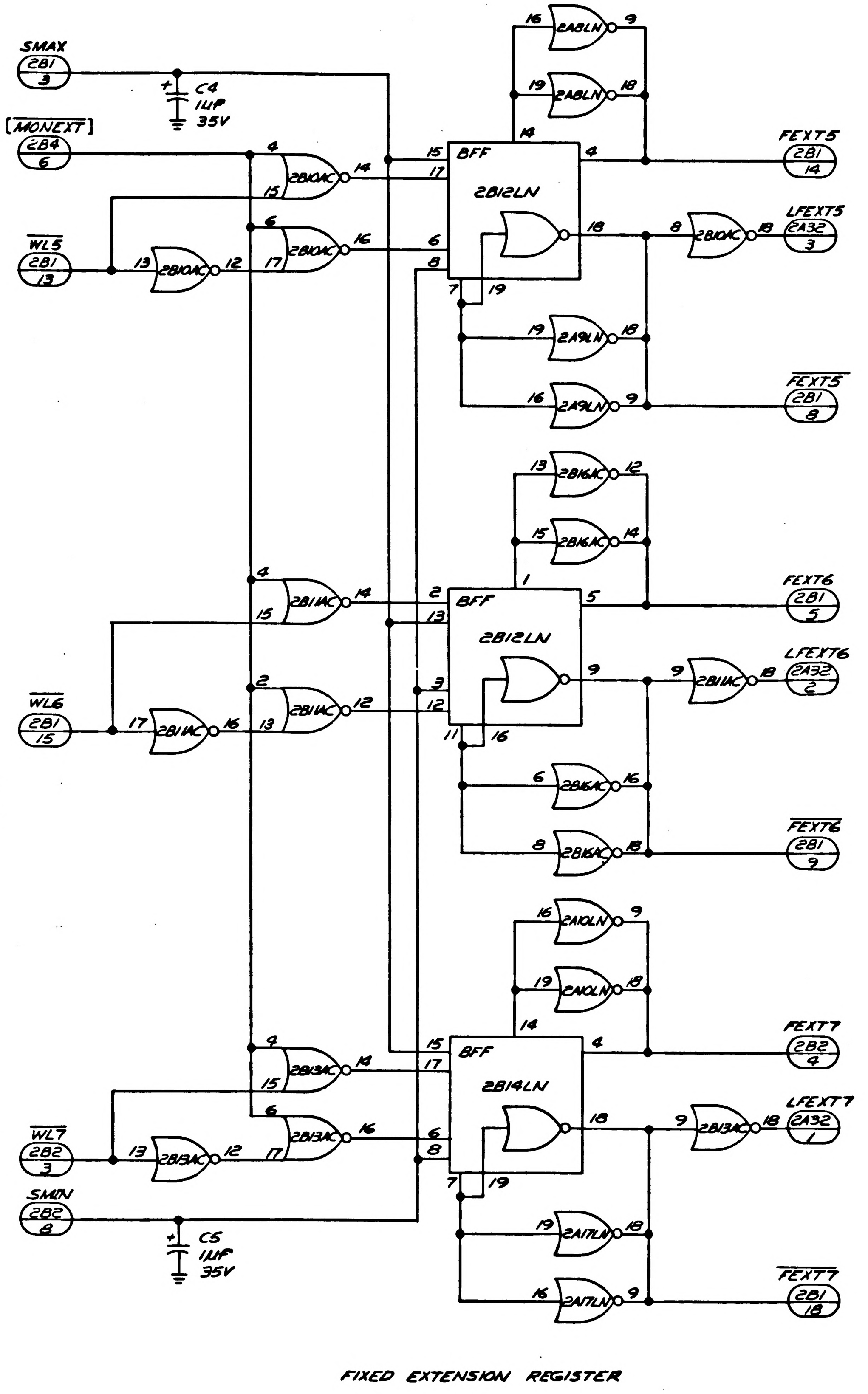
2016473 -

2722016473

2016473 —

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	CLASS A RELEASED PER TDRR 35525	31 JAN 68	

2A3	1	$\overline{KBCLR}$	2B31	13
2A3	2	$\overline{STL}$	2B31	3
2B3	1	RX15	2B32	1
2B3	2	RY15	2B32	2
2B3	3	RLP15	2B32	3
2B3	6	RB14	2B32	5
2B3	10	RQ14	2B32	6
2B3	11	RX14	2B32	7
2B3	12	RY14	2B32	8
2B3	13	RLP14	2B32	9
2B3	16	$\overline{STU}$	2B32	12
2B3	18	STU	2B32	13
2B3	19	$\overline{STD}$	2B32	14
2B2	1	STD	2B32	15
2B2	2	$\overline{STP}$	2B32	16
2B2	9	STP	2B32	17
2B2	10	$\overline{SRE}$	2B32	18
2B2	11	SRE	2B32 2B6	19 18
2A6	1	$\overline{SK}$	2B31	12
2A6	2	KBBS1	2B30	14
2A6	3	KBBS2	2B30	15
2A6	4	$\overline{SMO}$ C9 1uf 35V	2B31	1
2A6	5	SMO	2B31 2B6	2 17
2A6	6	R7A	2B32	10
2B6	10	SNISQ	2A3	5
2A6	7	R7A	2B32	11
2A6	9	RB13	2A30	6
2A6	10	RQ13	2A30	7
2A6	11	RX13	2A30	8
2A6	12	RY13	2A30	9
2A6	13	RLP13	2A30	10
2A6	14	RA16	2A30	11
2A6	15	RB16	2A30	12
2A6	16	RQ16	2A30	13
2A6	17	RX16	2A30	14
2A6	18	RY16	2A30	15
2A6	19	RLP16	2A30	16
2A5	1	RB15	2A30	18
2A5	2	RQ15	2A30	19
2A5	3	SVR	2A31	6
2A5	4	LTVF	2A32	17
2A5	5	R6A	2A32	18
2A5	6	LST3	2A32	6
2A5	7	MSTP	2B4	5
2A5	8	MTCSAI	2A31	15
2A5	9	MNHRPT	2A31	16
2A5	10	MNHNC	2A31	17
2A5	11	STRFR	2A31	18
2A5	12	STRSS	2A31	19
2B6	11	SSTWCH	2A3	8
2B31	7	$\overline{SKL}$	2B35	5
2B31	8	SKL	2B35 2B6	1 8
2B31	10	SRD	2B6	1
2B31	11	STC	2B34 2B5	2 8
2A30	1	SINHBK	2B34	9
2A30	2	SCLD	2B35	7
2A30	4	SCRD	2B35	8
2A31	1	SFST	2B5	17
2A31	2	$\overline{SPRCD}$	2B5	12
2A31	4	$\overline{SEX}$	2B35	10
2A31	5	SEX	2B34	1
2A31	8	$\overline{SSCALT}$	2B34	5
2A31	9	SCH	2B35	6
2A31	10	RSUBSYS	2B5	9
2A31	11	STMTC	2B34	3
2A31	12	STMRPT	2B34	6
2A31	13	STMHNC	2B34	7
2A32	4	LST1	2B6	3
2A32	5	LST2	2B4	16
2A32	7	LBR1	2B4	17
2A32	8	LBR2	2B4	18
2A31	3	SPRCD	2B5 SEE SHEET 2	13
2A32	9	LCHAN	2B35	9
2A32	10	LSQ10	2B4	9
2A32	11	LSQ11	2B4	10
2A32	12	LSQ12	2B4	11
2A32	13	LSQ13	2B4	12
2A32	14	LSQ14	2B4	13
2A32	15	LSQEXT	2B4	14
2A32	16	LSQ16	2B4	15
2A32	19	$\overline{SFST}$	2B34	10
2B33	13	$\overline{T121}$	2B5	3
2B33	14	$\overline{Q2}$	2B6	7
2B33	18	CLC	2B5	14
2B34	12	T9	2B5	19
2B34	13	$\overline{T67}$	2B5	6
2B34	15	$\overline{T34}$	2B5	5
2B34	16	$\overline{RDFB}$	2B4	7
2B34	17	LRCH	2B6	6
2B34	18	CRC	2B5	15
2B34	19	TCC	2B5	16
2B35	11	LDFB	2B4	2
2B35	12	RDFB	2B4	8
2B35	13	TCFB	2B5	2
2B35	14	BLK 2	2B5	11
2B35	15	$\overline{T78}$	2B5	7
2B35	17	$\overline{LDFB}$	2B4	1
2B35	18	$\overline{TCFB}$	2B5	1
2B6	12	SSTRCH	2A2	10


SMAX
2B1 3
C4 1UF 35V
[$\overline{MONEXT}$]
2B4 6
$\overline{WL5}$
2B1 13
2B10AC
BFF
2B12LN
2A8LN
2A9LN
FEXT5
2B1 14
LFEXT5
2A32 3
$\overline{FEXT5}$
2B1 8
2B16AC
$\overline{WL6}$
2B1 15
2B11AC
BFF
2B12LN
FEXT6
2B1 5
LFEXT6
2A32 2
$\overline{FEXT6}$
2B1 9
2A10LN
$\overline{WL7}$
2B2 3
2B13AC
SMIN
2B2 8
C5 1UF 35V
BFF
2B14LN
2A17LN
FEXT7
2B2 4
LFEXT7
2A32 1
$\overline{FEXT7}$
2B1 18

FIXED EXTENSION REGISTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN 22 JUN 67
CHECKED
APPROVAL
APPROVAL 10/25/67
APPROVAL
NASA APPROVAL
APPROVAL
APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC PLATE NO. 2
PROGRAM AND MONITOR
COMPUTER TEST SET

SIZE J
CODE IDENT NO. 49956
NASA DRAWING NO. 2016473
SCALE NONE
WT
SHEET 3 OF 3

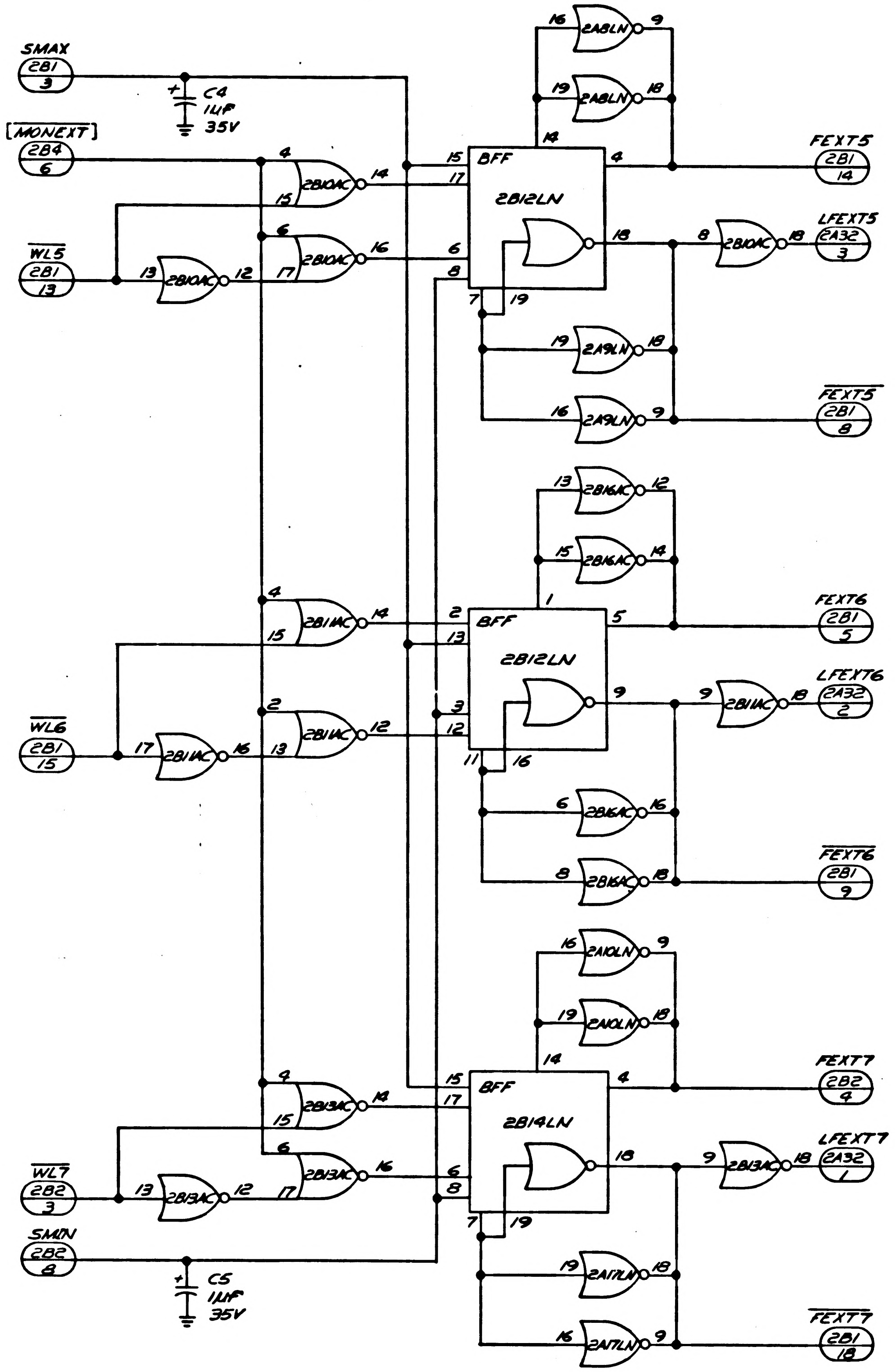
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2016473 —

1/2016473

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
–	CLASS A RELEASED PER TDRR 35525	31 JAN 68	

2A3/1	$\overline{KBCLR}$	2B31/13	
2A3/2	$\overline{STL}$	2B31/3	
2B3/1	RX15	2B32/1	
2B3/2	RY15	2B32/2	
2B3/3	RLP15	2B32/3	
2B3/6	RB14	2B32/5	
2B3/10	RQ14	2B32/6	
2B3/11	RX14	2B32/7	
2B3/12	RY14	2B32/8	
2B3/13	RLP14	2B32/9	
2B3/16	$\overline{STU}$	2B32/12	
2B3/18	STU	2B32/13	
2B3/19	$\overline{STD}$	2B32/14	
2B2/1	STD	2B32/15	
2B2/2	$\overline{STP}$	2B32/16	
2B2/9	STP	2B32/17	
2B2/10	$\overline{SRE}$	2B32/18	
2B2/11	SRE	2B32/19	2B6/18
2A6/1	$\overline{SK}$	2B31/12	
2A6/2	KBBS1	2B30/14	
2A6/3	KBBS2	2B30/15	
2A6/4	$\overline{SMO}$	2B31/1	C9 1uf 35V
2A6/5	SMO	2B31/2	2B6/17
2A6/6	R7A	2B32/10	
2B6/10	SNISQ	2A3/9	
2A6/7	R7A	2B32/11	
2A6/9	RB13	2A30/6	
2A6/10	RQ13	2A30/7	
2A6/11	RX13	2A30/8	
2A6/12	RY13	2A30/9	
2A6/13	RLP13	2A30/10	
2A6/14	RA16	2A30/11	
2A6/15	RB16	2A30/12	
2A6/16	RQ16	2A30/13	
2A6/17	RX16	2A30/14	
2A6/18	RY16	2A30/15	
2A6/19	RLP16	2A30/16	
2A5/1	RB15	2A30/18	
2A5/2	RQ15	2A30/19	
2A5/3	SVR	2A31/6	
2A5/4	LTVF	2A32/17	
2A5/5	R6A	2A32/18	
2A5/6	LST3	2A32/6	
2A5/7	MSTP	2B4/5	
2A5/8	MTCSAI	2A31/15	
2A5/9	MNHRPT	2A31/16	
2A5/10	MNHNC	2A31/17	
2A5/11	STRFR	2A31/18	
2A5/12	STRSS	2A31/19	
2B6/11	SSTWCH	2A3/8	
2B31/7	$\overline{SKL}$	2B35/5	
2B31/8	SKL	2B35/1	2B6/8
2B31/10	SRD	2B6/1	
2B31/11	STC	2B34/2	2B5/8
2A30/1	SINHBK	2B34/9	
2A30/2	SCLD	2B35/7	
2A30/4	SCRD	2B35/8	
2A31/1	SFST	2B5/17	
2A31/2	$\overline{SPRCD}$	2B5/12	
2A31/4	$\overline{SEX}$	2B35/10	
2A31/3	SEX	2B34/1	
2A31/8	$\overline{SSCALT}$	2B34/5	
2A31/9	SCH	2B35/6	
2A31/10	RSUBSYS	2B5/9	
2A31/11	STMTC	2B34/3	
2A31/12	STMRPT	2B34/6	
2A31/13	STMHNC	2B34/7	
2A32/4	LST1	2B6/3	
2A32/5	LST2	2B4/16	
2A32/7	LBR1	2B4/17	
2A32/8	LBR2	2B4/18	
2A31/3	SPRCD	2B5/13	SEE SHEET 2
2A32/9	LCHAN	2B35/9	
2A32/10	LSQ10	2B4/9	
2A32/11	LSQ11	2B4/10	
2A32/12	LSQ12	2B4/11	
2A32/13	LSQ13	2B4/12	
2A32/14	LSQ14	2B4/13	
2A32/15	LSQEXT	2B4/14	
2A32/16	LSQ16	2B4/15	
2A32/19	$\overline{SFST}$	2B34/10	
2B33/13	$\overline{T121}$	2B5/3	
2B33/14	$\overline{Q2}$	2B6/7	
2B33/18	CLC	2B5/14	
2B34/12	T9	2B5/19	
2B34/13	$\overline{T67}$	2B5/6	
2B34/15	$\overline{T34}$	2B5/5	
2B34/16	$\overline{RDFB}$	2B4/7	
2B34/17	LRCH	2B6/6	
2B34/18	CRC	2B5/15	
2B34/19	TCC	2B5/16	
2B35/11	LDFB	2B4/2	
2B35/12	RDFB	2B4/8	
2B35/13	TCFB	2B5/2	
2B35/14	BLK 2	2B5/11	
2B35/15	$\overline{T78}$	2B5/7	
2B35/17	$\overline{LDFB}$	2B4/1	
2B35/18	$\overline{TCFB}$	2B5/1	
2B6/12	SSTRCH	2A2/10	



FIXED EXTENSION REGISTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±

DO NOT SCALE DRAWING

MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO NAS 9-497
DRAWN 22 JUN 67
CHECKED
APPROVAL 14 Aug 67
APPROVAL P.Q. 10/25/67
APPROVAL
NASA APPROVAL
APPROVAL
NASA APPROVAL

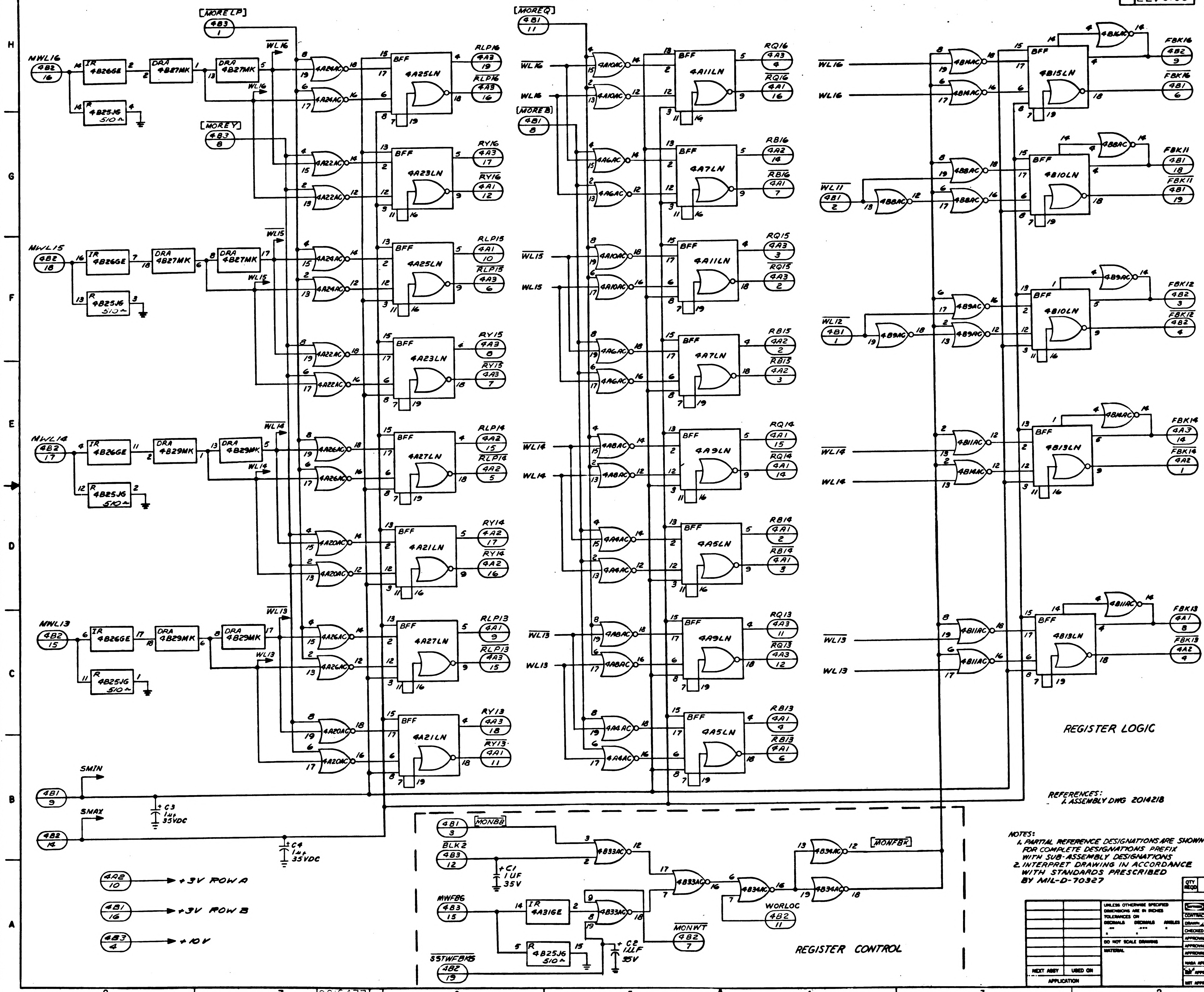
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC PLATE NO. 2
PROGRAM AND MONITOR
COMPUTER TEST SET

SIZE J | CODE IDENT NO. 49956 | NASA DRAWING NO. 2016473
SCALE NONE | WT | SHEET 3 OF 3

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SYM	DESCRIPTION
—	CLASS A RELEASED PER TDRR 35525


MORELP
4B3 1
MOREQ
4B1 11
MOREY
4B3 8
MOREB
4B1 8
MWL16
4B2 16
MWL15
4B2 18
MWL14
4B2 17
MWL13
4B2 15
IR 4B26GE
R 4B25J6 510 ~
DRA 4B27MK
DRA 4B29MK
WL16
WL15
WL14
WL13
WL11
4B1 2
WL12
4B1 1
BFF
4A25LN
4A23LN
4A27LN
4A21LN
4A11LN
4A7LN
4A9LN
4A5LN
4B15LN
4B10LN
4B13LN
RLP16
RY16
RLP15
RY15
RLP14
RY14
RLP13
RY13
RQ16
RB16
RQ15
RB15
RQ14
RB14
RQ13
RB13
FBK16
FBK11
FBK12
FBK14
FBK13
SMIN
4B1 9
SMAX
4B2 14
C3 1µf 35VDC
C4 1µf 35VDC
4A2 10 → +3V ROW A
4B1 16 → +3V ROW B
4B3 4 → +10V
MONBB
4B1 3
BLK2
4B3 12
C1 1UF 35V
MWFB6
4B3 15
IR 4A31GE
R 4B25J6 510 ~
C2 1UF 35V
SSTWFBKS
4B2 19
4B33AC
4B34AC
MONFBK
WORLOC
4B2 11
MONWT
4B2 7
REGISTER LOGIC
REGISTER CONTROL

REFERENCES:
1. ASSEMBLY DWG 2014218

NOTES:
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REV STATUS OF WIREWRAP
WIREWRAP CARD REV
—

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
JG	RESISTOR	1020130
MK	DRIVER	1014123
AC	NOR	1014036
KH	GATED FLIP-FLOP	1014072
LN	BUFFERED FLIP-FLOP	2014001
GE	INTERFACE RECEIVER	1014231

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
LIST OF MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN
DATE
CHECKED
APPROVAL
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

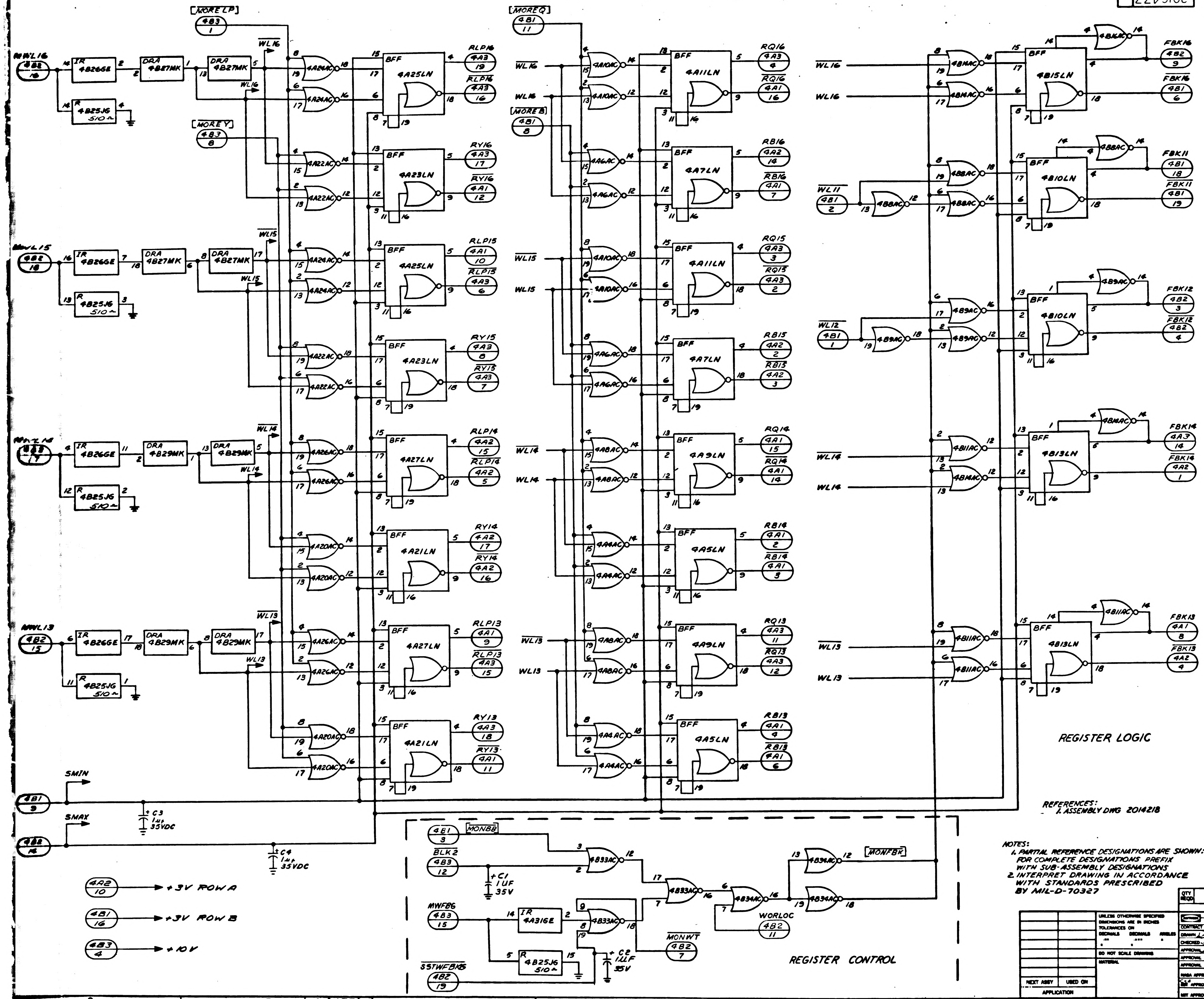
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1-PLATE 4
COMPUTER TEST SET

CODE IDENT NO.	SIZE	NASA DRAWING NO.
49956	J	2016477
SCALE NONE	WT	SHEET 1

2016477 -

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 35525	11/30/67	



MORE LP
MOREQ
MOREB
MOREY
WL16
WL15
WL14
WL13
WL11
WL12
4B26GE
4B27MK
4B29MK
4B25J6
510~
4A25LN
4A23LN
4A27LN
4A21LN
4A11LN
4A7LN
4A9LN
4A5LN
4B15LN
4B10LN
4B13LN
BFF
RLP16
RY16
RLP15
RY15
RLP14
RY14
RLP13
RY13
RQ16
RB16
RQ15
RB15
RQ14
RB14
RQ13
RB13
FBK16
FBK11
FBK12
FBK14
FBK13
SMIN
SMAX
C3 1μf 35VDC
C4 1μf 35VDC
+3V ROW A
+3V ROW B
+10V
MONBB
BLK2
C1 1UF 35V
MWFB6
4A31GE
4B25J6 510~
C2 1UF 35V
SSTWFBK5
4B33AC
4B34AC
MONFBK
WORLOC
MONWT
REGISTER CONTROL
REGISTER LOGIC

REV STATUS OF WIREWRAP

WIREWRAP CARD REV

SYMBOL REFERENCE		
KEY CODE	MODULE TYPE	SCHEMATIC NUMBER
JG	RESISTOR	1020130
MK	DRIVER	1014123
AC	NOR	1014036
KH	GATED FLIP-FLOP	1014072
LN	BUFFERED FLIP-FLOP	2014001
GE	INTERFACE RECEIVER	1014231

REFERENCES:
1. ASSEMBLY DWG 2014218

NOTES:
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS
2. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 22 JUNE 67
CHECKED 22 JUNE 67
APPROVAL 22 Jun 67
APPROVAL 10/25/67
APPROVAL
NASA APPROVAL
CSA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1-PLATE 4
COMPUTER TEST SET

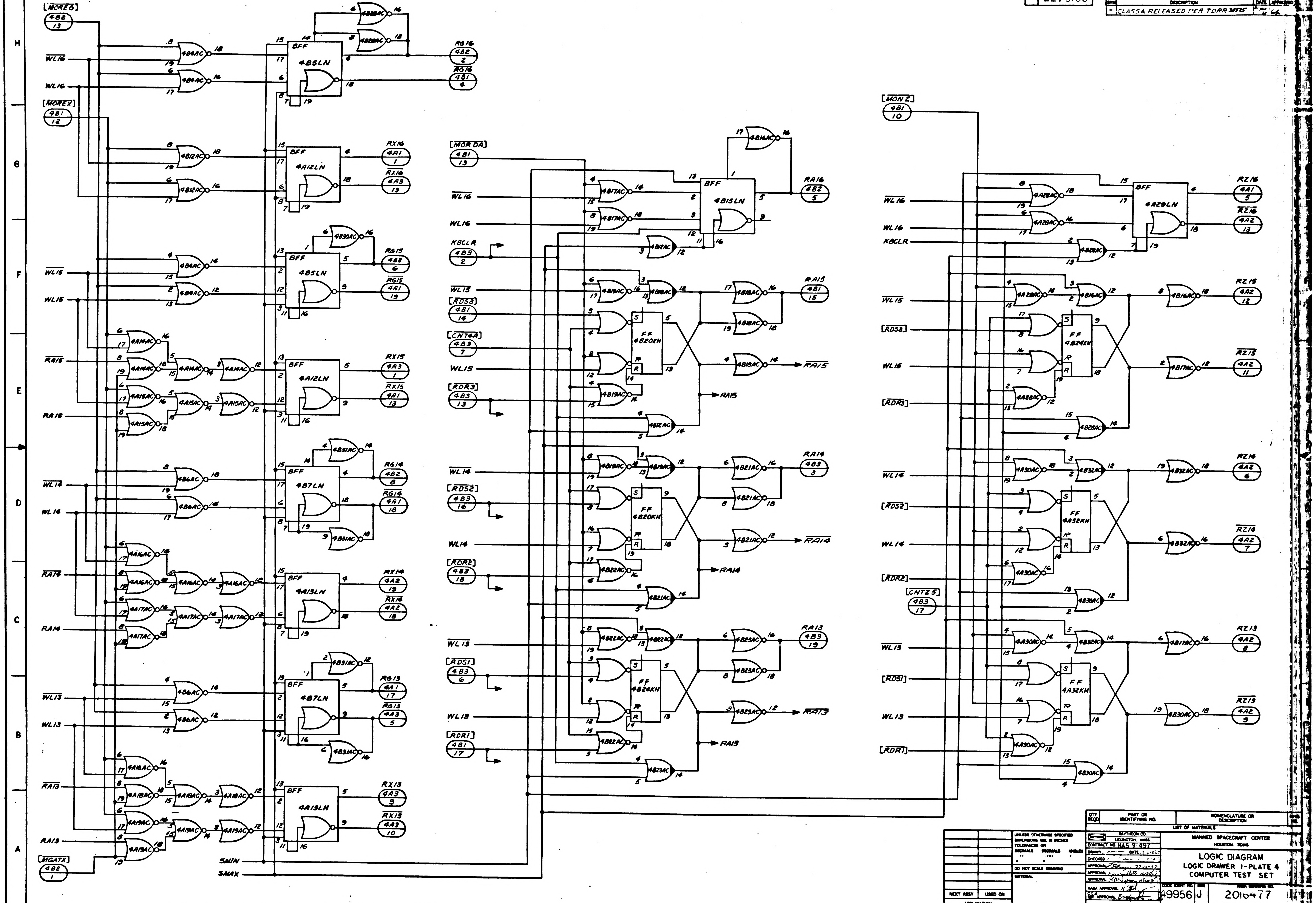
CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016477
SCALE NONE
WT
SHEET 1 OF 2

2016477 -

2/2016477

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 36525		

2016477 -



MOREG 4B2 13
WL16
WL16
MOREX 4B1 12
WL15
WL15
RA15
RA16
WL14
WL14
RA14
RA14
WL13
WL13
RA13
RA13
MGATX 4B2 1
SMIN
SMAX
BFF 4B5LN
BFF 4A12LN
BFF 4B5LN
BFF 4A12LN
BFF 4B7LN
BFF 4A13LN
BFF 4B7LN
BFF 4A13LN
RG16 4B2 2
RG16 4B1 4
RX16 4A1 1
RX16 4A3 13
RG15 4B2 6
RG15 4A1 19
RX15 4A3 1
RX15 4A1 13
RG14 4B2 8
RG14 4A1 18
RX14 4A2 19
RX14 4A2 18
RG13 4A1 17
RG13 4A3 5
RX13 4A3 9
RX13 4A3 10
MORDA 4B1 13
WL16
WL16
KBCLR 4B3 2
WL15
RDS3 4B1 14
CNT4A 4B3 7
WL15
RDR3 4B3 13
WL14
RDS2 4B3 16
WL14
RDR2 4B3 18
WL13
RDS1 4B3 6
WL13
RDR1 4B1 17
BFF 4B15LN
FF 4B20KH
FF 4B20KH
FF 4B24KH
RA16 4B2 5
RA15 4B1 15
RA15
RA15
RA14 4B3 3
RA14
RA14
RA13 4B3 19
RA13
RA13
MONZ 4B1 10
WL16
WL16
KBCLR
WL15
RDS3
WL16
RDR3
WL14
RDS2
WL14
RDR2
CNTZS 4B3 17
WL13
RDS1
WL13
RDR1
BFF 4A29LN
FF 4B24KH
FF 4A32KH
FF 4A32KH
RZ16 4A1 5
RZ16 4A2 13
RZ15 4A2 12
RZ15 4A2 11
RZ14 4A2 6
RZ14 4A2 7
RZ13 4A2 8
RZ13 4A2 9
8 7 6 5 4 3 2 1
H G F E D C B A

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS DECIMALS ANGLES
.XX .XXX ±
± ±
DO NOT SCALE DRAWING
MATERIAL

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE
CHECKED
APPROVAL 7-20-67
APPROVAL 10/25/67
APPROVAL
NASA APPROVAL
CCA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

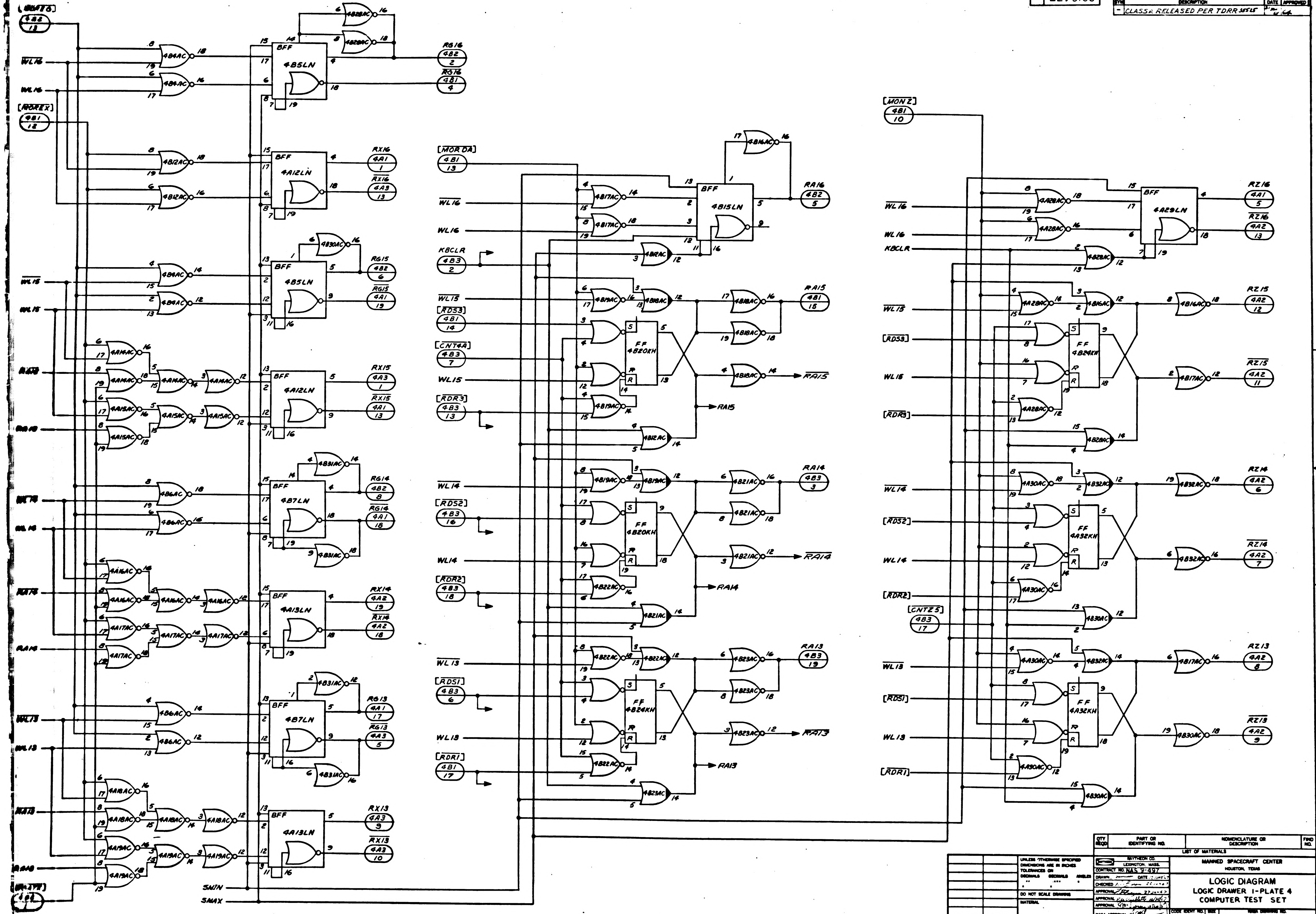
LOGIC DIAGRAM
LOGIC DRAWER 1-PLATE 4
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016477
SCALE NONE
WT
SHEET 2

2016477 -

1/2016477

SYM	DESCRIPTION	DATE	APPROVED
-	CLASS A RELEASED PER TDRR 35525		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WL16
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4B2 13
BFF
4B5LN
4B4AC
4B12AC
4A12LN
4B28AC
4B30AC
RG16 4B2 2
RG16 4B1 4
RX16 4A1 1
RX16 4A3 13
RG15 4B2 6
RG15 4A1 19
RX15 4A3 1
RX15 4A1 13
RG14 4B2 8
RG14 4A1 18
RX14 4A2 19
RX14 4A2 18
RG13 4A1 17
RG13 4A3 5
RX13 4A3 9
RX13 4A3 10
WL15
WL15
WL14
WL14
WL13
WL13
4A14AC
4A15AC
4A16AC
4A17AC
4A18AC
4A19AC
4B6AC
4B7LN
4B31AC
4A13LN
SWIN
SMAX
[MORDA] 4B1 13
WL16
WL16
KBCLR 4B3 2
WL15
[RDS3] 4B1 14
[CNT4A] 4B3 7
WL15
[RDR3] 4B3 13
WL14
[RDS2] 4B3 16
WL14
[RDR2] 4B3 18
WL13
[RDS1] 4B3 6
WL13
[RDR1] 4B1 17
4B17AC
4B15LN
4B16AC
4B2AC
4B19AC
4B18AC
FF 4B20KH
4B12AC
4B21AC
4B22AC
FF 4B24KH
4B23AC
RA16 4B2 5
RA15 4B1 15
RA15
RA15
RA14 4B3 3
RA14
RA14
RA13 4B3 19
RA13
RA13
[MONZ] 4B1 10
WL16
WL16
KBCLR
WL15
[RDS3]
WL15
[RDR3]
WL14
[RDS2]
WL14
[RDR2]
[CNTZ5] 4B3 17
WL13
[RDS1]
WL13
[RDR1]
4A28AC
4A29LN
4B28AC
4B16AC
FF 4B24KH
4B17AC
4A30AC
4B32AC
FF 4A32KH
4B30AC
RZ16 4A1 5
RZ16 4A2 13
RZ15 4A2 12
RZ15 4A2 11
RZ14 4A2 6
RZ14 4A2 7
RZ13 4A2 8
RZ13 4A2 9

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DO NOT SCALE DRAWING
MATERIAL

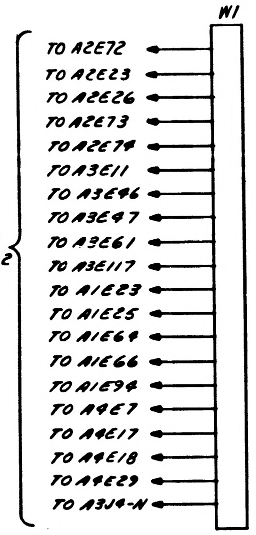
RAYTHEON CO.
LEXINGTON, MASS.
CONTRACT NO. NAS 9-497
DRAWN DATE 22 JUNE 67
CHECKED 22 JUNE 67
APPROVAL 22 JUNE 67
APPROVAL 10/20/67
APPROVAL
NASA APPROVAL
MIT APPROVAL
MIT APPROVAL

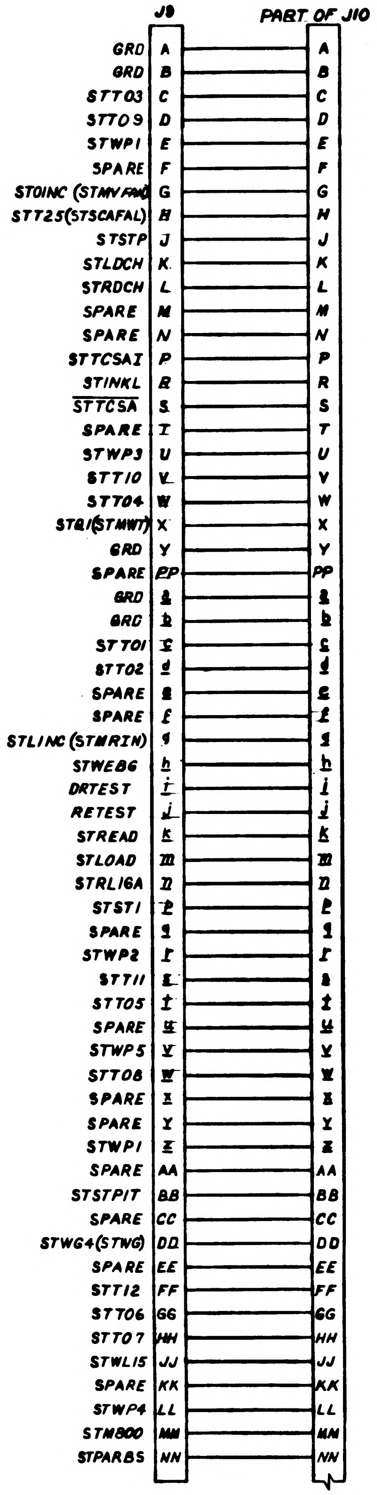
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LOGIC DIAGRAM
LOGIC DRAWER 1-PLATE 4
COMPUTER TEST SET

CODE IDENT NO. 49956
SIZE J
NASA DRAWING NO. 2016477
SCALE NONE
WT
SHEET 2 OF 2

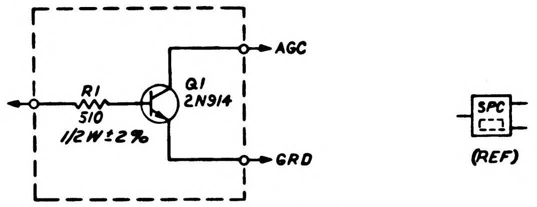
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
—	RELEASED PER TURR 35525		


W1
SEE SHEET 2
TO A2E72
TO A2E23
TO A2E26
TO A2E73
TO A2E74
TO A3E11
TO A3E46
TO A3E47
TO A3E61
TO A3E117
TO A1E23
TO A1E25
TO A1E64
TO A1E66
TO A1E94
TO A4E7
TO A4E17
TO A4E18
TO A4E29
TO A3J4-N

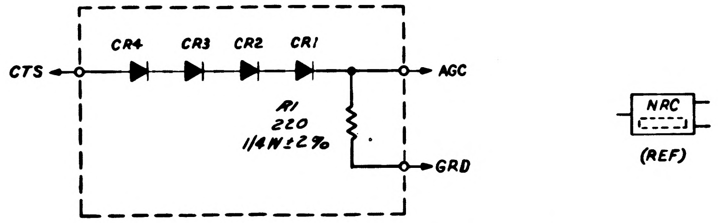

J9
PART OF J10
GRD A A
GRD B B
STT03 C C
STT09 D D
STWP1 E E
SPARE F F
STOINC (STMVFAIL) G G
STT25(STSCAFAL) H H
STSTP J J
STLDCH K K
STRDCH L L
SPARE M M
SPARE N N
STTCSA1 P P
STINKL R R
STTCSA S S
SPARE T T
STWP3 U U
STT10 V V
STT04 W W
STQ1(STMWT) X X
GRD Y Y
SPARE PP PP
GRD a a
GRD b b
STT01 c c
STT02 d d
SPARE e e
SPARE f f
STLINC (STMRIN) g g
STWEB6 h h
DRTEST i i
RETEST j j
STREAD k k
STLOAD m m
STRLI6A n n
STST1 p p
SPARE q q
STWP2 r r
STT11 s s
STT05 t t
SPARE u u
STWP5 v v
STT08 w w
SPARE x x
SPARE y y
STWP1 z z
SPARE AA AA
STSTPIT BB BB
SPARE CC CC
STWG4(STWG) DD DD
SPARE EE EE
STT12 FF FF
STT06 GG GG
STT07 HH HH
STWL15 JJ JJ
SPARE KK KK
STWP4 LL LL
STM800 MM MM
STPARBS NN NN

FOR REFERENCE ONLY

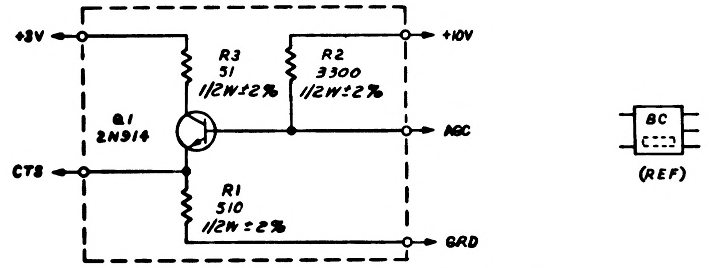
REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
A3C1 THRU A3C8	1006755-36	CAP.	47uF	±15%	20V
A3C9 THRU A3C12 A4C2 THRU A4C4	CS13AF010K	CAP.	1.0 uF	±10%	35V
CR1 THRU CR4	1006751	DIODE			
J1	MS3120E-24-61-SX	CONN			
J2	MS3120E-24-61-SZ				
J3	MS3120E-24-61-SY				
J4	MS3120E-24-61-SX				
J5	MS3120E-24-61-SZ				
J6	MS3120E-24-61-SY				
J7	MS35179-1094A				
J8					
J9	MS3120E-24-61SW	CONN			
J10					
Q1	1006752	TRANS			
R1 (BC & SPC)	1006760-25	RES	510	±2%	½W
R1 (NRC)	1006750-16		220	±2%	¼W
R2 (BC)	1006760-44		3300	±2%	½W
R3 (BC)	1006760-1	RES	51	±2%	½W
S1	MS35059-23	SWITCH			
S2	MS35059-23	SWITCH			
TB1	1006678-3	TERM. BD			
TB2	1006678-4	TERM. BD			
A5R1	1006760-25	RES	510	±2%	½W


R1
510
1/2W±2%
Q1
2N914
AGC
GRD
SPC
(REF)

SPECIAL CIRCUIT


CTS
CR4
CR3
CR2
CR1
AGC
R1
220
1/4W±2%
GRD
NRC
(REF)

NOISE REJECTION CIRCUIT


+3V
R3
51
1/2W±2%
R2
3300
1/2W±2%
+10V
Q1
2N914
AGC
CTS
R1
510
1/2W±2%
GRD
BC
(REF)

BUFFER CIRCUIT

NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTOR VALUES ARE EXPRESSED IN OHMS
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATIONS PREFIX WITH SUB-ASSEMBLY DESIGNATIONS.

REFERENCE:

1. ASSEMBLY DWG		2014254
2. HARNESS	A	2014126
3. HARNESS	B	2014127
4. HARNESS	C	2014128
5. HARNESS	D	2014129
6. HARNESS	E	2014130
7. HARNESS	F	2014131
8. HARNESS	G	2014197

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS DECIMALS ANGLES

DO NOT SCALE DRAWING
MATERIAL

RAYTHEON CO
LEXINGTON MASS
CONTRACT NO NAS 9-497
DRAWN A.J. Biron 13 OCT 67
CHECKED R.P.Chambers 18 Oct 67
APPROVAL E.C. Cuthbert 18 OCT 67
APPROVAL J.P. Fagan 18 OCT 67
APPROVAL
NASA APPROVAL
CCB APPROVAL
MIT APPROVAL

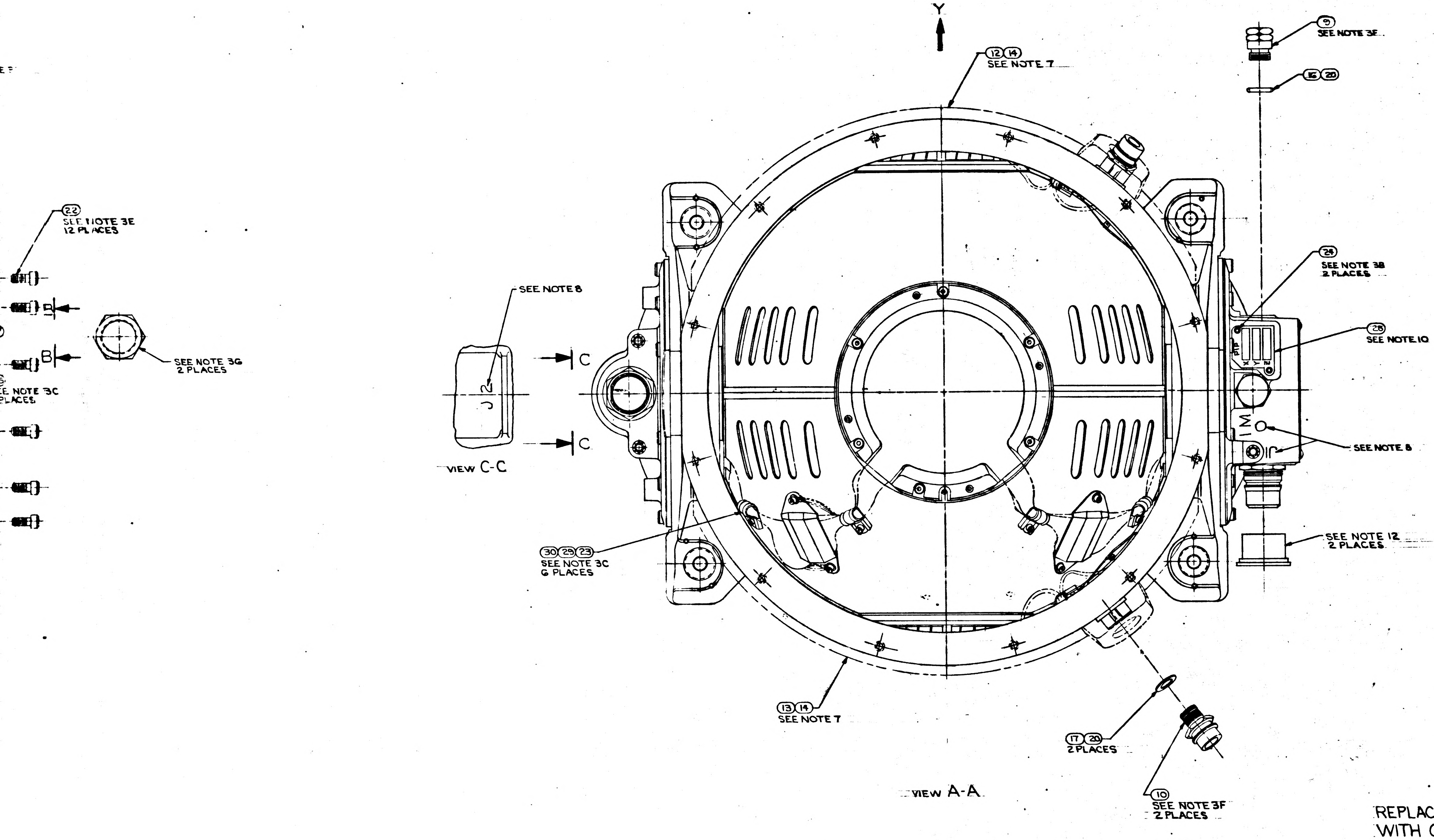
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ELECTRICAL SCHEMATIC
BUFFER CIRCUIT

CODE IDENT NO 49956
SIZE J
NASA DRAWING NO 2016502
SCALE NONE
WT
SHEET 1

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

	REVISIONS		
SYM	DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 M[illegible]	
V	REVISED TDRR 19275	2 Jun 65	
W	REVISED TDRR 21187	26 Jul 65	
Y	REVISED PER TDRR 21814	8 Sep 65	
Z	REVISED TDRR 22594	19 Oct 65	
AA	REVISED TDRR 23700	19 Oct 65	



REPLACES REV T WITH CHANGES

021	011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	2018807-SEE NOTE 5	WEIGHT, BALANCE S/M	40
A/R	A/R	1000260-SEE NOTE 5	WEIGHT, BALANCE S/M	39
A/R	A/R	1000270-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	38
A/R	A/R	1000268-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	37
A/R	A/R	1000263-SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	1000262-SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	1000261-SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
~~A/R~~	~~A/R~~	~~1001489-SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	1001488-SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
8	8	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	1000223	WASHER, CABLE CLAMP	30
6	6	1000220-SEE NOTE 4	CLAMP, CABLE	29
1	1	1000022	PLATE, INFORMATION	28
1	1	2018795	PLATE, IDENTIFICATION	27
4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	1010838	ADHESIVE	14
1	1	2018806	INSULATION CASE HEAT EXCH. (L.H.)	13
1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
1	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
—	1	2018612-011	I.G.S.A. RESOLVER OUTER AXIS	4
1	1	2018710	CASE COVER	3
—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

2018601 AA

3A

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL W.G. [illegible] 13-23-65
MSC APPROVAL W. Cooper

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

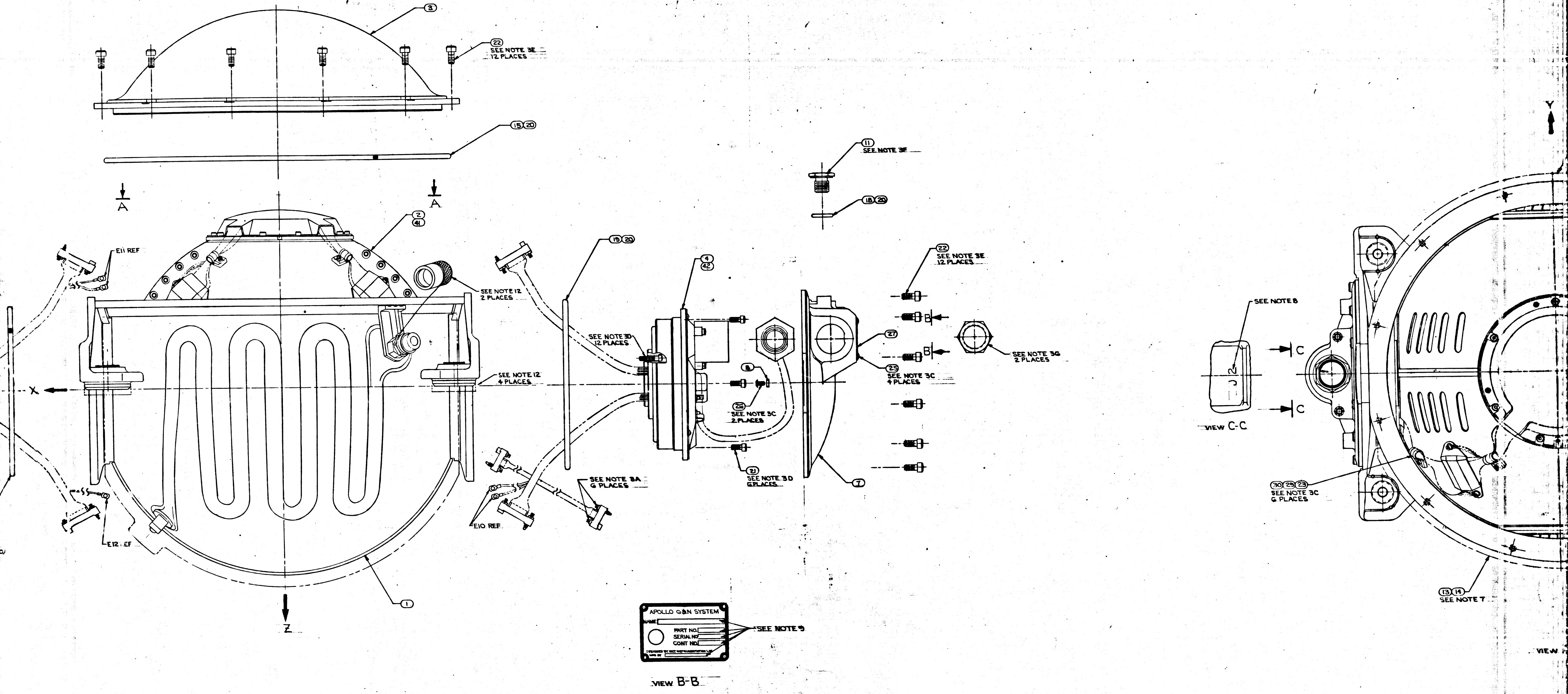
INERTIAL
MEASURING UNIT
ASSEMBLY (BLOCK II)

CODE IDENT NO. 80230 | SIZE J | NASA DRAWING NO. 2018601
SCALE 1/1 | WT | SHEET 1 OF 1

MASTER

2018601 AA

E3


③
㉒ SEE NOTE 3E 12 PLACES
⑮⑳
A
A
⑪ SEE NOTE 3E
⑱⑳
E11 REF
② ㊶
SEE NOTE 12 2 PLACES
⑮⑳
④ ㊷
㉒ SEE NOTE 3E 12 PLACES
SEE NOTE 8
SEE NOTE 3D 12 PLACES
B
B
㉗
SEE NOTE 3G 2 PLACES
C
C
J2
Y
X
SEE NOTE 12 4 PLACES
⑨
㉖ SEE NOTE 3C 2 PLACES
㉕ SEE NOTE 3C 4 PLACES
SEE NOTE 3A 6 PLACES
㉑ SEE NOTE 3D 6 PLACES
⑦
㉚㉙㉓ SEE NOTE 3C 6 PLACES
E12 REF
E10 REF
①
Z
⑬⑭ SEE NOTE 7
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY MIT INSTRUMENTATION LAB
MFD BY
SEE NOTE 9

VIEW C-C

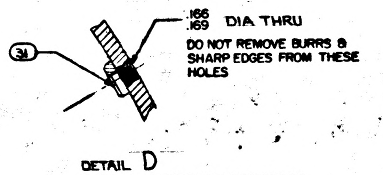
VIEW B-B

VIEW

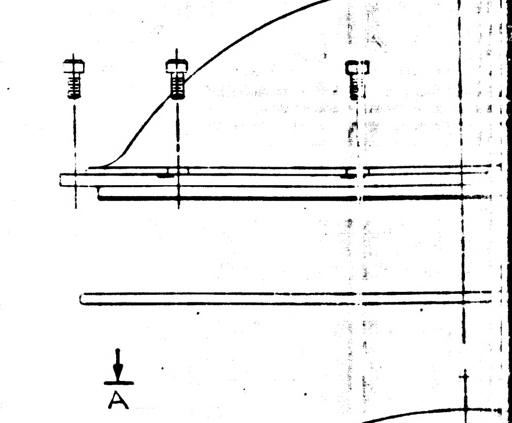
TABLE II	
SCREW SELECTION CHART ㉜	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	

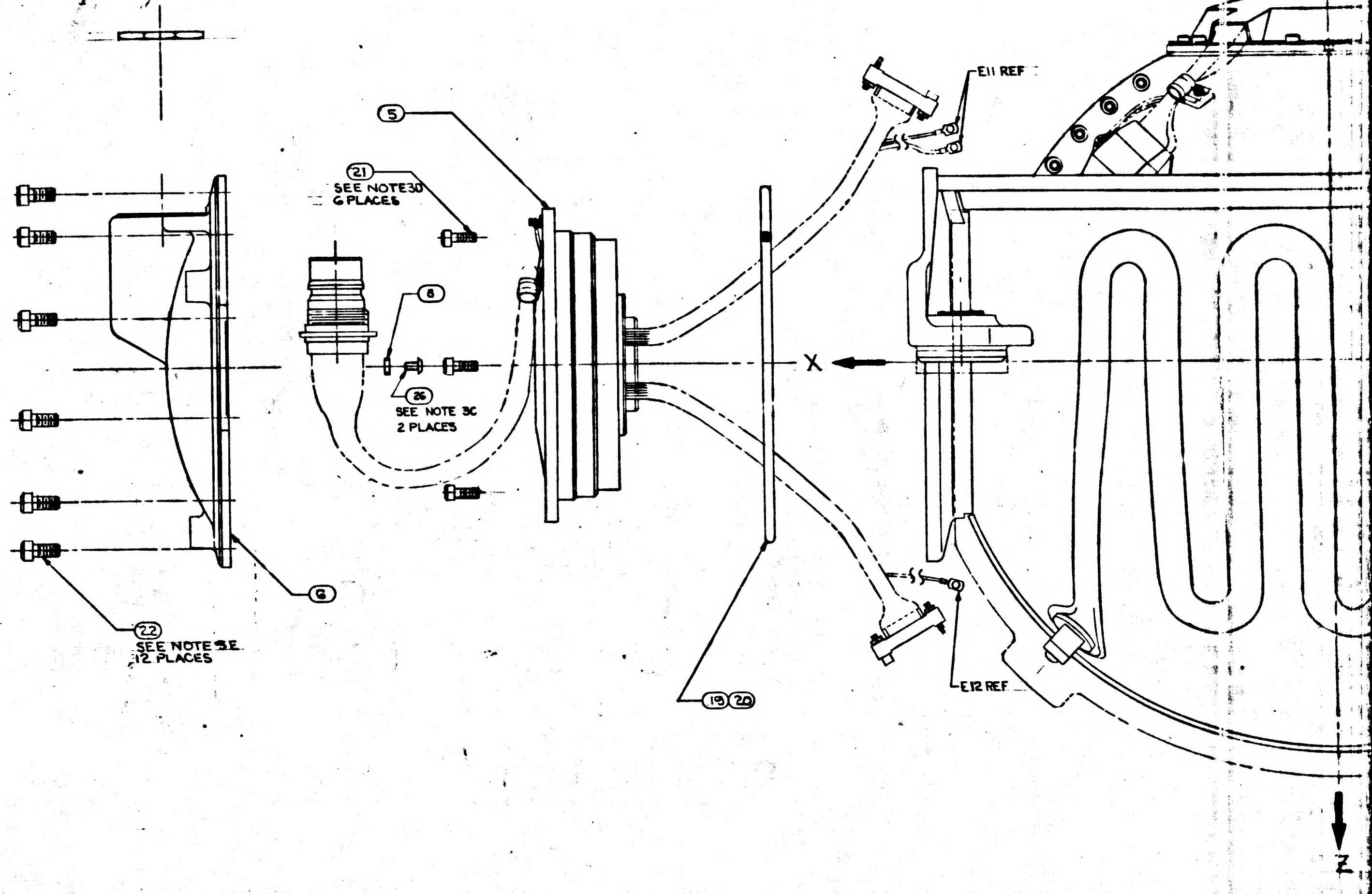
TABLE I	
CABLE CLAMP ㉙	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

SCHEMATIC REF CHART	
ASSEMBLY NO.	USE SCHEMATIC
2018601-011	2018615
2018601-021	2018618



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

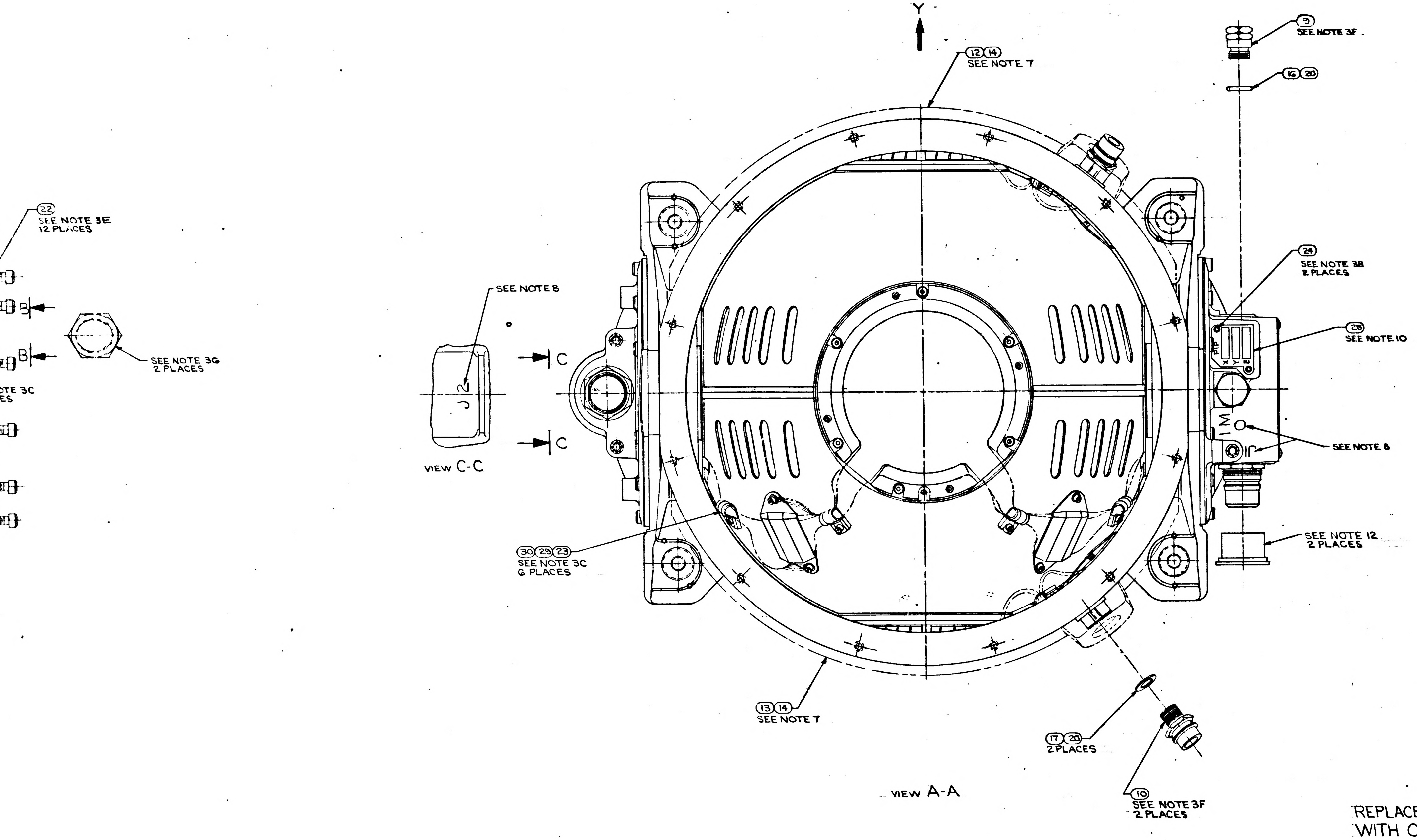




NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS OF PS 2018601
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED PER PS2018601. ITEM ㊴ NASA DWG. NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY. SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭. COAT MATING SURFACES OF ITEMS ⑫, ⑬ AND ① WITH ~~ITEM~~ ⑭ BEFORE ASSEMBLING.
8. MARK CHARACTERS $^{.23}_{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $^{.10}_{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS ⑩, ⑰ AND ⑳ ARE ASSEMBLED TO CASE, ITEM ①
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65		
V	REVISED TDRR 19275	2 Jun 65		
W	REVISED TDRR 21187	26 Jun 65		
Y	REVISED PER TDRR 21814	8 Aug 65		
Z	REVISED TDRR 22594	19 Oct 65		
AA	REVISED TDRR 23700	19 Oct 65		
AB	REVISED TDRR 24308	14 Dec 65		



REPLACES REV T
WITH CHANGES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
A/R	A/R	1000260 - SEE NOTE 5	WEIGHT, BALANCE S/M	39
A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID GIMBAL	36
A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
8	8	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	1000223	WASHER, CABLE CLAMP	30
6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1000022	PLATE, INFORMATION	28
1	1	2018795	PLATE, IDENTIFICATION	27
4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	1010838	ADHESIVE	14
1	1	2018806	INSULATION CASE HEAT EXCH. (L.H.)	13
1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
1	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
—	1	2018612-011	I.G.S.A. RESOLVER OUTER AXIS	4
1	1	2018710	CASE COVER	3
—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
021	011	LIST OF MATERIALS		

2018601 AB

3A

NEXT ASSY	USED ON
G007001	G015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL W.Q. 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

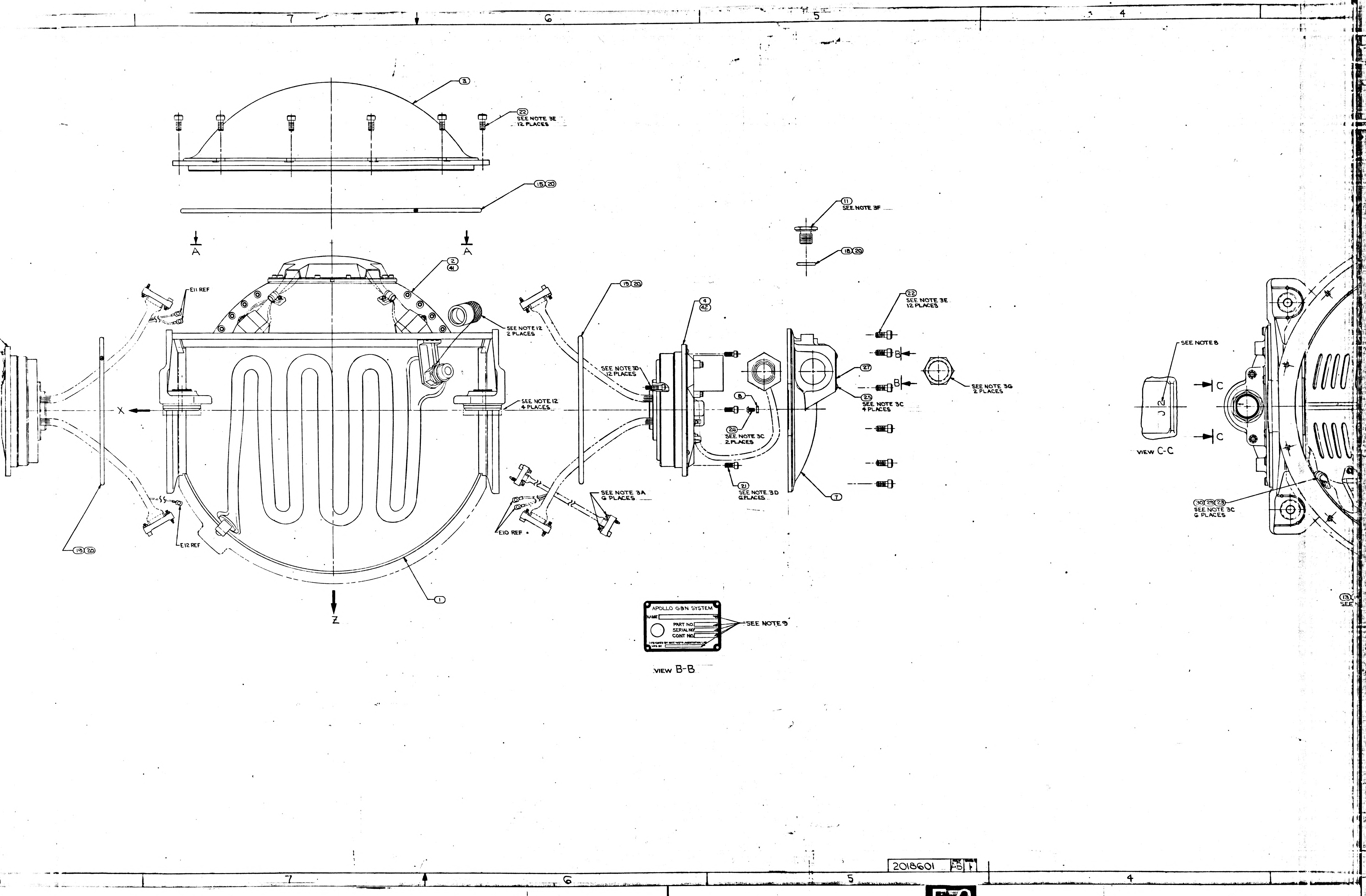
INERTIAL
MEASURING UNIT
ASSEMBLY (BLOCK II)

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1

MASTER

2018601

F3


7
6
5
4
3
22
SEE NOTE 3E
12 PLACES
15 20
A
A
2
41
E11 REF
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
X
E12 REF
19 20
1
Z
19 20
SEE NOTE 3D
12 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
4
42
8
26
SEE NOTE 3C
2 PLACES
21
SEE NOTE 3D
6 PLACES
11
SEE NOTE 3F
18 20
22
SEE NOTE 3E
12 PLACES
B
B
27
25
SEE NOTE 3C
4 PLACES
7
SEE NOTE 3G
2 PLACES
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY M.I.T. INSTRUMENTATION LAB
MFD BY
SEE NOTE 9
VIEW B-B
SEE NOTE 8
J2
C
C
VIEW C-C
30 29 23
SEE NOTE 3C
6 PLACES
13
SEE
7
6
5
4

2018601 AB 1

F-2

TABLE II

SCREW SELECTION CHART (32)

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

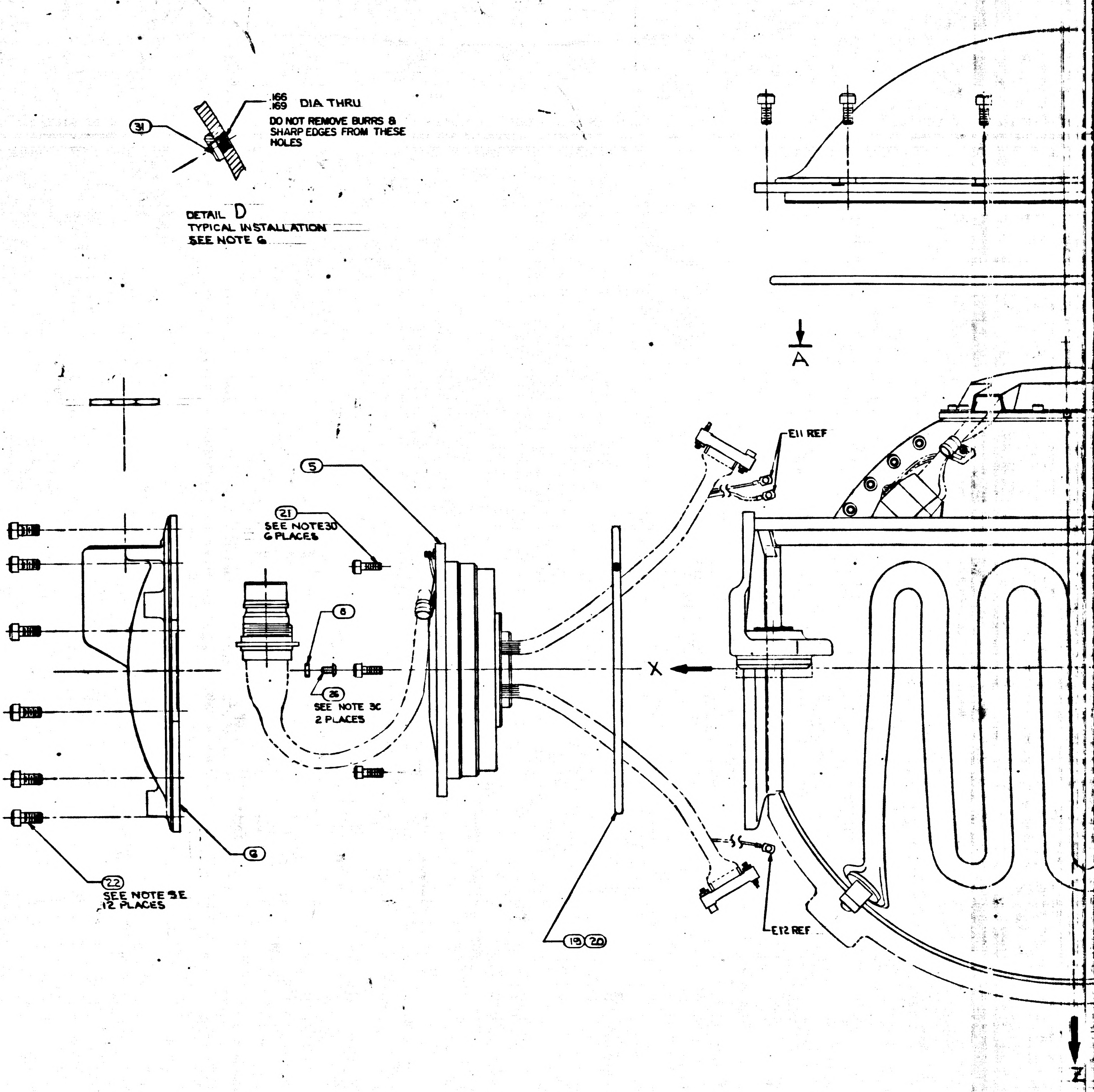
TABLE I

CABLE CLAMP (29)

PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

SCHEMATIC REF CHART

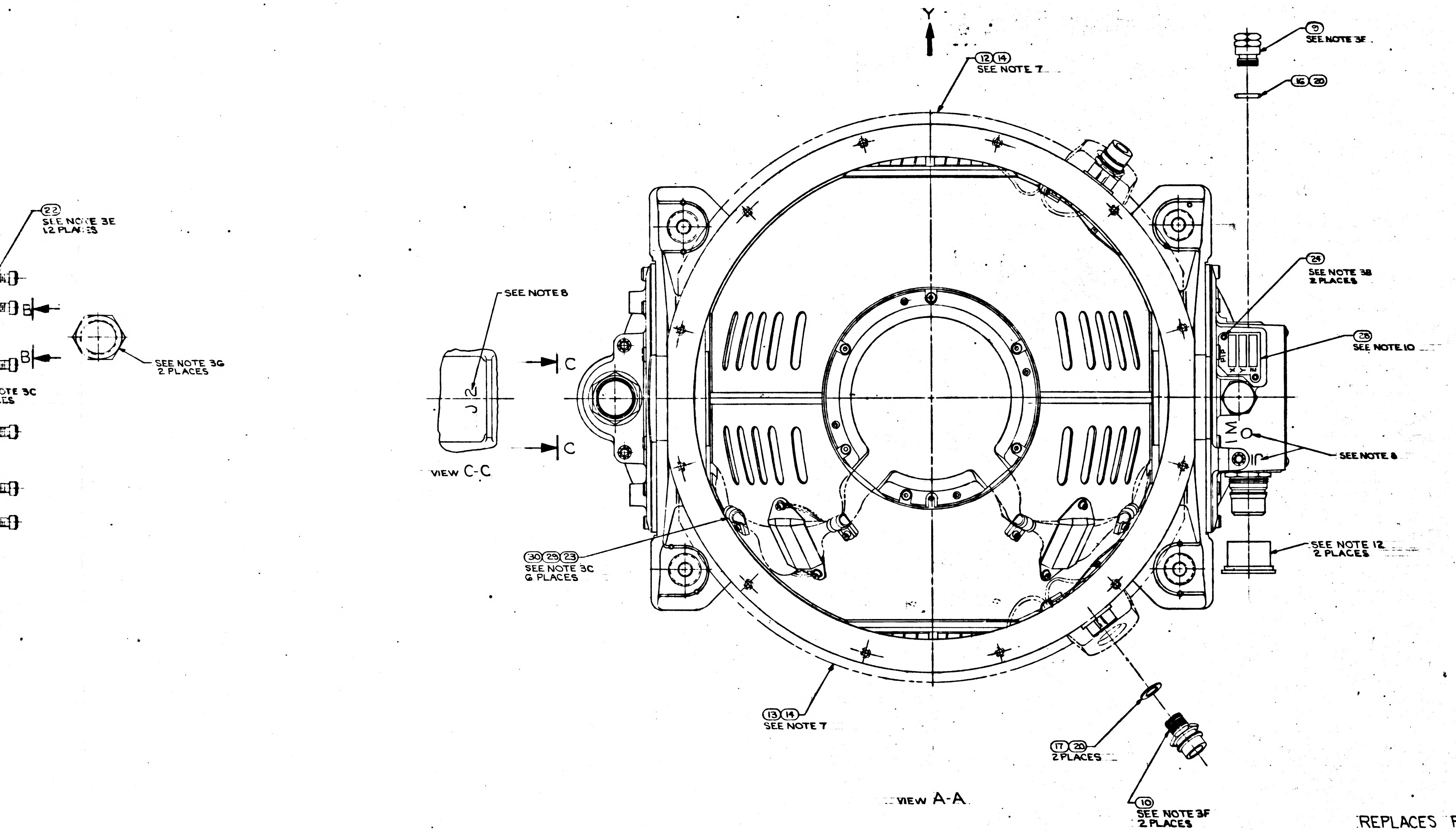
ASSEMBLY NO.	USE SCHEMATIC
2018601-011	2018615
2018601-021	2018618



NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS OF PS 2018601
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED PER PS2018601. ITEM (39) NASA DWG NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY. SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). COAT MATING SURFACES OF ITEMS (12), (13) AND (1) WITH ITEM (14) BEFORE ASSEMBLING.
8. MARK CHARACTERS $\substack{.23\\.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\substack{.10\\.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	WK
V	REVISED TDRR 19275	2 Jun 65	WK
W	REVISED TDRR 21187	26 Jul 65	WK
Y	REVISED PER TDRR 21814	8 Sep 65	
Z	REVISED TDRR 22594	19 Oct 65	WK
AA	REVISED TDRR 23700	19 Oct 65	WK
AB	REVISED TDRR 24308	14 Dec 65	WK
AC	REVISED TDRR 25485	15 Feb 66	WK
AD	REVISED TDRR 26246	15 Feb 66	WK



REPLACES REV T
WITH CHANGES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
A/R	A/R	1000260 - SEE NOTE 5	WEIGHT, BALANCE S/M	39
A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
8	8	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	1000223	WASHER, CABLE CLAMP	30
6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1000022	PLATE, INFORMATION	28
1	1	2018795	PLATE, IDENTIFICATION	27
4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	1010838	ADHESIVE	14
1	1	2018806	INSULATION CASE HEAT EXCH. (L.H)	13
1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
1	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
—	1	2018612-011	I.G.S.A. RESOLVER OUTER AXIS	4
1	1	2018710	CASE COVER	3
—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
021	011	LIST OF MATERIALS		

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY (BLOCK II)

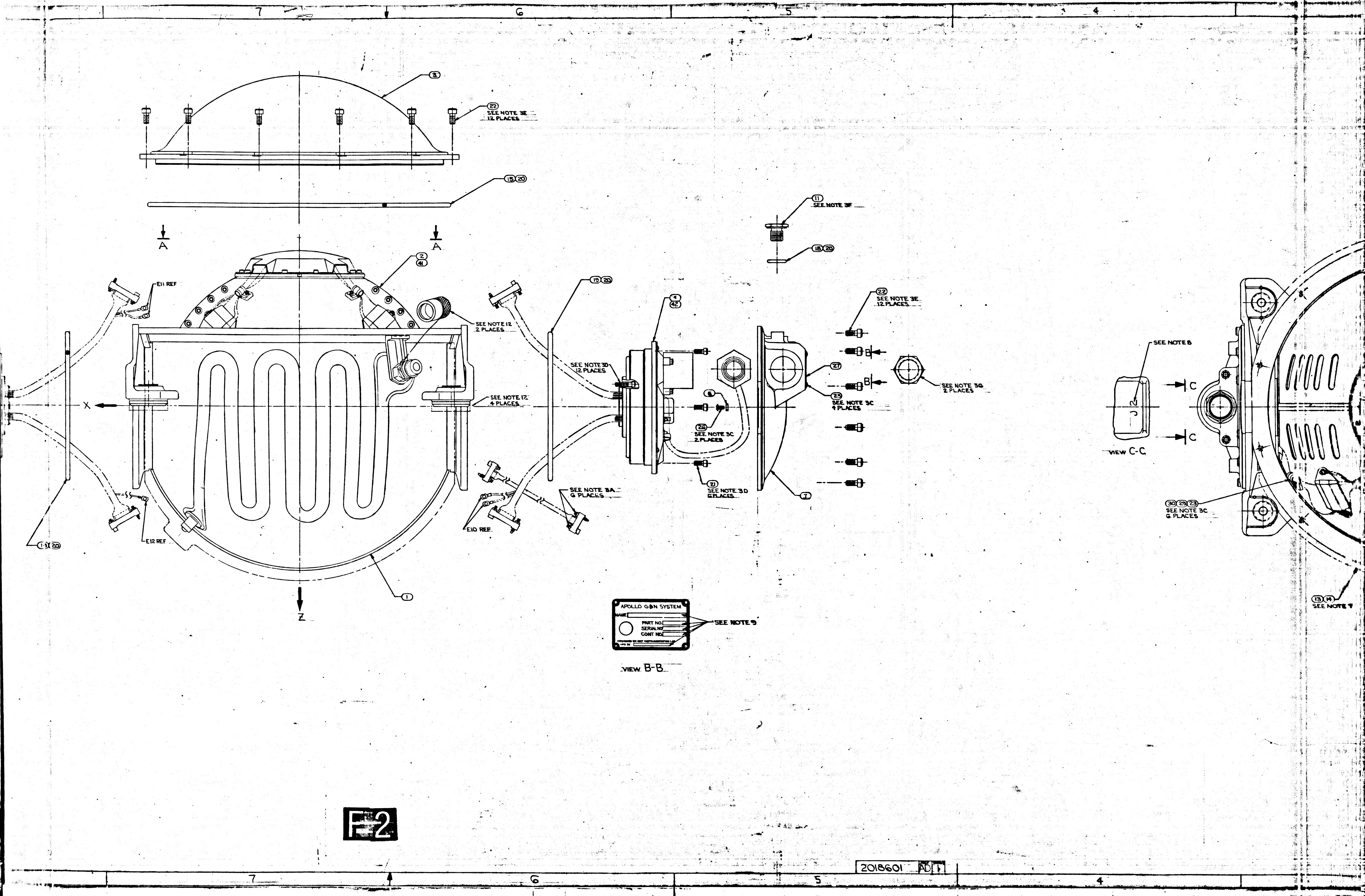
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET OF

F3
MASTER

2018601 AD

3A

2018601


7
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③
㉒ SEE NOTE 3E 12 PLACES
⑮⑳
A
A
E11 REF
② ㊶
SEE NOTE 12 2 PLACES
X
SEE NOTE 12 4 PLACES
E12 REF
⑬⑳
①
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⑲⑳
SEE NOTE 3D 12 PLACES
E10 REF
SEE NOTE 8A 6 PLACES
④ ㊷
⑪ SEE NOTE 3F
⑮⑳
㉒ SEE NOTE 3E 12 PLACES
B
B
㉗
⑤
㉖ SEE NOTE 3C 2 PLACES
㉑ SEE NOTE 3D 6 PLACES
㉕ SEE NOTE 3C 4 PLACES
SEE NOTE 3G 2 PLACES
⑦
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
SEE NOTE 9
VIEW B-B
SEE NOTE 8
J2
C
C
VIEW C-C
㉚㉙㉓ SEE NOTE 3C 6 PLACES
⑬⑭ SEE NOTE 7
7
6
5
4

F2

2018601 AD 1

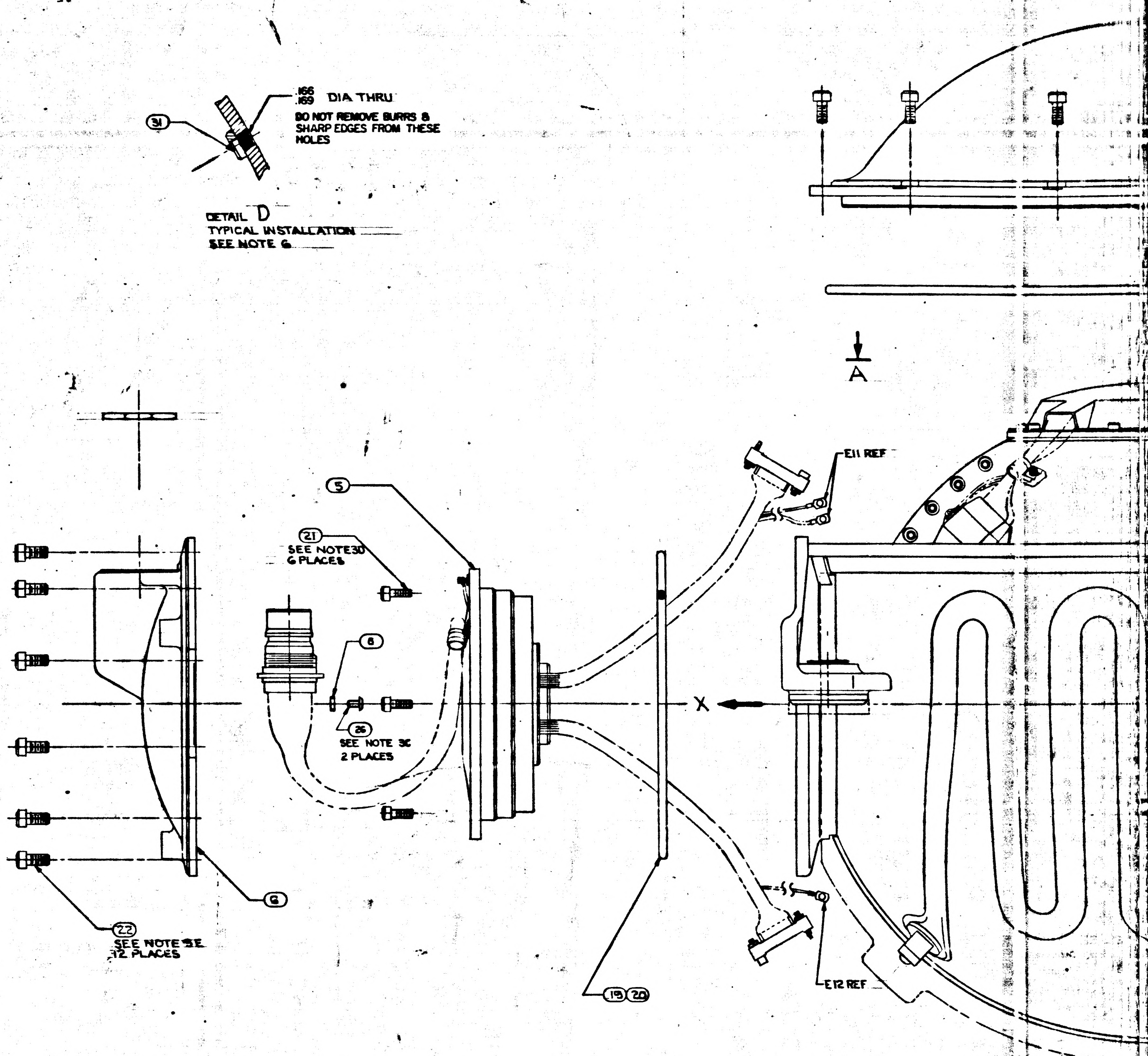
TABLE II

SCREW SELECTION CHART ㉜	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

TABLE I

CABLE CLAMP ㉙	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

SCHEMATIC REF CHART	
ASSEMBLY NO.	USE SCHEMATIC
2018601-011	2018615
2018601-021	2018618

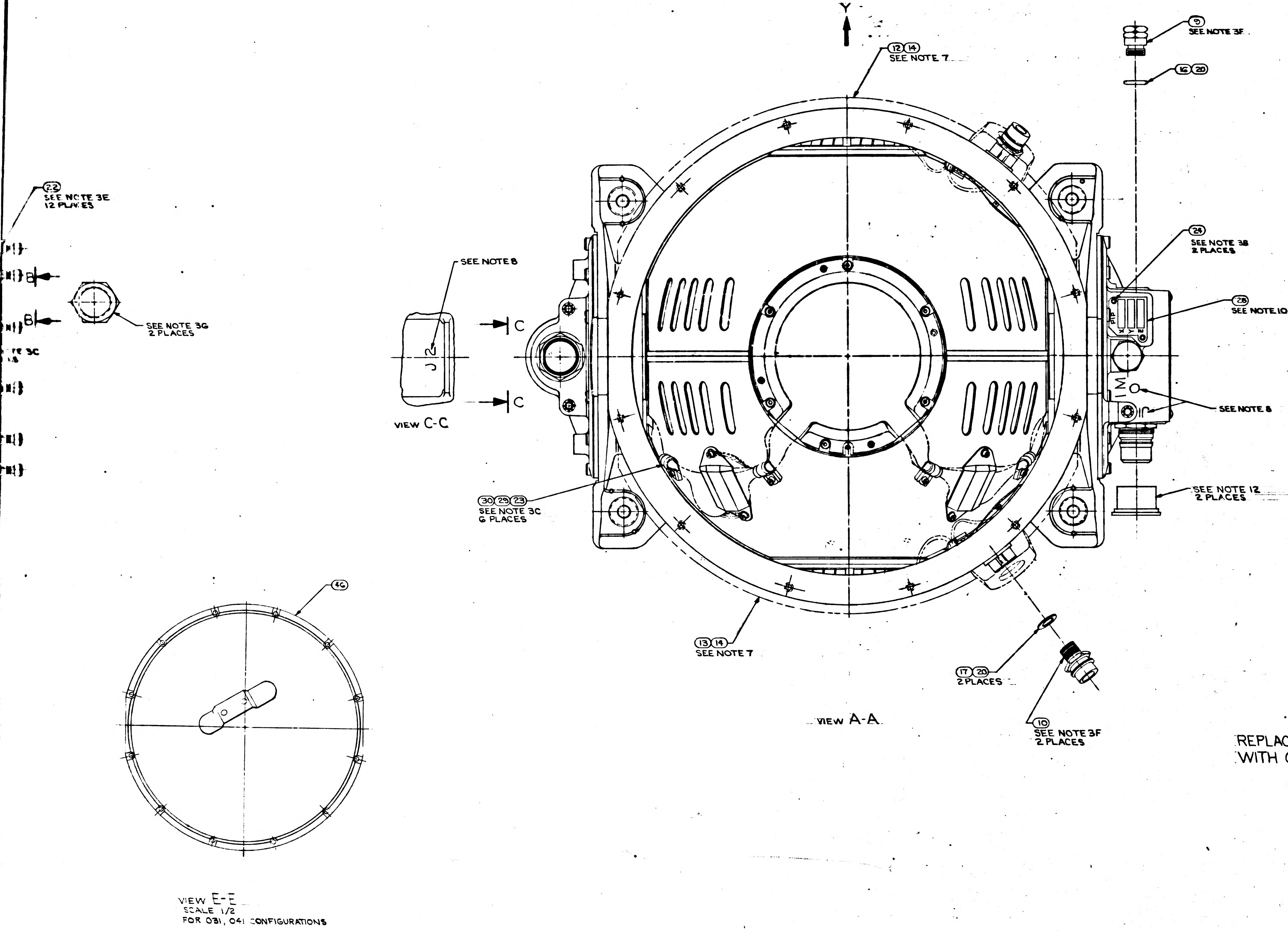


NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS OF PS 2018601
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED PER PS2018601. ITEM ㊴ NASA DWG NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY. SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭. ADJOINING SURFACES OF ITEMS ⑫ + ⑬ TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\substack{.23\\.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\substack{.10\\.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS ⑩, ⑰ AND ⑳ ARE ASSEMBLED TO CASE, ITEM ①
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.

34

SYM	REVISIONS DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	
V	REVISED TDRR 19275	2 Jun 65	
W	REVISED TDRR 21187	26 Jul 65	
Y	REVISED PER TDRR 21814	8 Sep 65	
Z	REVISED TDRR 22594	19 Oct 65	
AA	REVISED TDRR 23700	19 Oct 65	
AB	REVISED TDRR 24308	14 Dec 65	
AC	REVISED TDRR 25485	15 Feb 66	
AD	REVISED TDRR 26246	15 Feb 66	
AE	REVISED TDRR 26247	23 Feb 66	
AF	REVISED TDRR 26258	23 Feb 66	
AG	REVISED TDRR 26260	23 Feb 66	



REPLACES REV T
WITH CHANGES

041	031	021	011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1	—	—	2018839	CASE COVER ASSEMBLY	46
1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	—	1	—	2018612 - 021	IGSA RESOLVER OUTER AXIS	42
1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	39
A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX. SOC	26
4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	1000159-8	PACKING, PREFORMED "O" RING	17
1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	2018806	INSULATION CASE HEAT EXCH. (L.H)	13
1	1	1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
1	1	1	1	2018609-011	I.G.SA. TORQUE MOTOR, OUTER AXIS	5
—	1	—	1	2018612-011	I.G.SA, RESOLVER OUTER AXIS	4
—	—	1	1	2018710	CASE COVER	3
—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

LIST OF MATERIALS

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL W.J. 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY (BLOCK II)

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1

2018601 AG

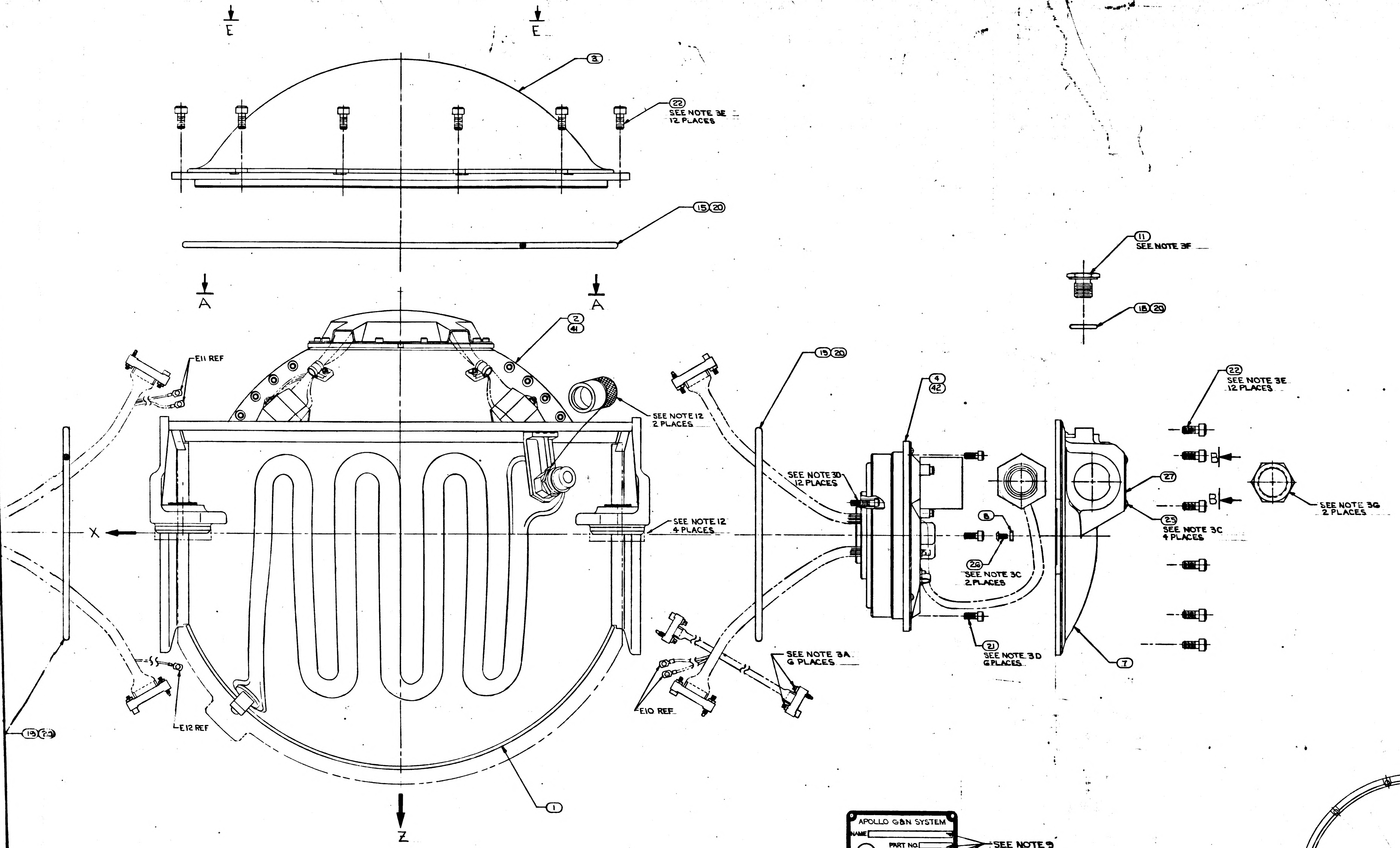
3A

E3

MASTER

2018601 A

2018601


E
E
③
㉒
SEE NOTE 3E
12 PLACES
⑮⑳
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E11 REF
SEE NOTE 12
2 PLACES
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SEE NOTE 3D
12 PLACES
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SEE NOTE 12
4 PLACES
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SEE NOTE 3C
2 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
E12 REF
⑲⑳
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SEE NOTE 3D
6 PLACES
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SEE NOTE 3C
4 PLACES
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SEE NOTE 3E
12 PLACES
B
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2 PLACES
①
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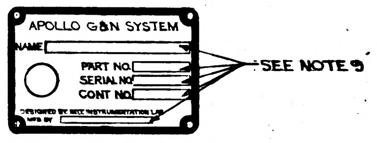
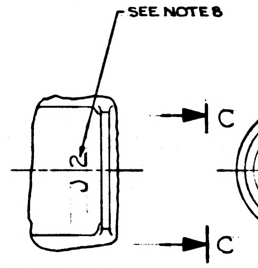
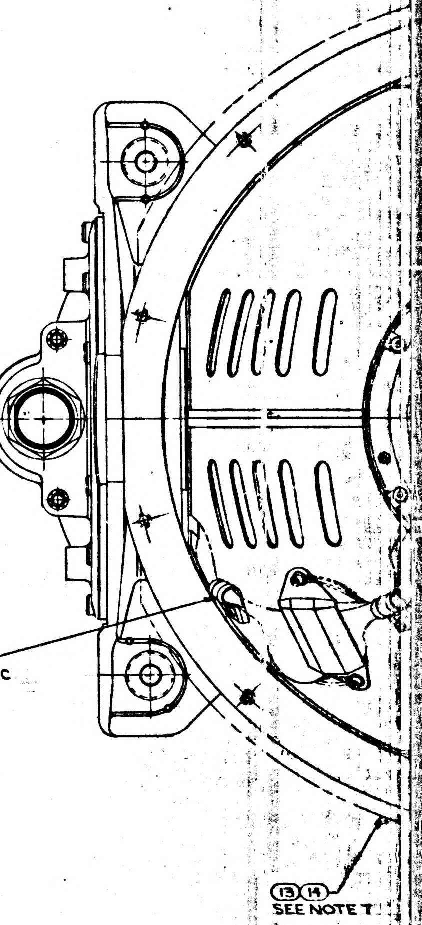

APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY MIT INSTRUMENTATION LAB
MFD BY
SEE NOTE 9

VIEW B-B


SEE NOTE 8
J2
C
C

VIEW C-C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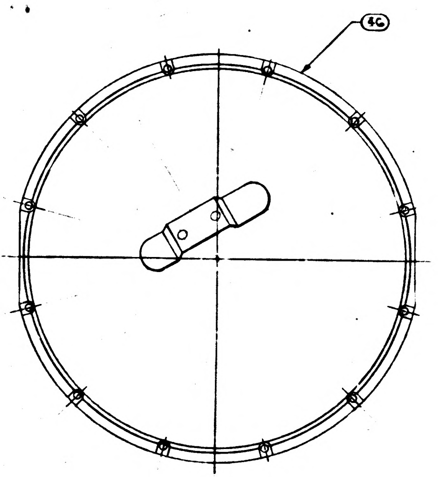
SEE NOTE 3C
6 PLACES
⑬⑭
SEE NOTE 7



VIEW E-E
SCALE 1/2
FOR 081, 041 CONFIGURATIONS

E-2

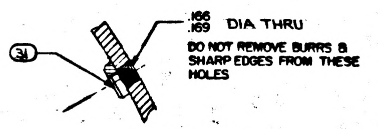
TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

TABLE I	
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

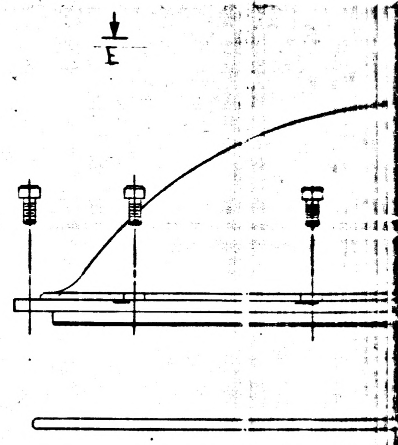
SCHEMATIC REF CHART	
ASSEMBLY NO.	USE SCHEMATIC
2018601-011	2018615
2018601-021	2018618

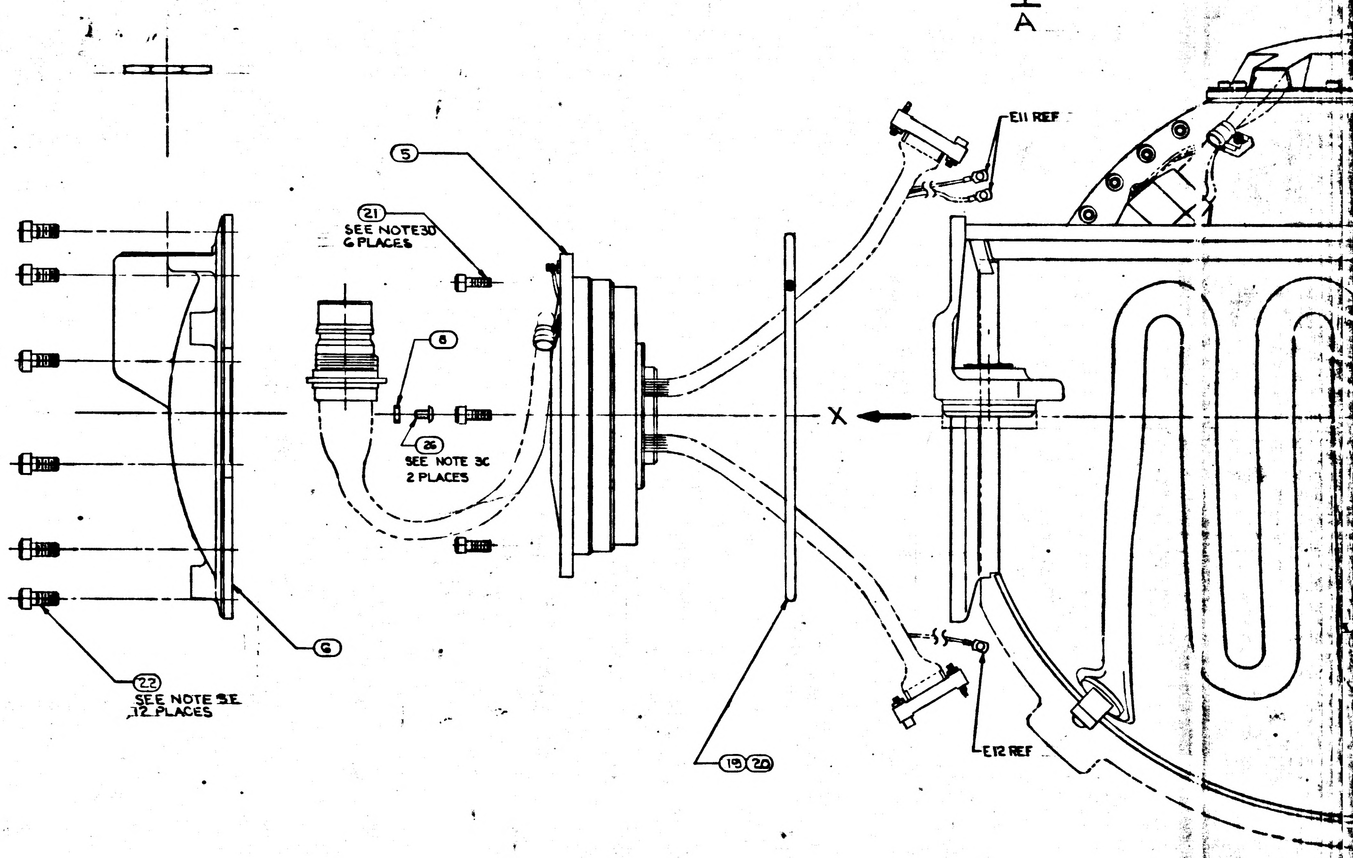
NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS OF PS 2018601
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED PER PS2018601. ~~ITEM (39) NASA DWG NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). *ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER*
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP *NASA DRAWING NO. 2018816-011* TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.



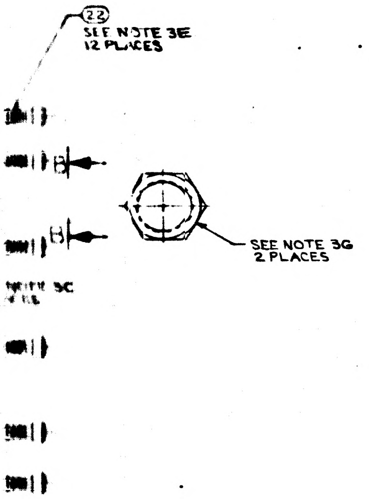
DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

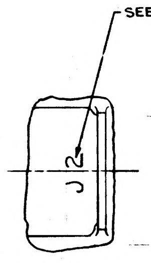



A
E11 REF
(5)
(21) SEE NOTE 3D 6 PLACES
(8)
(26) SEE NOTE 3C 2 PLACES
X
(6)
(22) SEE NOTE 3E 12 PLACES
(19) (20)
E12 REF

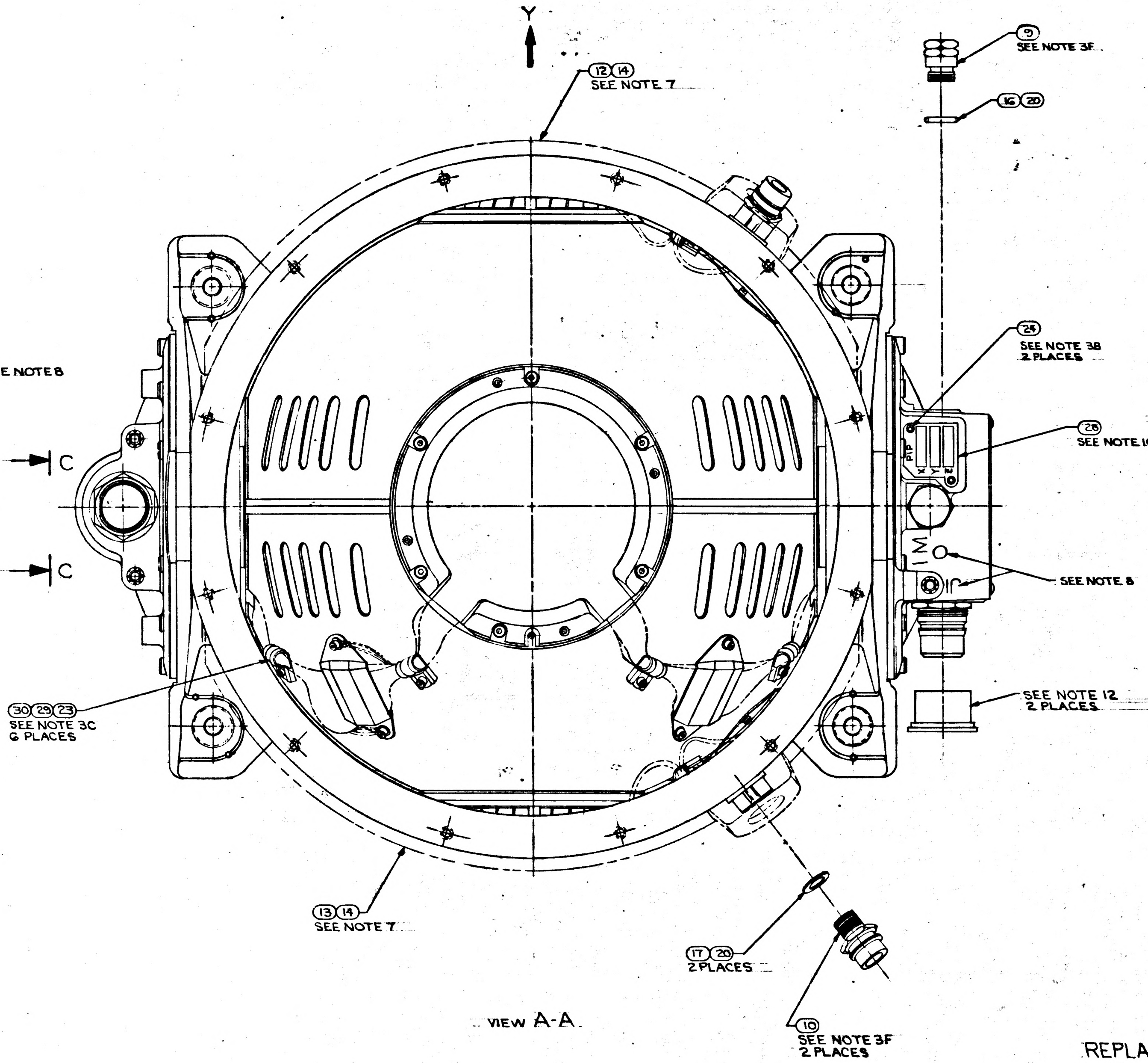
34

SYM	REVISIONS DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65		WK
V	REVISED TDRR 19275	2 Jun 65		WK
W	REVISED TDRR 21187	26 Jul 65		WK
Y	REVISED PER TDRR 21814	8 Sep 65		
Z	REVISED TDRR 22594	19 Oct 65		WK
AA	REVISED TDRR 23700	19 Oct 65		WK
AB	REVISED TDRR 24308	14 Dec 65		WK
AC	REVISED TDRR 25485	15 Feb 66		WK
AD	REVISED TDRR 26246	15 Feb 66		WK
AE	REVISED TDRR 26247	23 Feb 66		WK
AF	REVISED TDRR 26258	23 Feb 66		WK
AG	REVISED TDRR 26260	23 Feb 66		WK
AH	REVISED TDRR 26879	14 Mar 66		WK

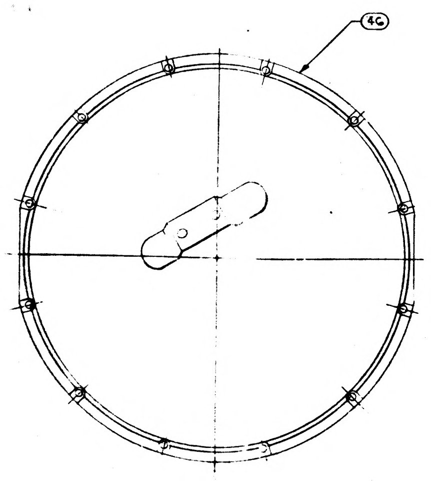




VIEW C-C



VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 041 CONFIGURATIONS

REPLACES REV T
WITH CHANGES

1	1	—	—	2018839	CASE COVER ASSEMBLY	46
1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	—	1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX. SOC HEAD~~	33
A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	2018806	INSULATION CASE HEAT EXCH.(L.H)	13
1	1	1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
1	1	1	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
—	1	—	1	2018612-011	I.G.S.A, RESOLVER OUTER AXIS	4
—	—	1	1	2018710	CASE COVER	3
—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
			QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
041	031	021	011	LIST OF MATERIALS		

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO. CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL W. O. 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

2018601 AH

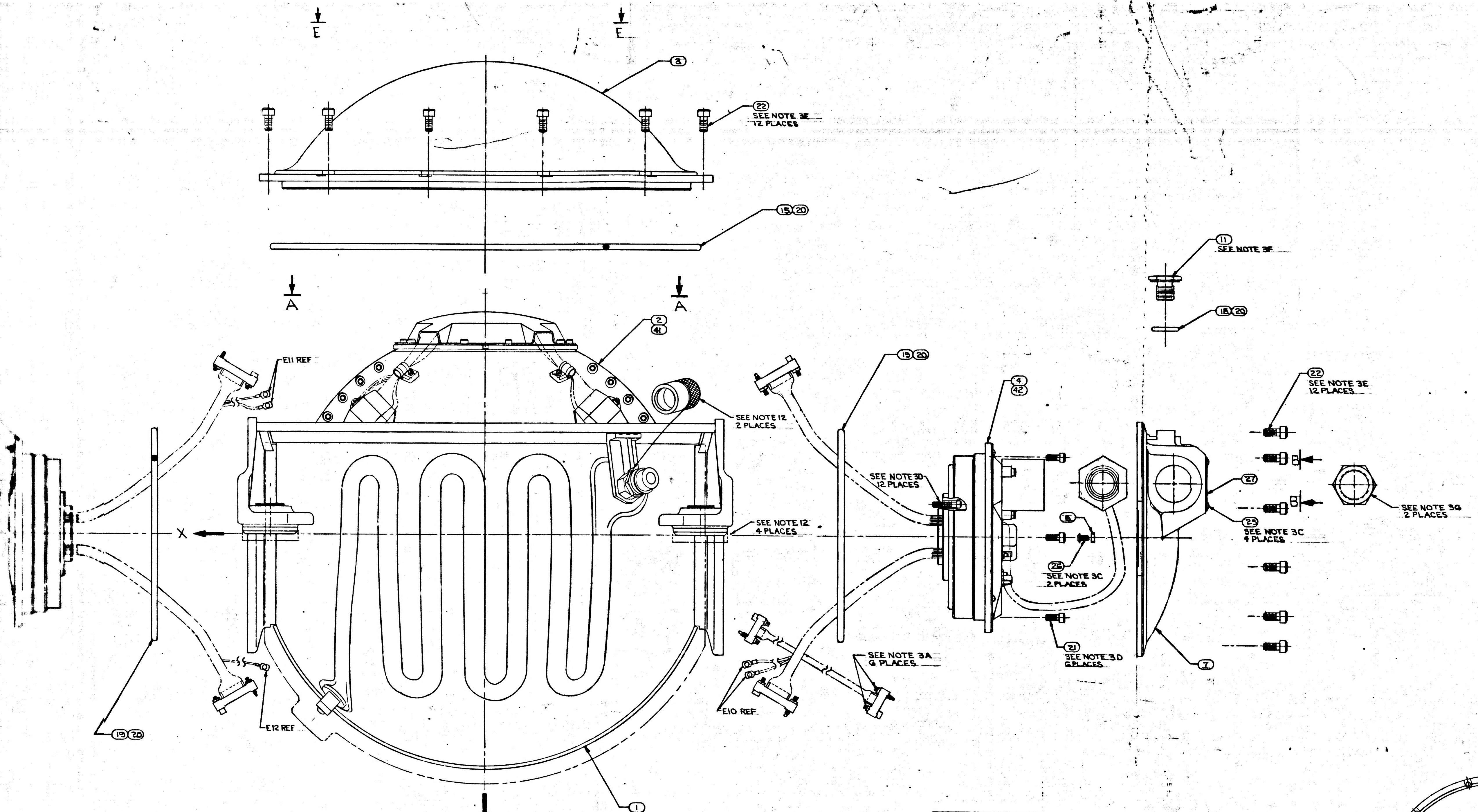
3A

MASTER

2018601 REV AH

2018601

F3


E
E
A
A
X
Z
③
㉒ SEE NOTE 3E 12 PLACES
⑮⑳
② ㊶
E11 REF
SEE NOTE 12 2 PLACES
SEE NOTE 12 4 PLACES
⑲⑳
E12 REF
①
E10 REF
SEE NOTE 3A 6 PLACES
SEE NOTE 3D 12 PLACES
⑲⑳
④ ㊷
⑥
㉖ SEE NOTE 3C 2 PLACES
㉑ SEE NOTE 3D 6 PLACES
⑪ SEE NOTE 3F
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B
B
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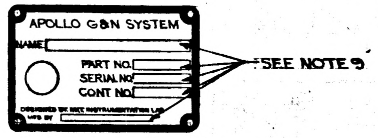
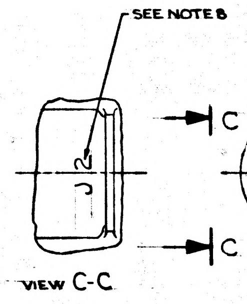
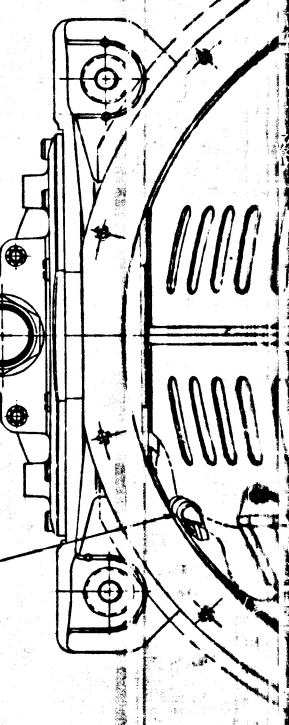
㉕ SEE NOTE 3C 4 PLACES
⑦
SEE NOTE 3G 2 PLACES

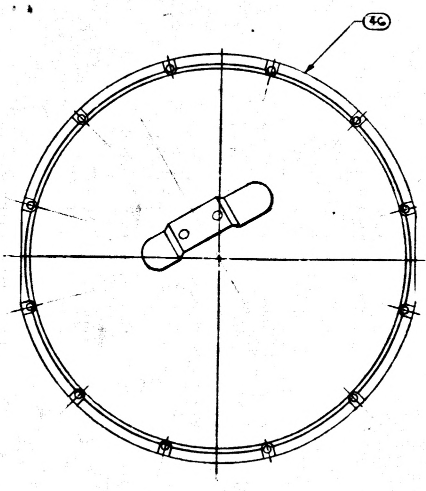

APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY MIT INSTRUMENTATION LAB
MFG BY
SEE NOTE 9

VIEW B-B


SEE NOTE 8
J2
C
C

VIEW C-C

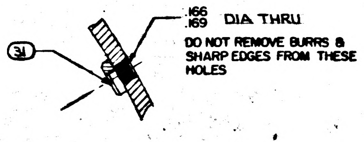

㉚㉙㉓ SEE NOTE 3C 6 PLACES



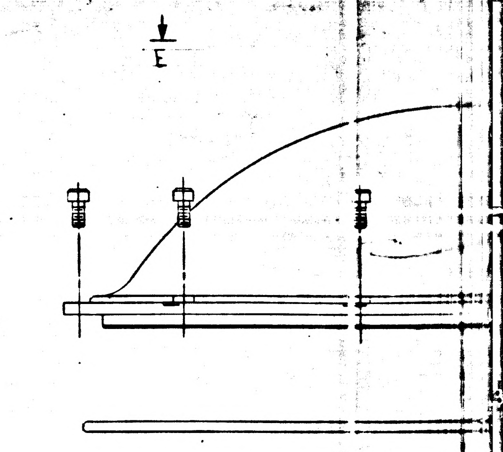
VIEW E-E
SCALE 1/2
FOR 031, 041 CONFIGURATIONS

TABLE II	
SCREW SELECTION CHART ㉜	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

TABLE I	
CABLE CLAMP ㉙	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

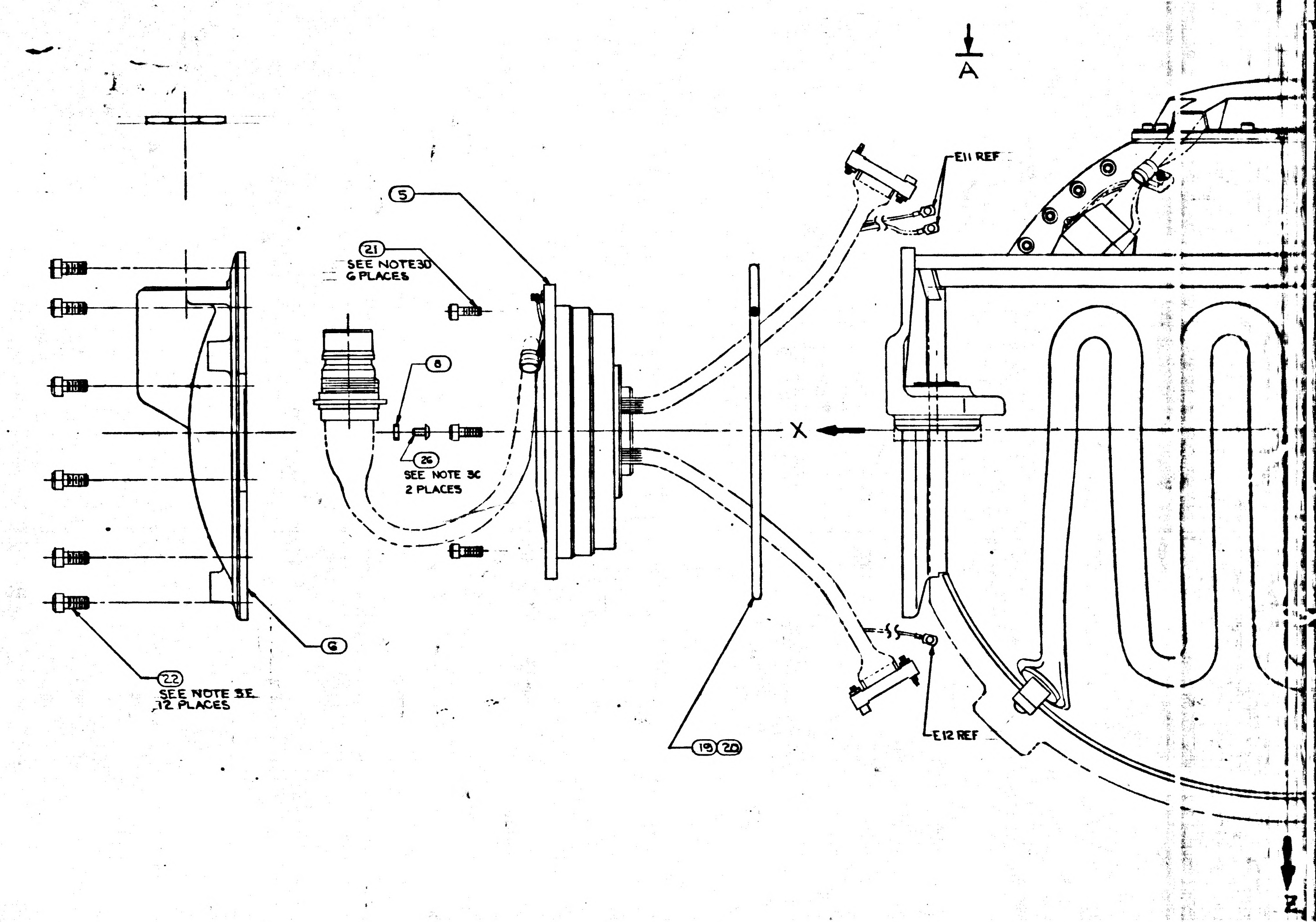


DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016152
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152

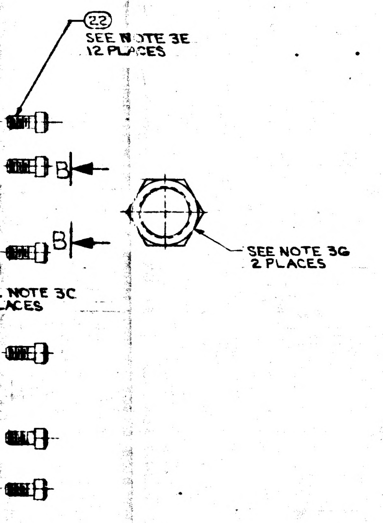


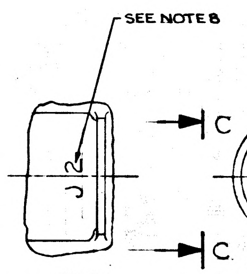
NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM ㉝ NASA DWG NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭. ADJOINING SURFACES OF ITEMS ⑫ + ⑬ TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS ⑩, ⑰ AND ⑳ ARE ASSEMBLED TO CASE, ITEM ①
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.

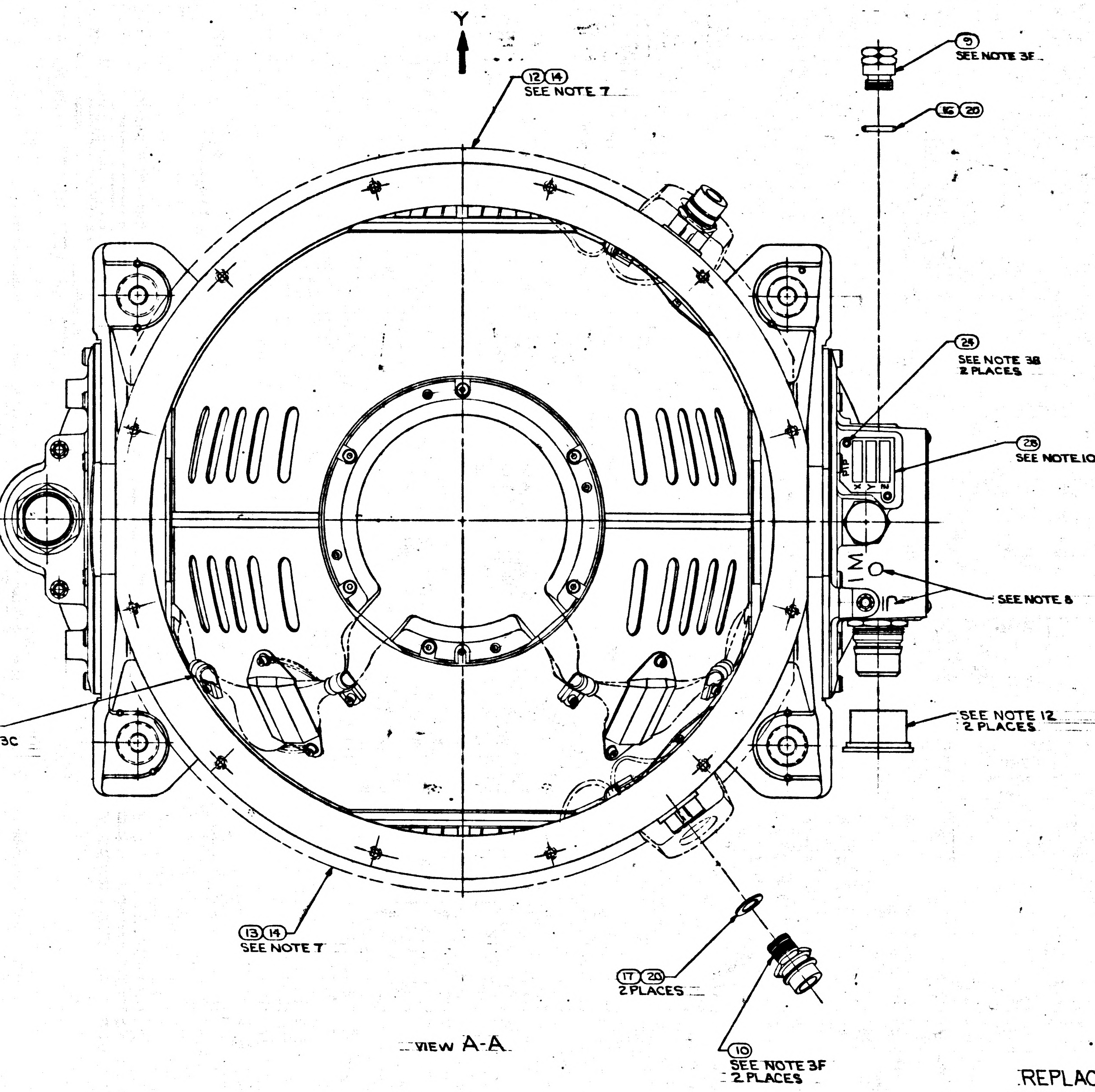
34

SYM	DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	wk
V	REVISED TDRR 19275	2 Jun 65	wk
W	REVISED TDRR 21187	16 Jun 65	wk
Y	REVISED PER TDRR 21814	13 Sep 65	wk
Z	REVISED TDRR 22594	19 Oct 65	wk
AA	REVISED TDRR 23700	19 Oct 65	wk
AB	REVISED TDRR 24308	14 Dec 65	wk
AC	REVISED TDRR 25485	15 Feb 66	wk
AD	REVISED TDRR 26246	15 Feb 66	wk
AE	REVISED TDRR 26247	23 Feb 66	wk
AF	REVISED TDRR 26258	23 Feb 66	wk
AG	REVISED TDRR 26260	23 Feb 66	wk
AH	REVISED TDRR 26879	14 Mar 66	wk
AJ	REVISED TDRR 27347	25 Mar 66	wk

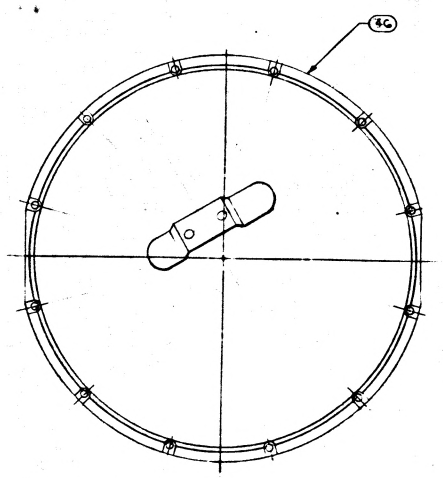




VIEW C-C



VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 041 CONFIGURATIONS

REPLACES REV T
WITH CHANGES

1	1	—	—	2018835	CASE COVER ASSEMBLY	46
1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	—	1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	39
A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	1000159-9	PACKING, PREFORMED "O" RING	17
1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L.H)	13
1	1	1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
—	1	—	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
—	1	—	1	2018612-011	I.G.S.A, RESOLVER OUTER AXIS	4
—	—	1	1	2018710	CASE COVER	3
—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
			QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
041	031	021	011	LIST OF MATERIALS		

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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INSTRUMENTATION LAB
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DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL W.J. 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018601
SCALE 1/1 WT SHEET 1 OF 1

2018601 AJ

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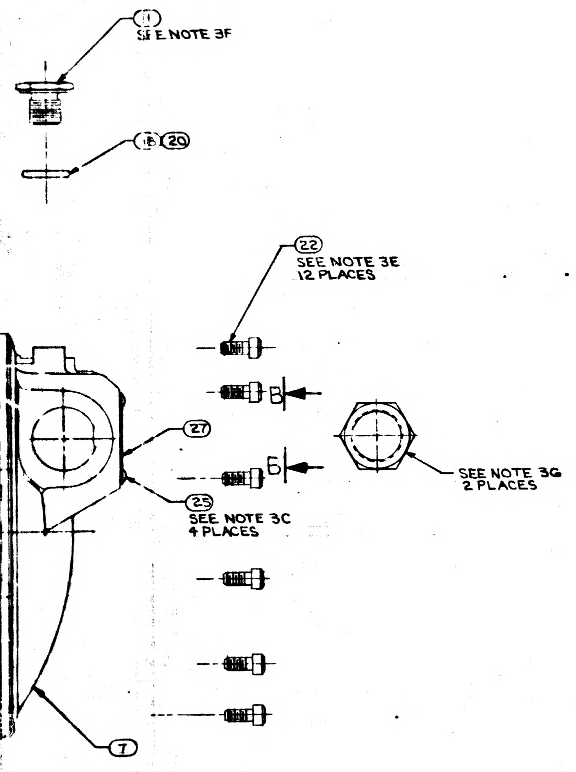
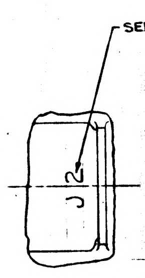
MASTER

2018601 AJ

F-4

	REVISIONS		
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	
V	REVISED TDRR 19275	2 Jun 65	
W	REVISED TDRR 21187	26 Jul 65	
Y	REVISED PER TDRR 21814	13 Sep 65	
Z	REVISED TDRR 22594	19 Oct 65	
AA	REVISED TDRR 23700	19 Oct 65	
AB	REVISED TDRR 24308	[illegible]	
AC	REVISED TDRR 25485	15 Feb 66	
AD	REVISED TDRR 26246	15 Feb 66	
AE	REVISED TDRR 26247	23 Feb 66	
AF	REVISED TDRR 26258	23 Feb 66	
AG	REVISED TDRR 26260	23 Feb 66	
AH	REVISED TDRR 26879	[illegible]	
AJ	REVISED TDRR 27347	25 Mar 66	





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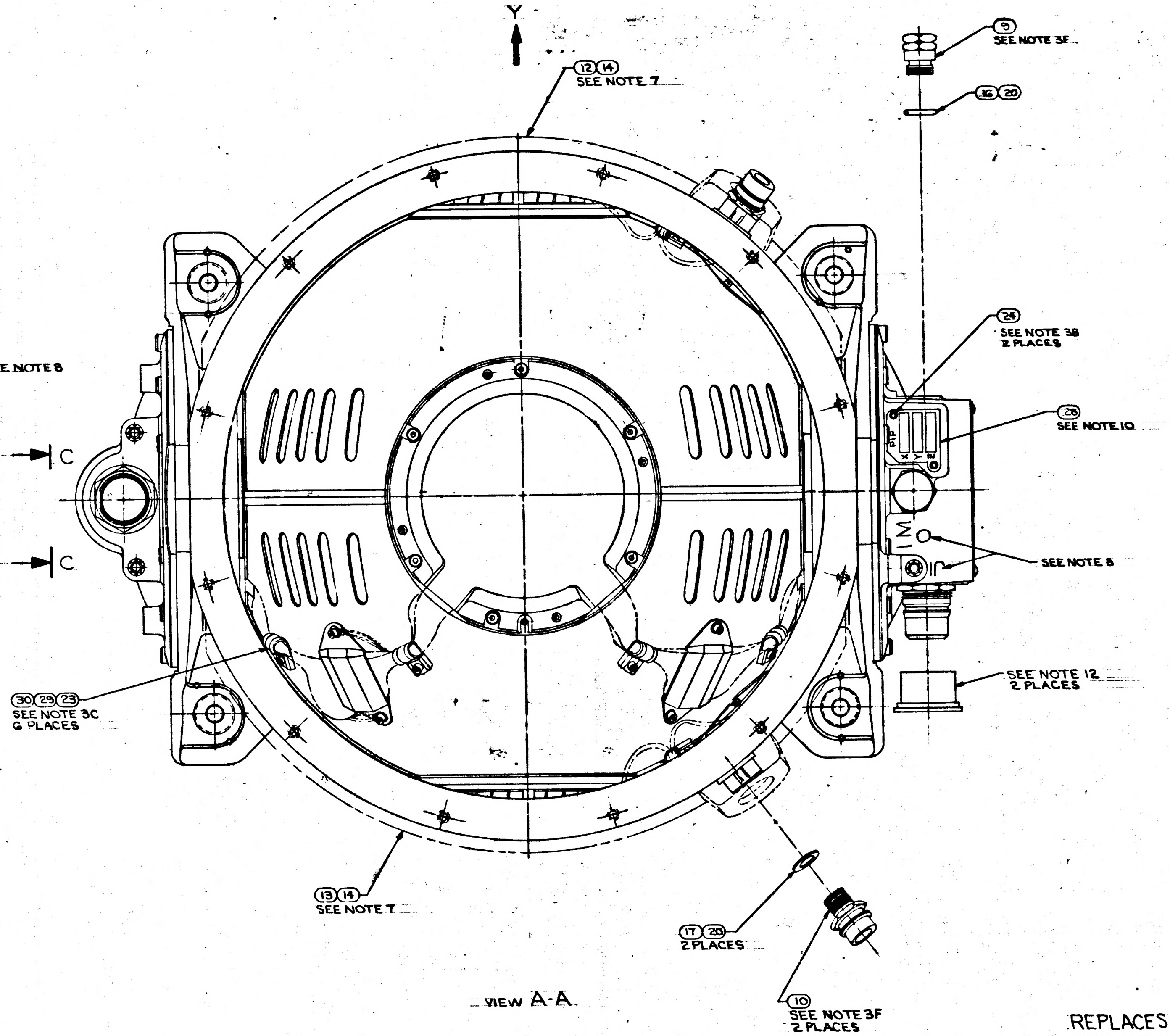

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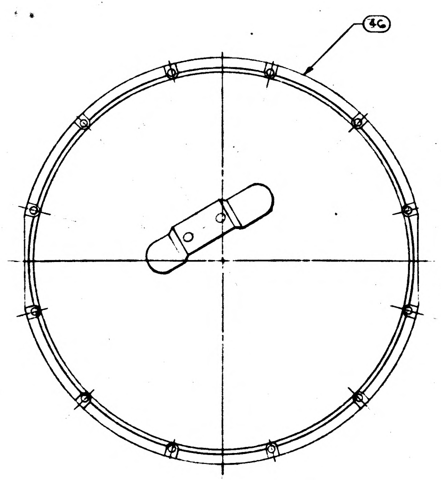

VIEW E-E
SCALE 1/2
FOR 031, 041 CONFIGURATIONS

REPLACES REV T
WITH CHANGES

MASTER

1	1	—	—	2018839	CASE COVER ASSEMBLY
1	—	1	—	2018609-021	IGSA., TORQUE MOTOR OUTER AXIS
2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX., SOC HD SELF-LKG
A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M
1	—	1	—	2018612 - 021	IGSA RESOLVER OUTER AXIS
1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY
A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL
~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~
A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M
A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M
A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL
A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL
A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL
~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX. SOC HEAD~~
A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG
4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH
6	6	6	6	1000223	WASHER, CABLE CLAMP
6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE
1	1	1	1	1000022	PLATE, INFORMATION
1	1	1	1	2018795	PLATE, IDENTIFICATION
4	4	4	4	1006783-18	SCREW. BUTTON HD, HEX. SOC
4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE
2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE
6	6	6	6	1001488-1	SCREW, HEX SOC HEAD
36	36	36	36	1001489-46	SCREW, HEX SOC HEAD
12	12	12	12	1001489-18	SCREW, HEX SOC HEAD
A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55
2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING
1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING
2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING
1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING
1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING
A/R	AR	A/R	A/R	1010838	ADHESIVE
1	1	1	1	2018806	INSULATION CASE HEAT EXCH. (L.H.)
1	1	1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)
1	1	1	1	2018775	COVER ACCESS RSVR MODULE
2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT
1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY
2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS
1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS
1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS
—	1	—	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS
—	1	—	1	2018612-011	I.G.S.A. RESOLVER OUTER AXIS
—	—	1	1	2018710	CASE COVER
—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY
1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y
			QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
041	031	021	011	LIST OF MATERIALS	

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
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FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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MIT
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DWG NO
CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
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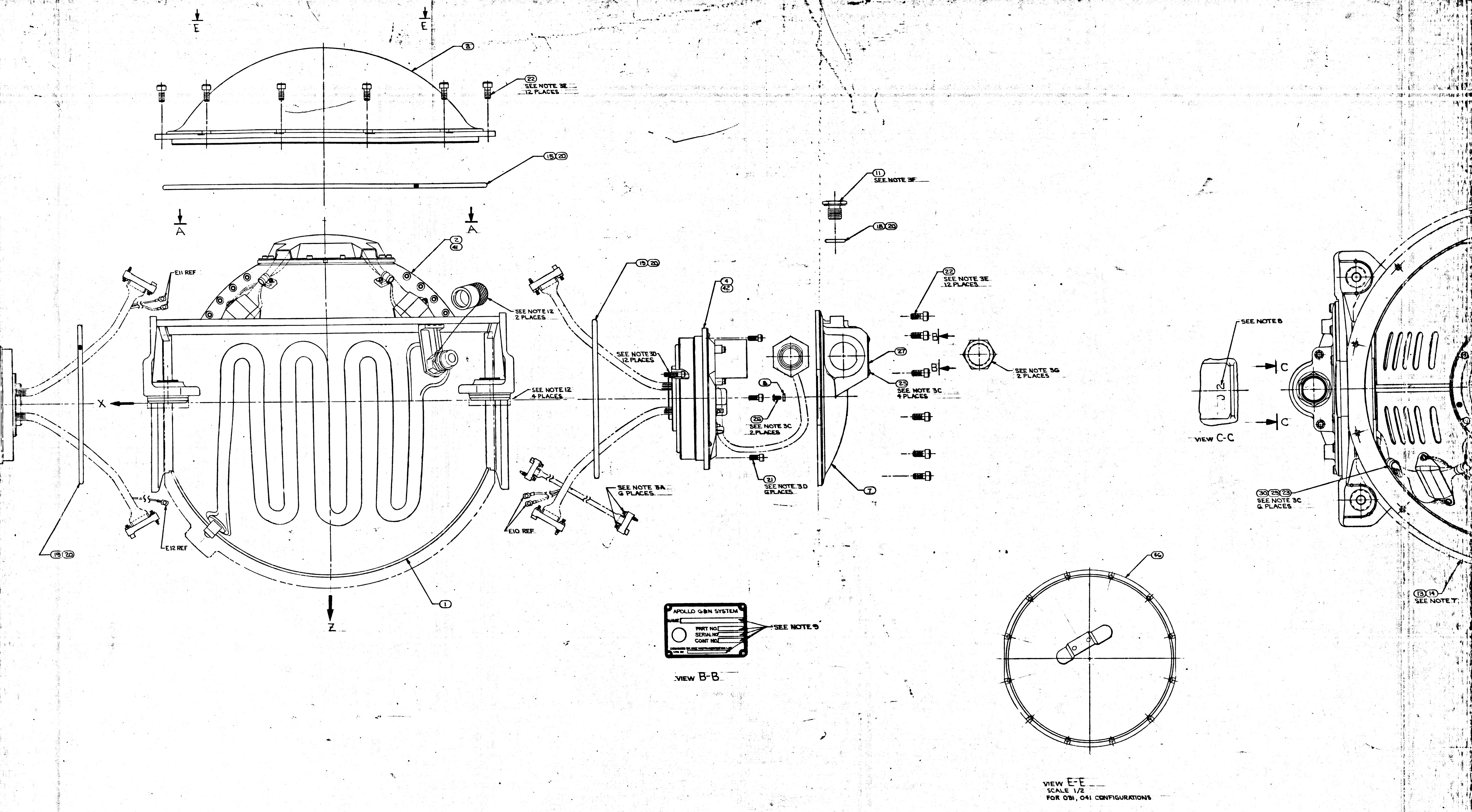
INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1

2018601 AJ

3A

2018601 AJ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3
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SEE NOTE 3E
12 PLACES
15 20
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42
SEE NOTE 3D
12 PLACES
SEE NOTE 12
4 PLACES
X
SEE NOTE 3A
6 PLACES
E10 REF
E12 REF
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SEE NOTE 3F
18 20
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SEE NOTE 3E
12 PLACES
B
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27
25
SEE NOTE 3C
4 PLACES
SEE NOTE 3G
2 PLACES
8
26
SEE NOTE 3C
2 PLACES
21
SEE NOTE 3D
6 PLACES
7
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
SEE NOTE 9
VIEW B-B
SEE NOTE 8
J2
C
C
VIEW C-C
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
46
VIEW E-E
SCALE 1/2
FOR 081, 041 CONFIGURATIONS

2018601 AJ

TABLE II

SCREW SELECTION CHART (32)

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

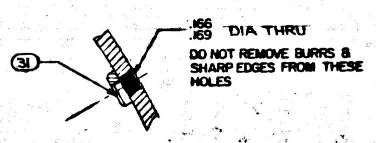
TABLE I

CABLE CLAMP (29)

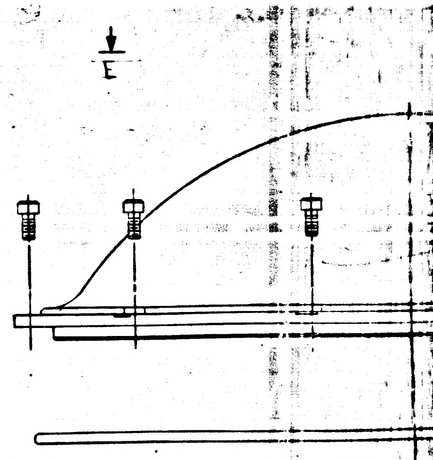
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

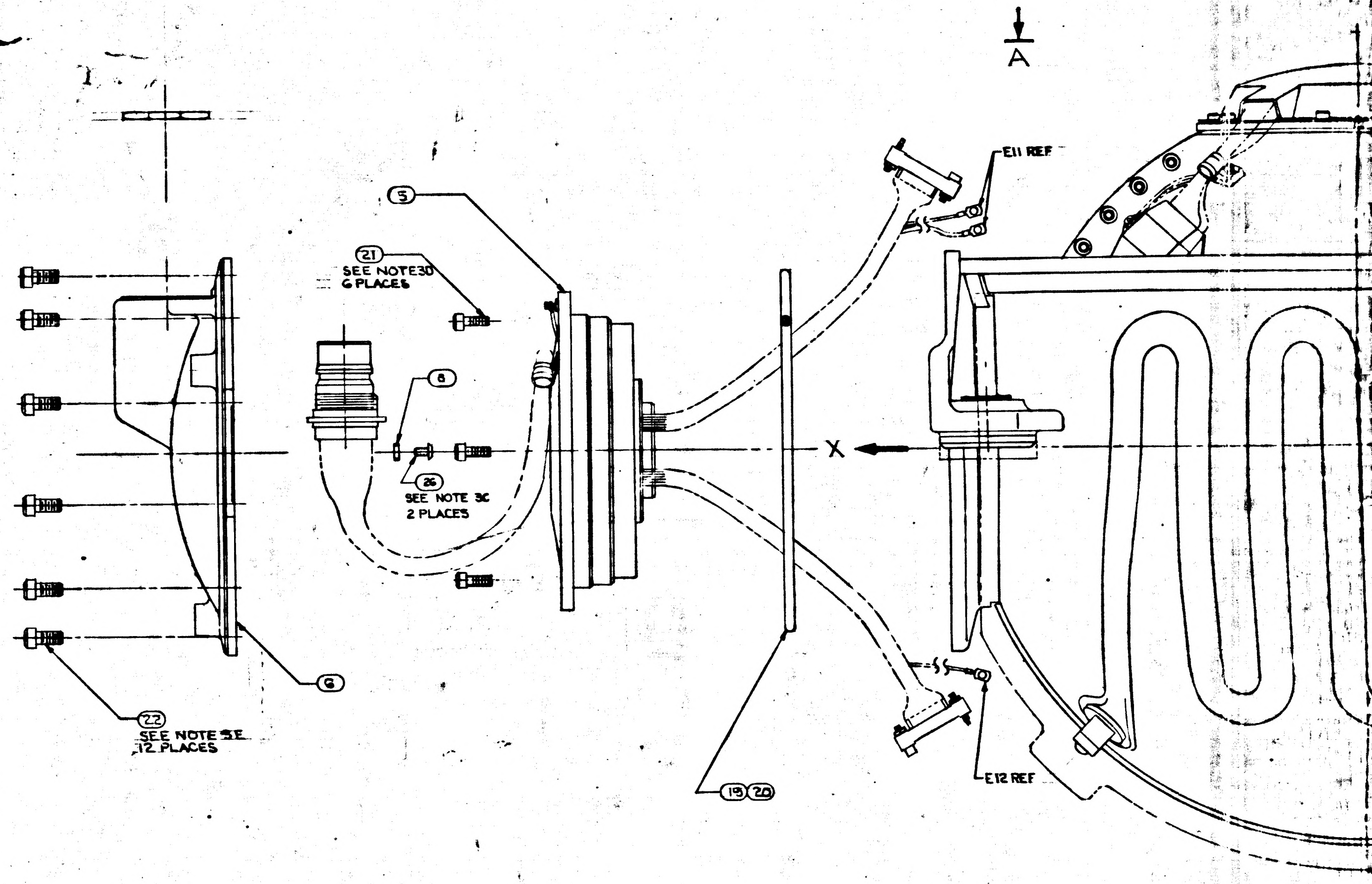
DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC. SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6




A
E11 REF
(5)
(21) SEE NOTE 3D 6 PLACES
(8)
(26) SEE NOTE 3C 2 PLACES
X
(6)
(22) SEE NOTE 3E 12 PLACES
(19)(20)
E12 REF

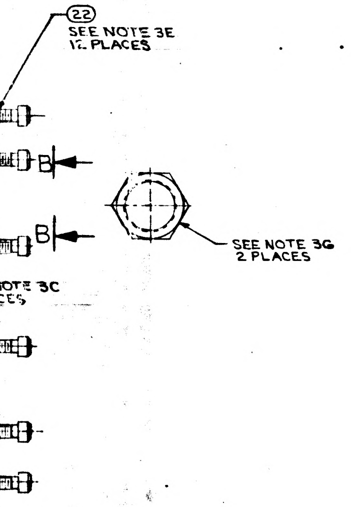
NOTES

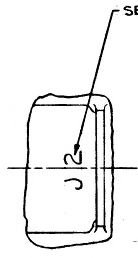
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (33) NASA DWG NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE *BONDED TO EACH OTHER*
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP NASA DRAWING *NO.2018816-011* TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.

34

2018601 AJ 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	WK
V	REVISED TDRR 19275	2 Jun 65	WK
W	REVISED TDRR 21187	26 Jul 65	WK
Y	REVISED PER TDRR 21814	8 Sep 65	
Z	REVISED TDRR 22594	19 Oct 65	WK
AA	REVISED TDRR 23700	19 Oct 65	WK
AB	REVISED TDRR 24 308	[illegible] Dec 65	WK
AC	REVISED TDRR 25485	15 Feb 66	WK
AD	REVISED TDRR 26246	15 Feb 66	WK
AE	REVISED TDRR 26247	23 Feb 66	WK
AF	REVISED TDRR 26258	23 Feb 66	WK
AG	REVISED TDRR 26260	23 Feb 66	WK
AH	REVISED TDRR 26879	17 Mar 66	WK
AJ	REVISED TDRR 27347	25 Mar 66	WK
AK	REVISED TDRR 27776	22 Apr 66	WK





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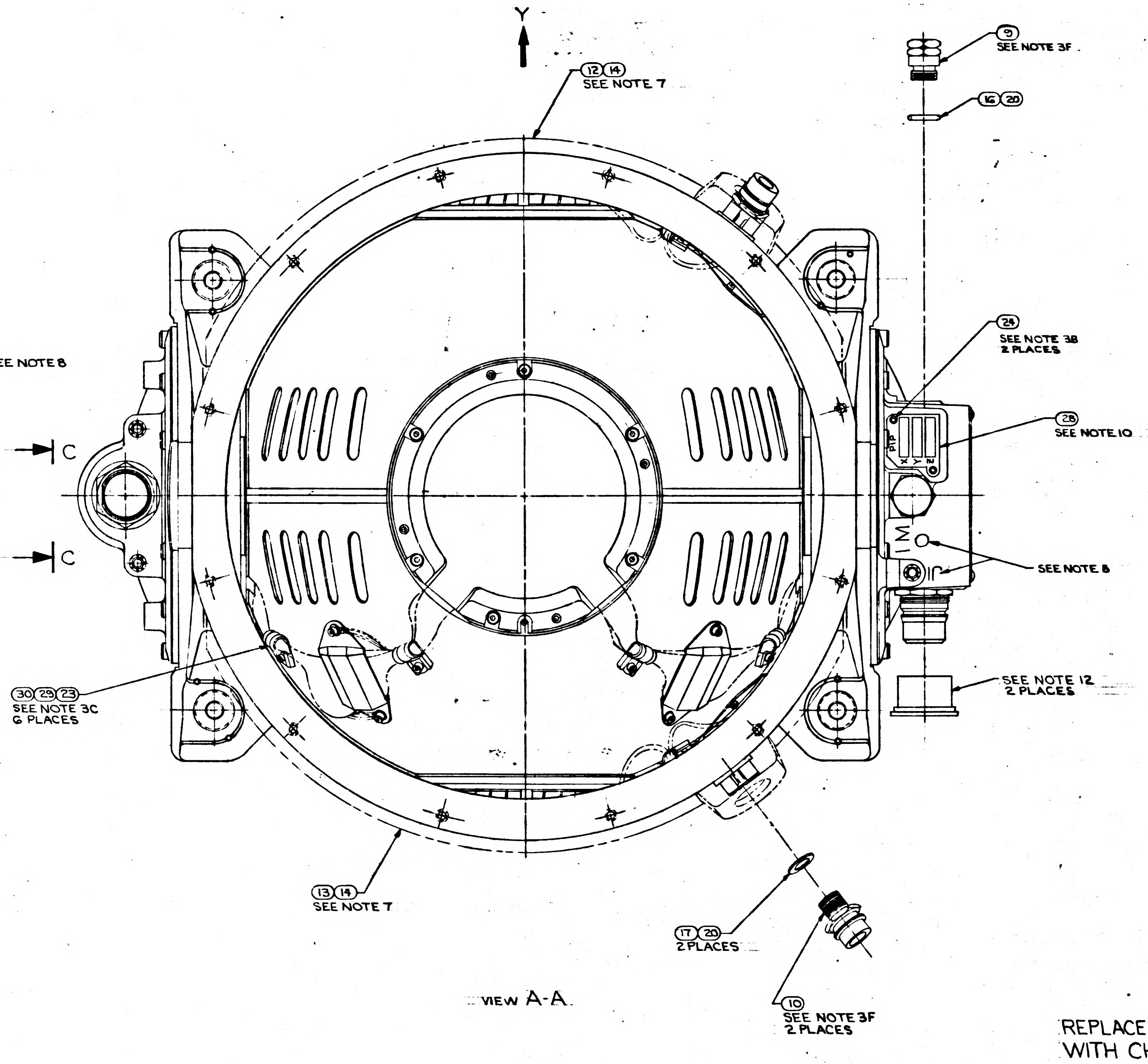

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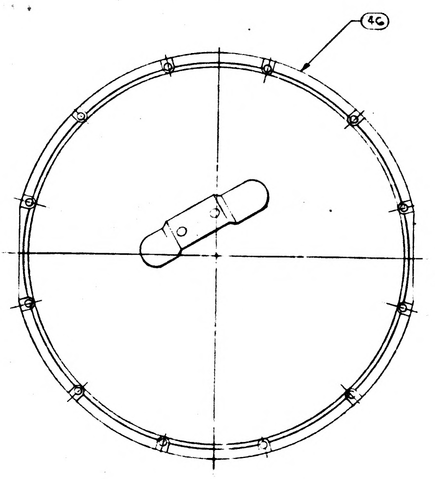

VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

REPLACES REV T WITH CHANGES

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1	—	1	—	—	2018839	CASE COVER ASSEMBLY	46
1	1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	—	1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
	~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
	~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX. SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	1006783-18	SCREW. BUTTON HD, HEX. SOC	26
4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH. (L.H)	13
1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
—	—	1	—	1	2018609-011	I.G.SA. TORQUE MOTOR, OUTER AXIS	5
—	—	1	—	1	2018612-011	I.G.SA, RESOLVER OUTER AXIS	4
—	1	—	1	1	2018710	CASE COVER	3
—	—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

LIST OF MATERIALS

G007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

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MATERIAL
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DRAWN DTB DATE 3/5/65
CHECKED G. G. [illegible] 3/11/65
APPROVAL [illegible] 23 Mar 65
APPROVAL
NASA APPROVAL W J [illegible] 3-23-65
MIT APPROVAL W [illegible] 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL MEASURING UNIT ASSEMBLY

CODE IDENT NO. 80230 | SIZE J | NASA DRAWING NO. 2018601
SCALE 1/1 | WT | SHEET [illegible] OF [illegible]

2018601 AK

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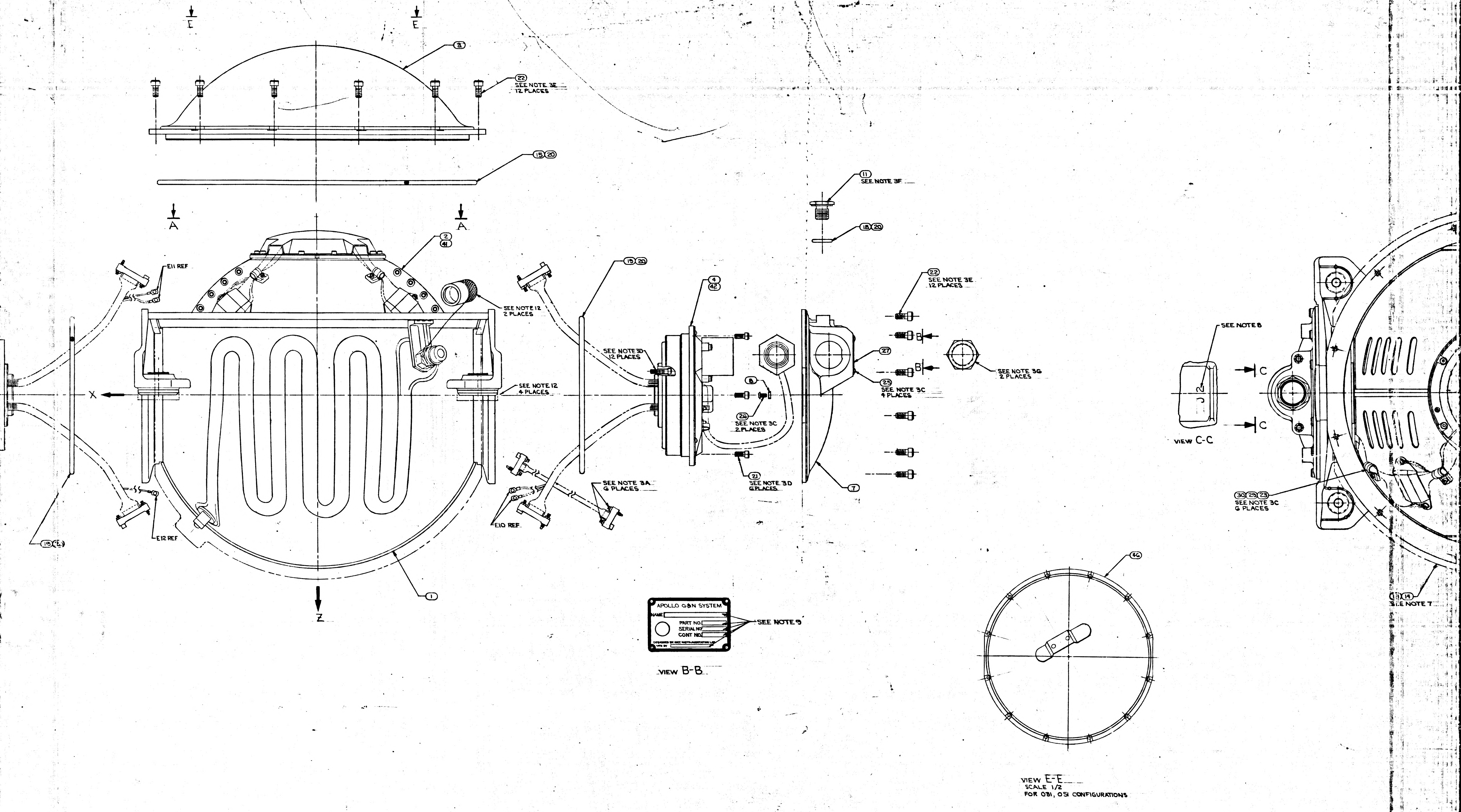
2018601	REV AK	SHEET -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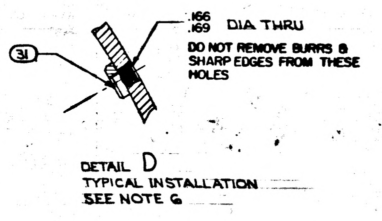
Z
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
SEE NOTE 9
VIEW B-B
㊱
VIEW E-E
SCALE 1/2
FOR 081, 051 CONFIGURATIONS

E-2

TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

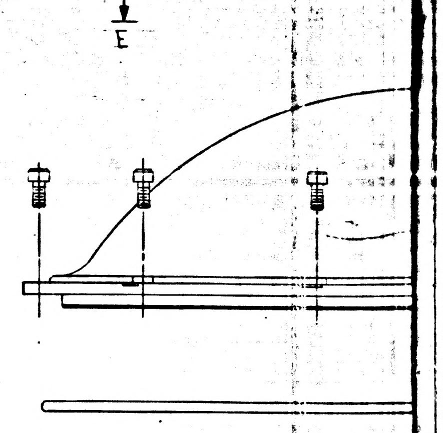
TABLE I	
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

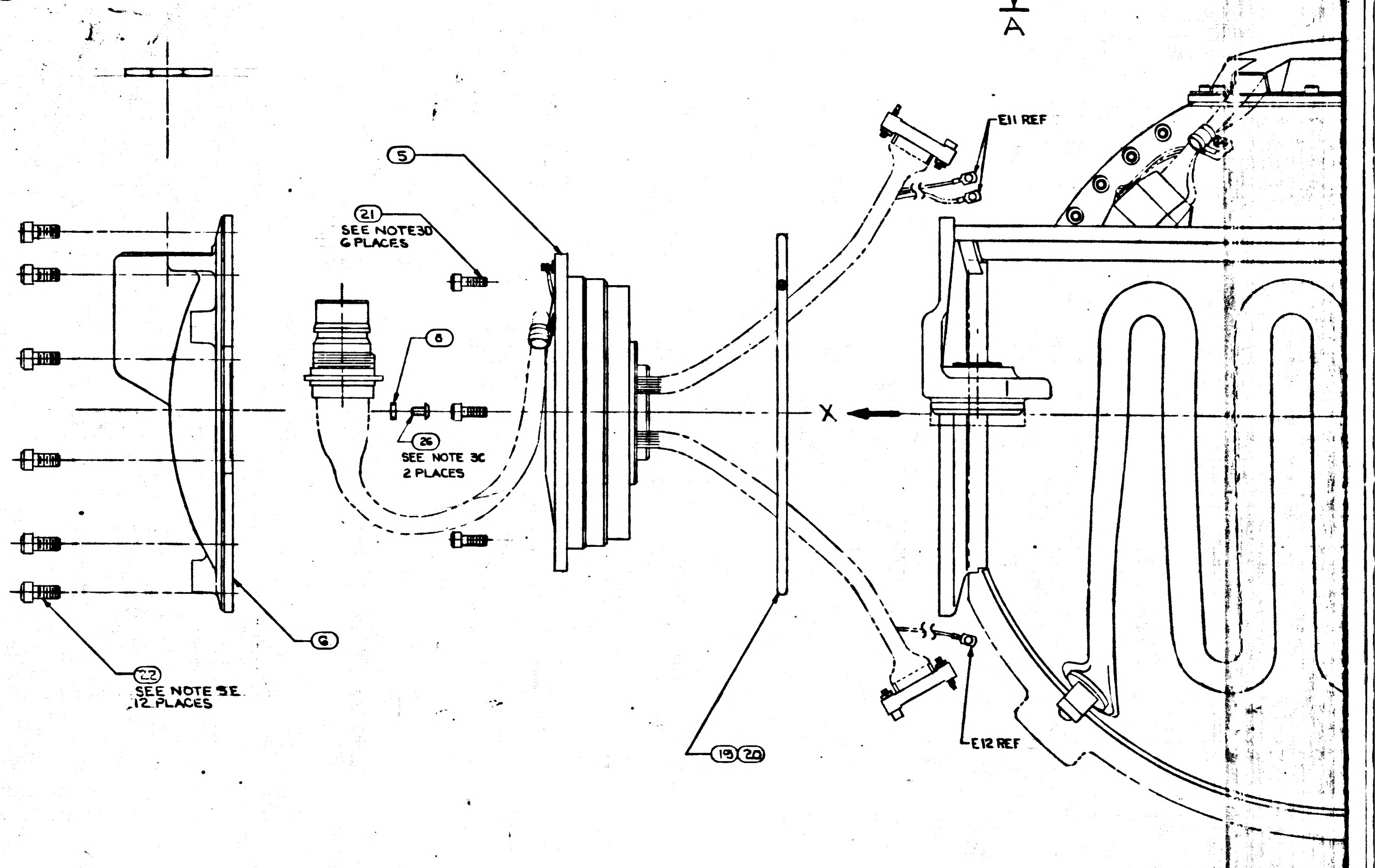


DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC. SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152



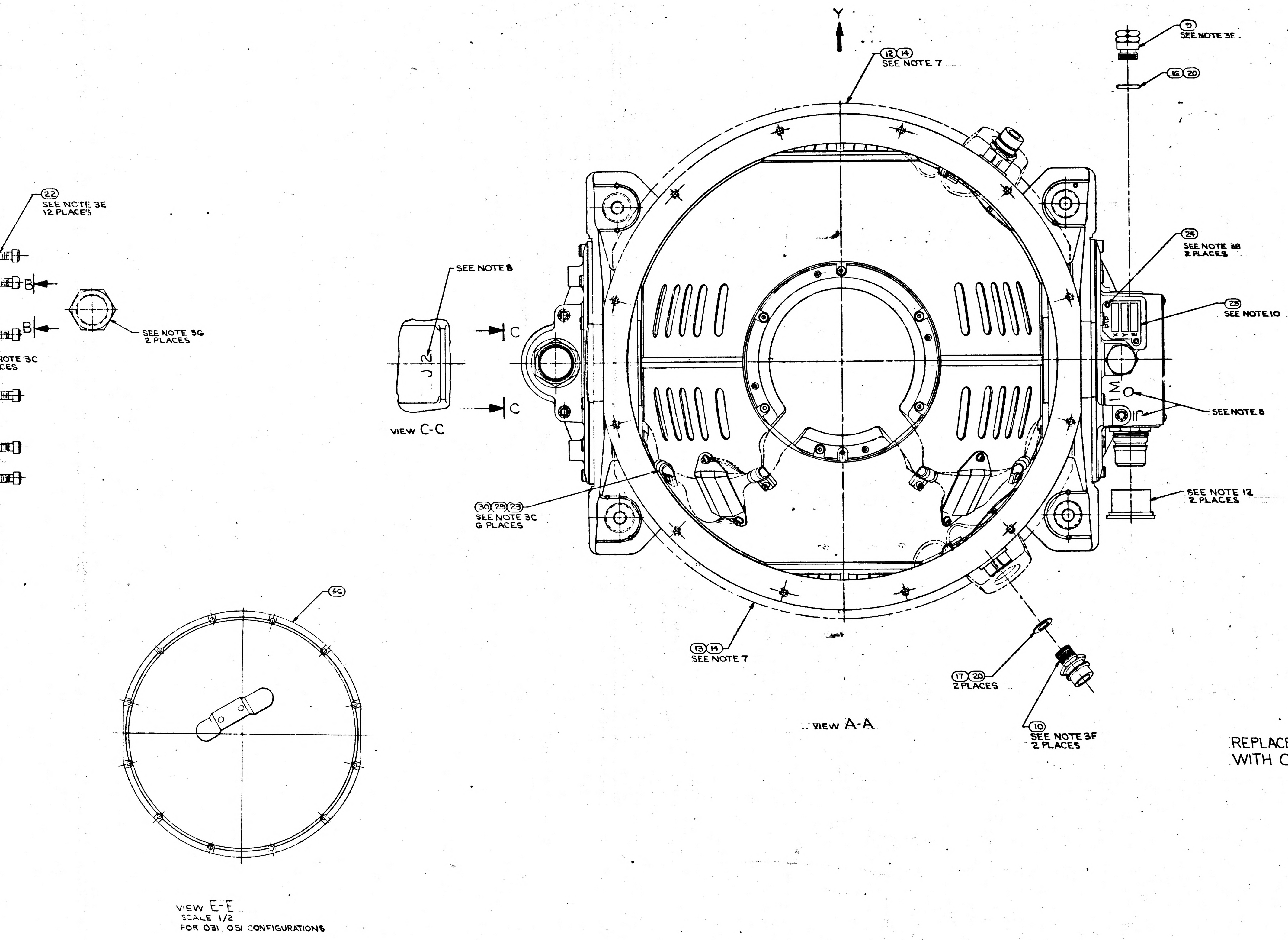


NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   B. 3.5 IN-LB
   C. 5.0 IN-LB
   D. 10.0 IN-LB
   E. 30.0 IN-LB
   F. 70.0 IN-LB
   G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (39) NASA DWG NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.

3/4

	REV	SHEET
2018601	AK	1

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65		
V	REVISED TDRR 19275	2 June 65		
W	REVISED TDRR 21187	26 Jul 65		
Y	REVISED PER TDRR 21814	8 Sep 65		
Z	REVISED TDRR 22594	19 Oct 65		
AA	REVISED TDRR 23700	19 Oct 65		
AB	REVISED TDRR 24303	14 Dec 65		
AC	REVISED TDRR 25485	15 Feb 66		
AD	REVISED TDRR 26246	15 Feb 66		
AE	REVISED TDRR 26247	23 Feb 66		
AF	REVISED TDRR 26258	23 Feb 66		
AG	REVISED TDRR 26260	23 Feb 66		
AH	REVISED TDRR 26879	14 Mar 66		
AJ	REVISED TDRR 27347	29 Mar 66		
AK	REVISED TDRR 27776			
AL	REVISED TDRR 28126			



REPLACES REV T
WITH CHANGES

3	3	3	—	—	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
—	—	—	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
1	—	1	—	—	2018839	CASE COVER ASSEMBLY	46
1	1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	—	1	—	2018612 - 021	IGSA RESOLVER OUTER AXIS	42
1	1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
	~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	39
A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
	~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH. (L.H)	13
1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
—	—	1	—	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
—	—	1	—	1	2018612-011	I.G.S.A, RESOLVER OUTER AXIS	4
—	1	—	1	1	2018710	CASE COVER	3
—	—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
				QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
051	041	031	021	011	LIST OF MATERIALS		

2018601 AL

3A

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL W.G. 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

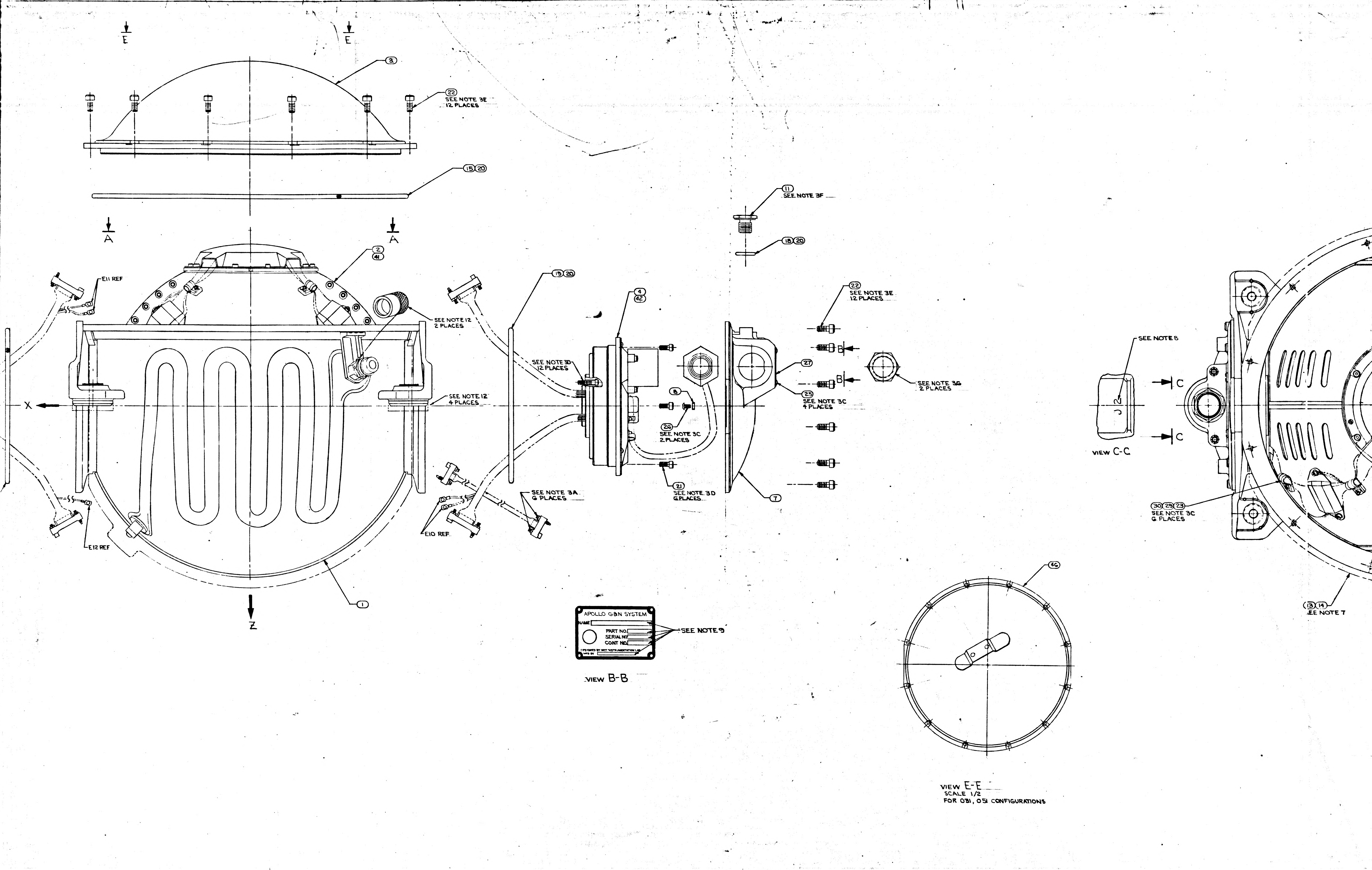
INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018601
SCALE 1/1 WT SHEET 1 OF 1

MASTER

2018601 REV AL SHEET 1

F-3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E11 REF
E12 REF
SEE NOTE 12 2 PLACES
SEE NOTE 12 4 PLACES
X
Z
①
⑮⑳
SEE NOTE 3D 12 PLACES
E10 REF
SEE NOTE 3A 6 PLACES
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㉑ SEE NOTE 3D 6 PLACES
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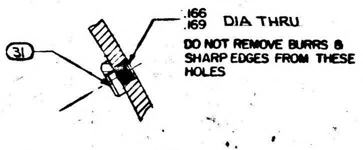
㉗
㉕ SEE NOTE 3C 4 PLACES
⑦
㉒ SEE NOTE 3E 12 PLACES
B
B
SEE NOTE 3G 2 PLACES
SEE NOTE 8
J2
C
C
VIEW C-C
㉚㉙㉓ SEE NOTE 3C 6 PLACES
⑬⑭ SEE NOTE 7
㊻
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY MIT INSTRUMENTATION LAB
MFD BY
SEE NOTE 9
VIEW B-B
VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

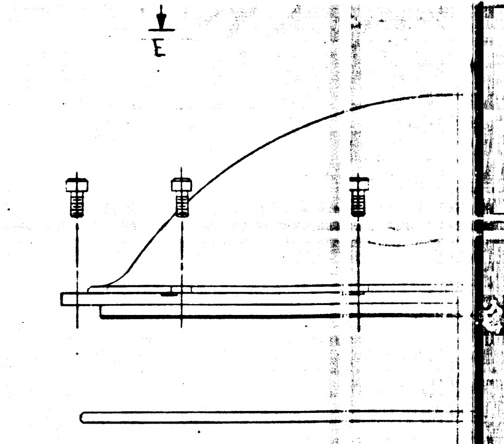
2018601 AL 1

TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

TABLE I	
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

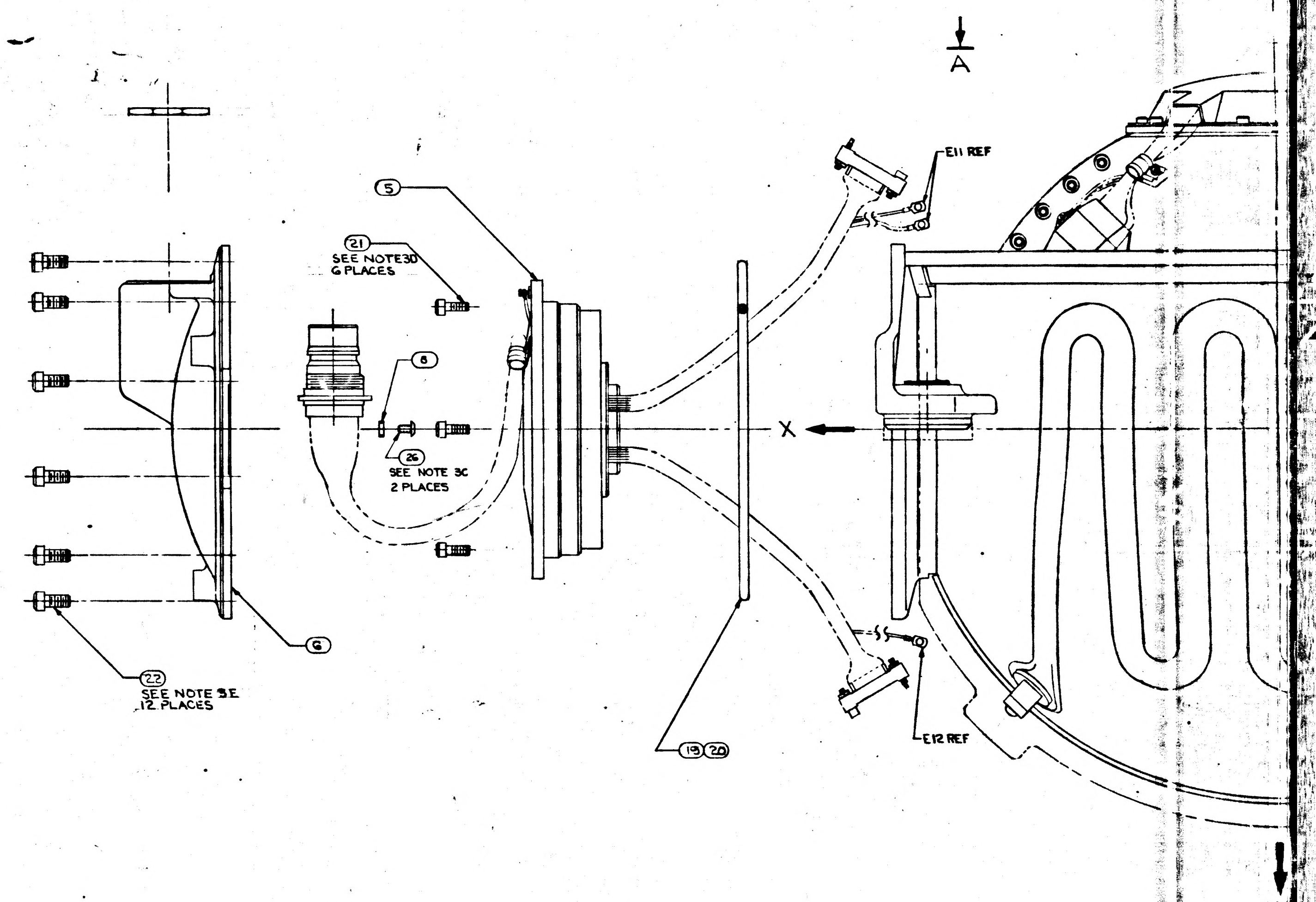


DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152

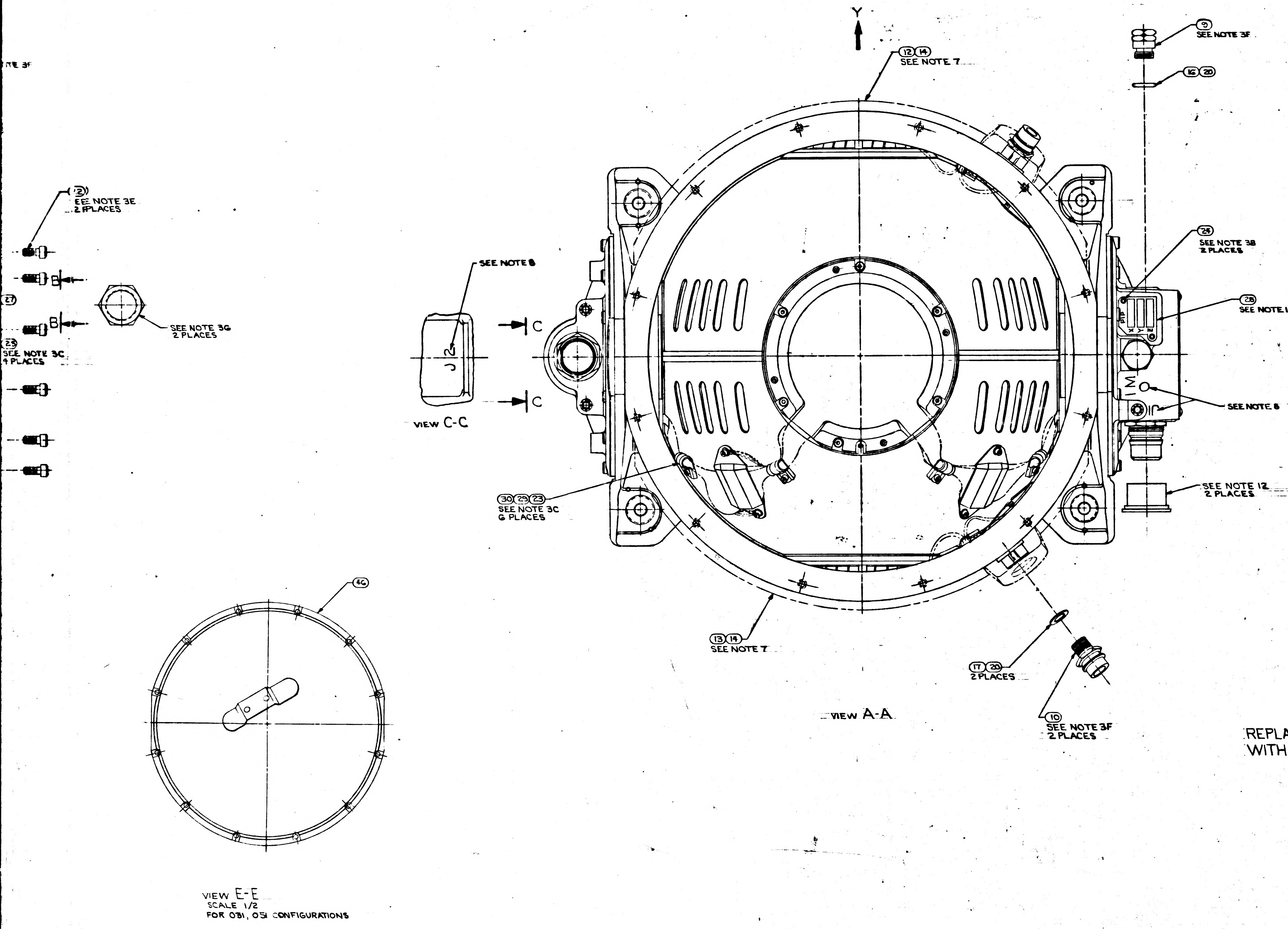


NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (35) NASA DWG NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). *ADJOINING SURFACES OF ITEMS* (12) + (13) *TO BE BONDED TO EACH OTHER*
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP NASA DRAWING *NO. 2018816-011* TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION

	REV	SHEET
2018601	AL	1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	WK
V	REVISED TDRR 19275	2 Jun 65	WK
W	REVISED TDRR 21187	26 Jul 65	WK
Y	REVISED PER TDRR 21814	8 Sep 65	
Z	REVISED TDRR 22594	19 Oct 65	WK
AA	REVISED TDRR 23700	19 Oct 65	WK
AB	REVISED TDRR 24308	14 Dec 65	WK
AC	REVISED TDRR 25485	15 Feb 66	WK
AD	REVISED TDRR 26246	15 Feb 66	WK
AE	REVISED TDRR 26247	23 Feb 66	WK
AF	REVISED TDRR 26258	23 Feb 66	WK
AG	REVISED TDRR 26260	23 Feb 66	WK
AH	REVISED TDRR 26879	19 Mar 66	WK
AJ	REVISED TDRR 27347	25 Mar 66	WK
AK	REVISED TDRR 27776	12 Apr 66	WK
AL	REVISED TDRR 28126	22 Apr 66	WK
AM	REVISED TDRR 29026	25 May 66	



REPLACES REV T WITH CHANGES

061	051	041	031	021	011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
—	—	—	3	—	3	2021500 SEE NOTE 15 & 16	IRIG PREALIGNED ASS'Y	51
3	3	3	—	—	—	2021500-051 SEE NOTE 15	IRIG PREALIGNED ASS'Y	50
—	—	—	—	3	—	2021500-031 SEE NOTE 15	IRIG PREALIGNED ASS'Y	49
—	3	3	3	—	—	2018844-021 SEE NOTE 15	CALIBRATED PIP ASS'Y	48
3	—	—	—	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
—	1	—	1	—	—	2018839	CASE COVER ASSEMBLY	46
1	1	1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	—	1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	1	1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	1000270 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH. (L.H.)	13
1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
—	—	—	1	—	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
—	—	—	1	—	1	2018612-011	I.G.S.A. RESOLVER OUTER AXIS	4
1	—	1	—	1	1	2018710	CASE COVER	3
—	—	—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

LIST OF MATERIALS

NEXT ASSY	USED ON
6001001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL W.Q. [illegible] 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

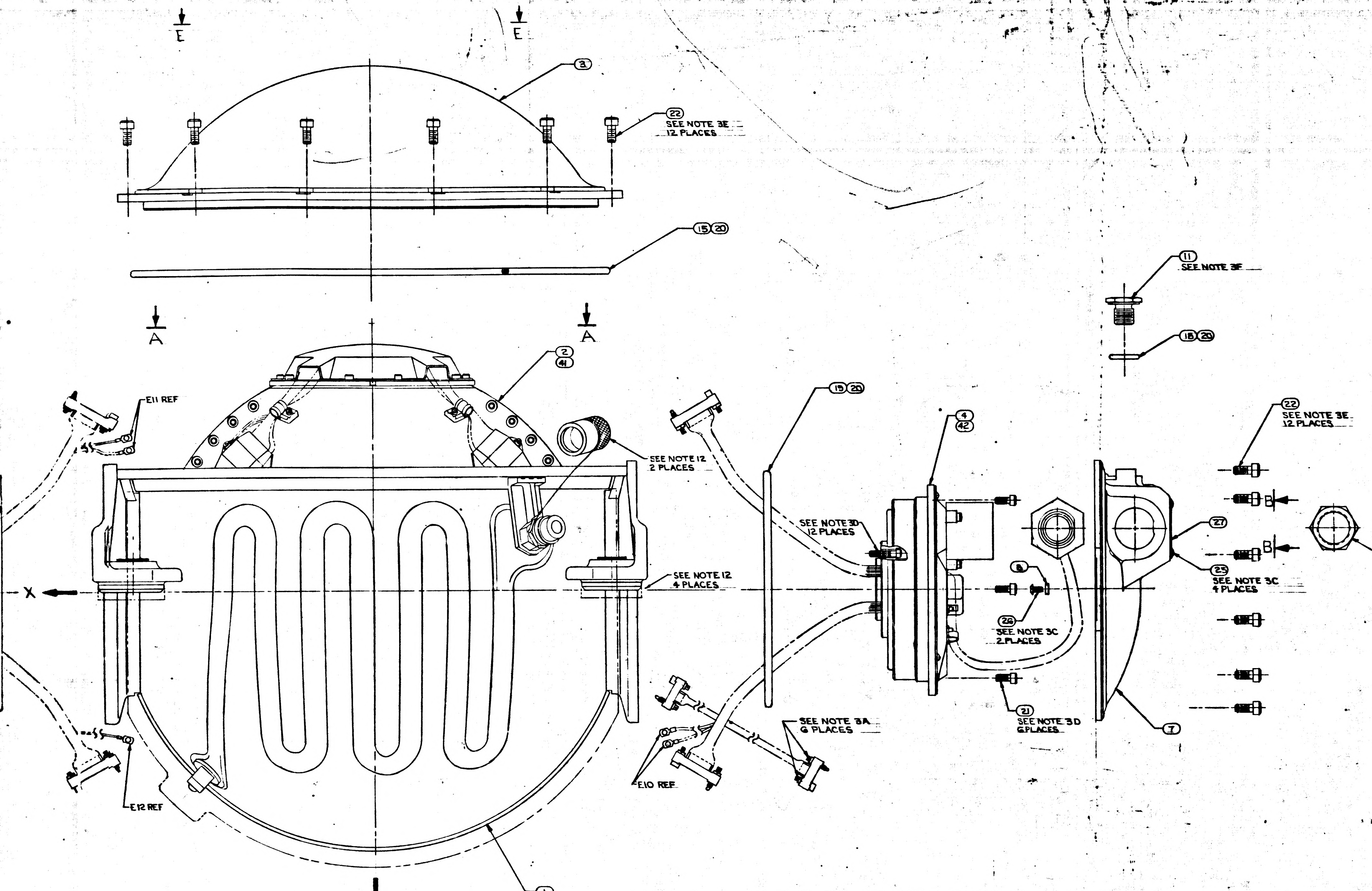
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
SHEET 1

2018601 AM

2018601 AM

MASTER

E-3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③
㉒ SEE NOTE 3E 12 PLACES
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E11 REF
SEE NOTE 12 2 PLACES
⑲⑳
④ ㊷
SEE NOTE 3D 12 PLACES
X
SEE NOTE 12 4 PLACES
⑧
㉖ SEE NOTE 3C 2 PLACES
㉑ SEE NOTE 3D 6 PLACES
⑪ SEE NOTE 3F
⑱⑳
㉒ SEE NOTE 3E 12 PLACES
B
B
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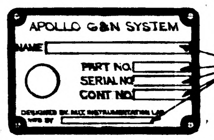
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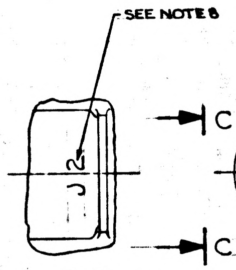
NAME
PART NO.
SERIAL NO.
CONT NO.
SEE NOTE 9

VIEW B-B


SEE NOTE 8
J2
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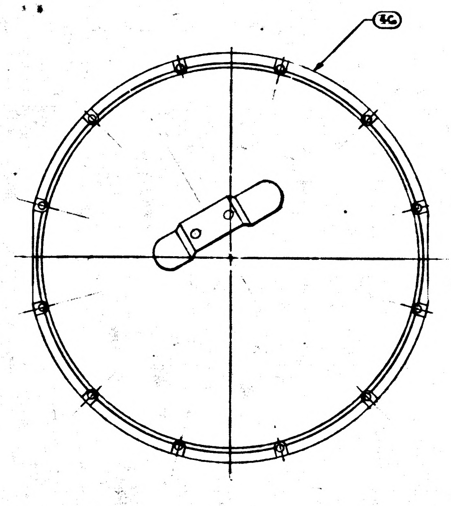
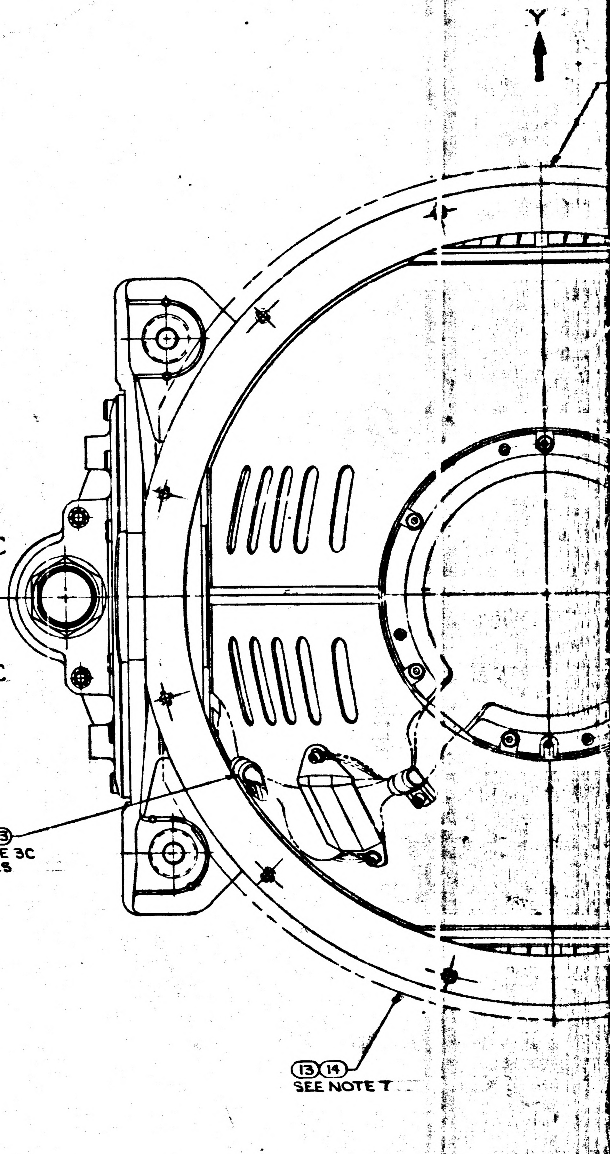
VIEW C-C



VIEW E-E
SCALE 1/2
FOR 0B1, 0S1 CONFIGURATIONS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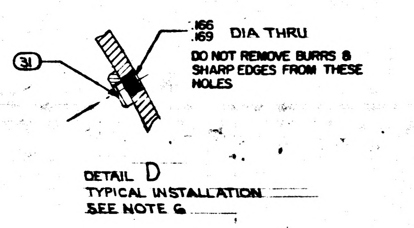
㉚㉕㉓ SEE NOTE 3C 6 PLACES
⑬⑭ SEE NOTE 7

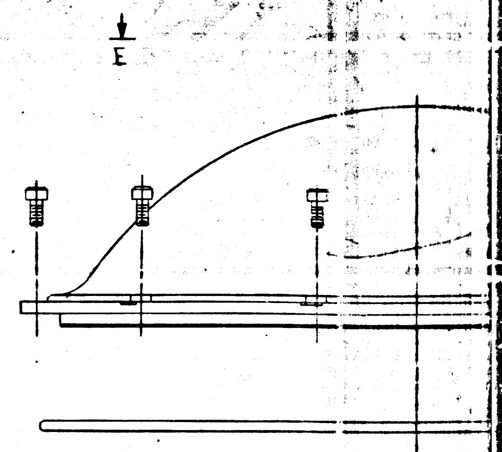
VIEW A-A

TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

TABLE I	
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

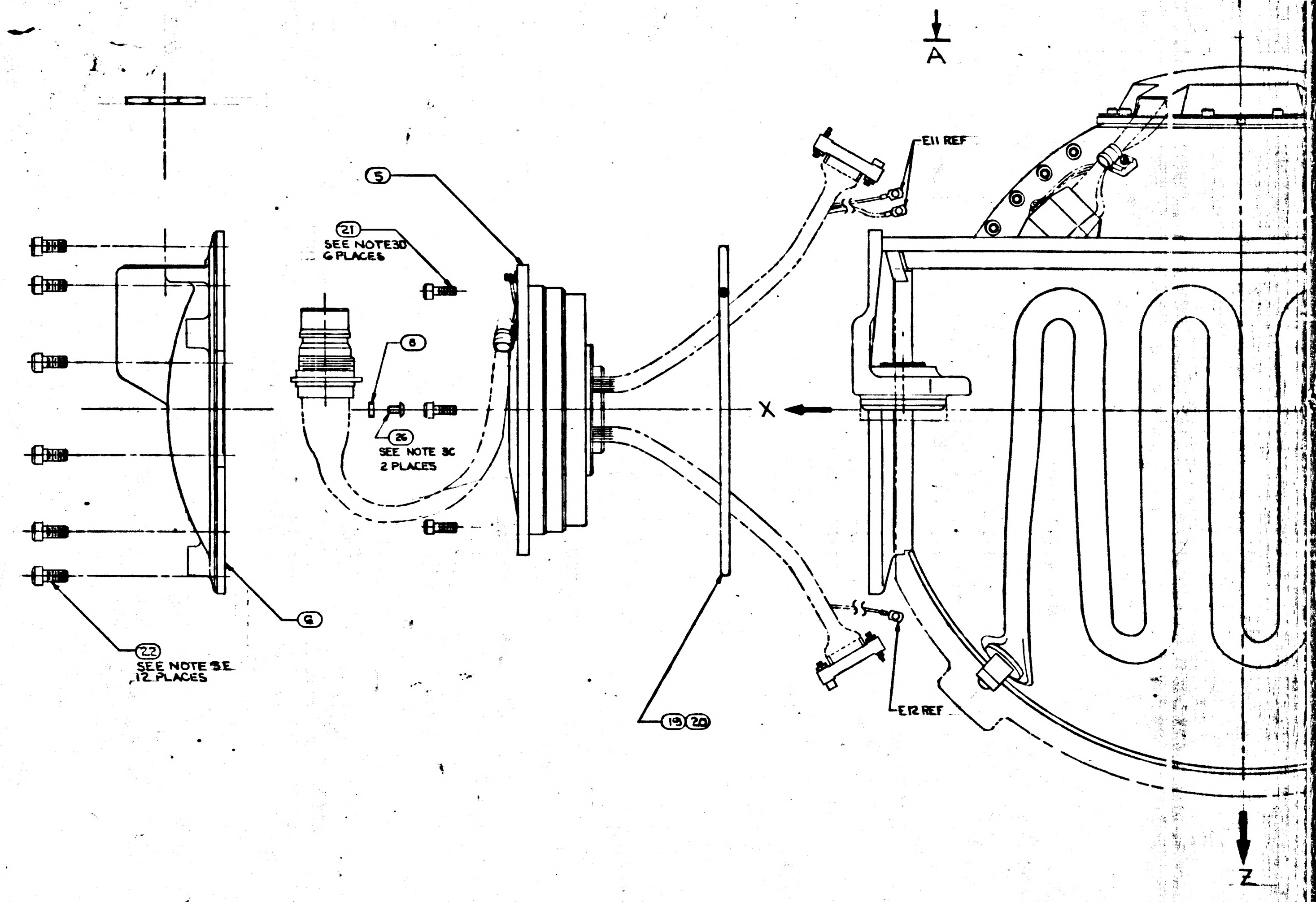


DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154



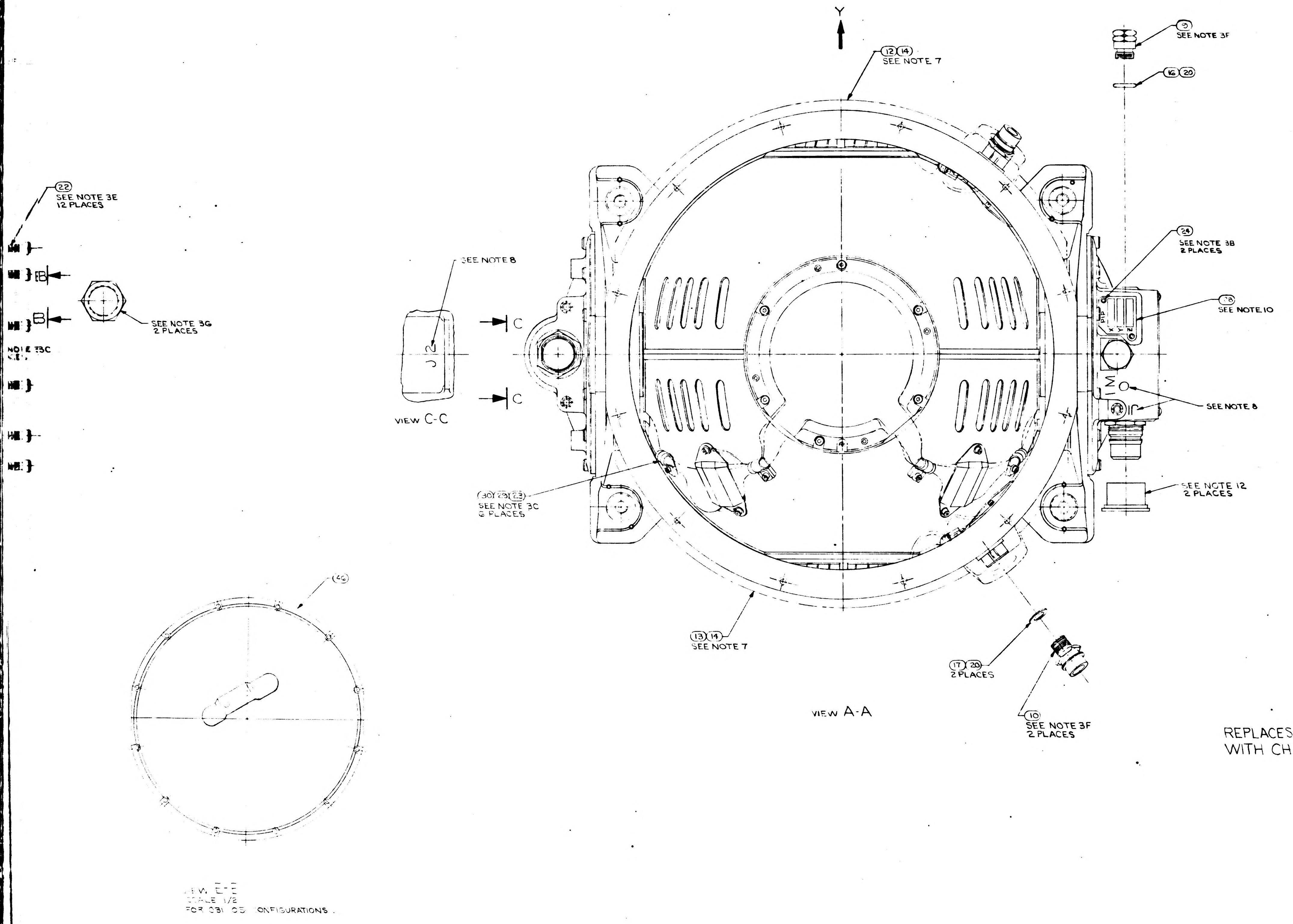
NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (39) NASA DWG NO 1000260 USE 1000260-1 THRU 1000260-12 ONLY,~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). *ADJOINING SURFACES OF* ITEMS (12) + (13) TO BE *BONDED TO EACH OTHER*
8. MARK CHARACTERS $\substack{.23\\.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\substack{.10\\.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY

2018601	AM	1

E1

SYM	DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	WK
V	REVISED TDRR 19275	2 Jun 65	WK
W	REVISED TDRR 21187	26 Jul 65	WK
Y	REVISED PER TDRR 21814	8 Sep 65	
Z	REVISED TDRR 22594	19 Oct 65	WK
AA	REVISED TDRR 23700	19 Oct 65	WK
AB	REVISED TDRR 24308	14 Dec 65	WK
AC	REVISED TDRR 25485	15 Feb 66	WK
AD	REVISED TDRR 26246	15 Feb 66	WK
AE	REVISED TDRR 26247	23 Feb 66	WK
AF	REVISED TDRR 26258	23 Feb 66	WK
AG	REVISED TDRR 26260	23 Feb 66	WK
AH	REVISED TDRR 26873	14 Mar 66	WK
AJ	REVISED TDRR 27347	25 Mar 66	
AK	REVISED TDRR 27776	12 Apr 66	
AL	REVISED TDRR 28126	22 Apr 66	WK
AM	REVISED TDRR 29026	23 May 66	
AN	REVISED PER TDRR 29571	[illegible]	



REPLACES REV T
WITH CHANGES

061	051	041	031	021	011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
—	—	—	3	—	3	2021500 SEE NOTE 15 & 16	IRIG PREALIGNED ASS'Y	51
3	3	3	–	–	–	2021500-051 SEE NOTE 15	IRIG PREALIGNED ASS'Y	50
—	—	–	–	3	–	2021500-031 SEE NOTE 15	IRIG PREALIGNED ASS'Y	49
—	3	3	3	–	–	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	—	—	—	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
—	1	—	1	---	---	2018839	CASE COVER ASSEMBLY	46
1	1	1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	—	1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	1	1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD., HEX. SOC	26
4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH. (L.H)	13
1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
—	—	—	1	—	1	2018609-011	IGSA. TORQUE MOTOR, OUTER AXIS	5
—	—	–	1	—	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	—	1	—	1	1	2018710	CASE COVER	3
—	—	—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

LIST OF MATERIALS

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
Cambridge Mass

DRAWN DTB DATE 3/5/65
CHECKED G QUINN
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL W Cupler 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 2018601
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SHEET 1 OF 1

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2018601 AN

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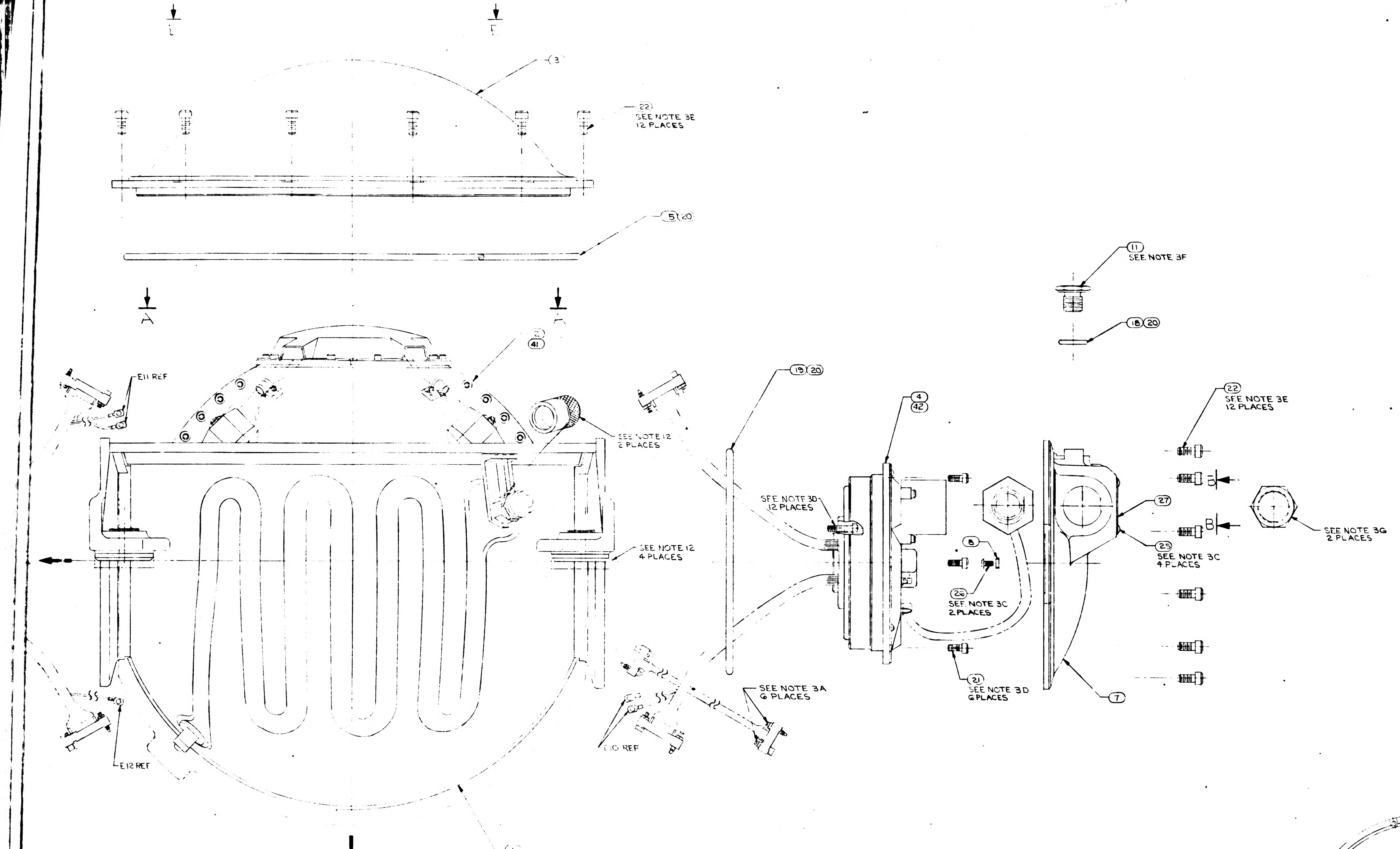
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SEE NOTE 3E
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4 PLACES
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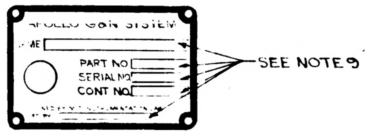
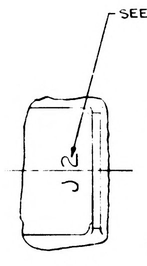

APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9

VIEW B-B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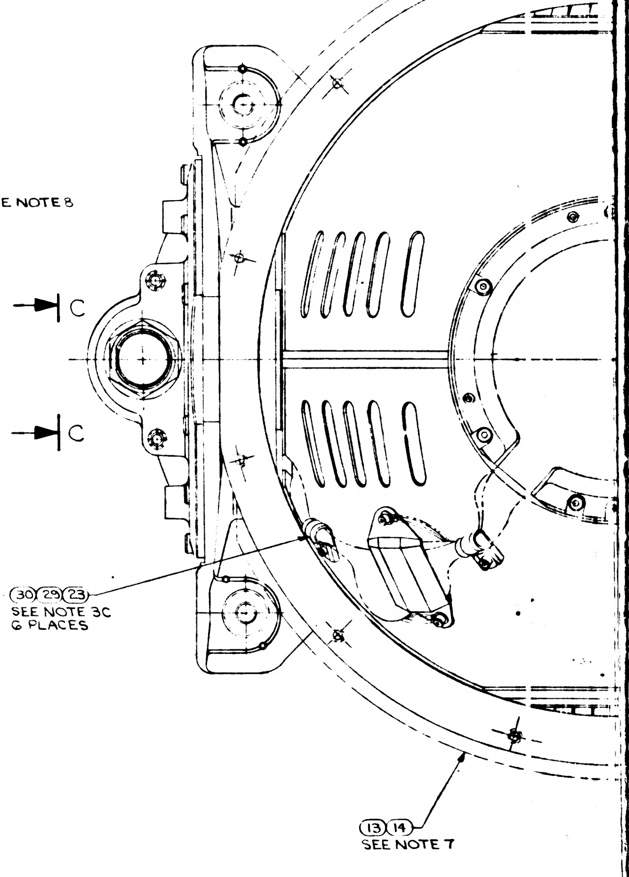
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SEE NOTE 3C
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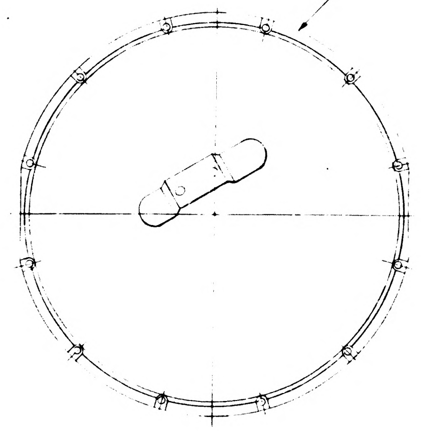
SEE NOTE 7

VIEW



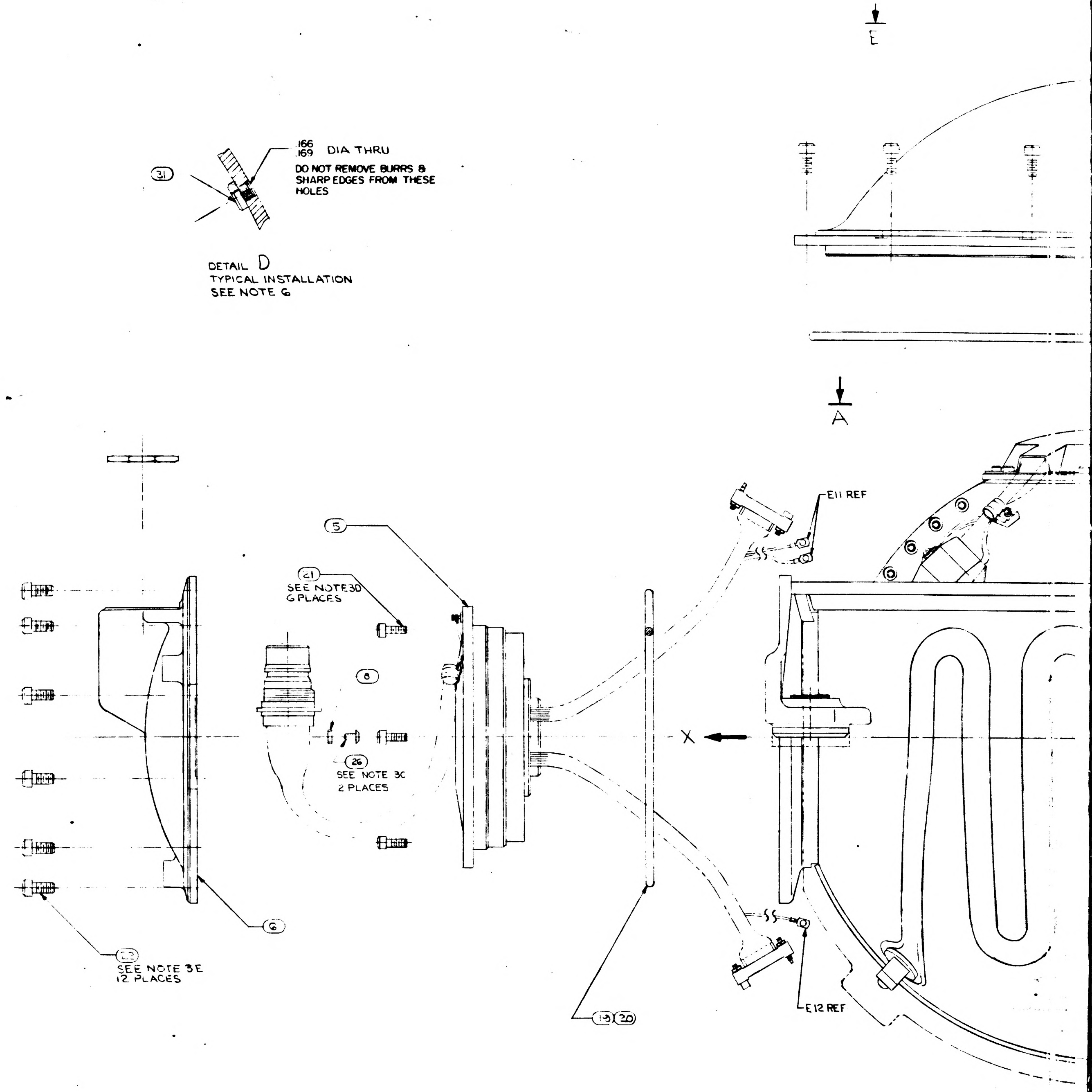
VIEW E-E
SCALE 1/2
FOR 031 051 CONFIGURATIONS

TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	

TABLE I	
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ITEM (39) ~~NASA DWG~~ NO 1000260 USE ~~1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (16), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001434, AND MOUNTING PAD CAP NASA DRAWING NO. 2018216-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001434 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018[illegible] GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY

34

TABLE II

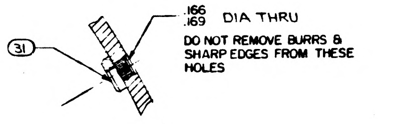
SCREW SELECTION CHART ㉜

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011825-11	

TABLE I

CABLE CLAMP ㉙

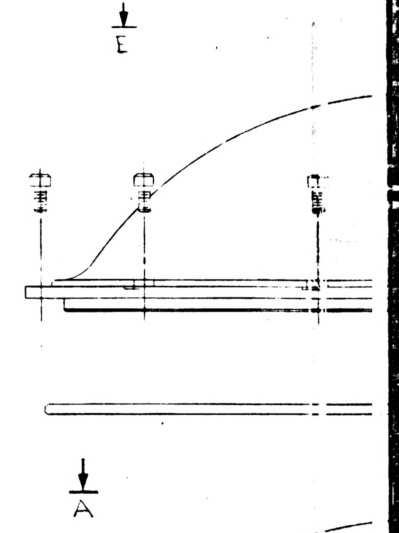
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

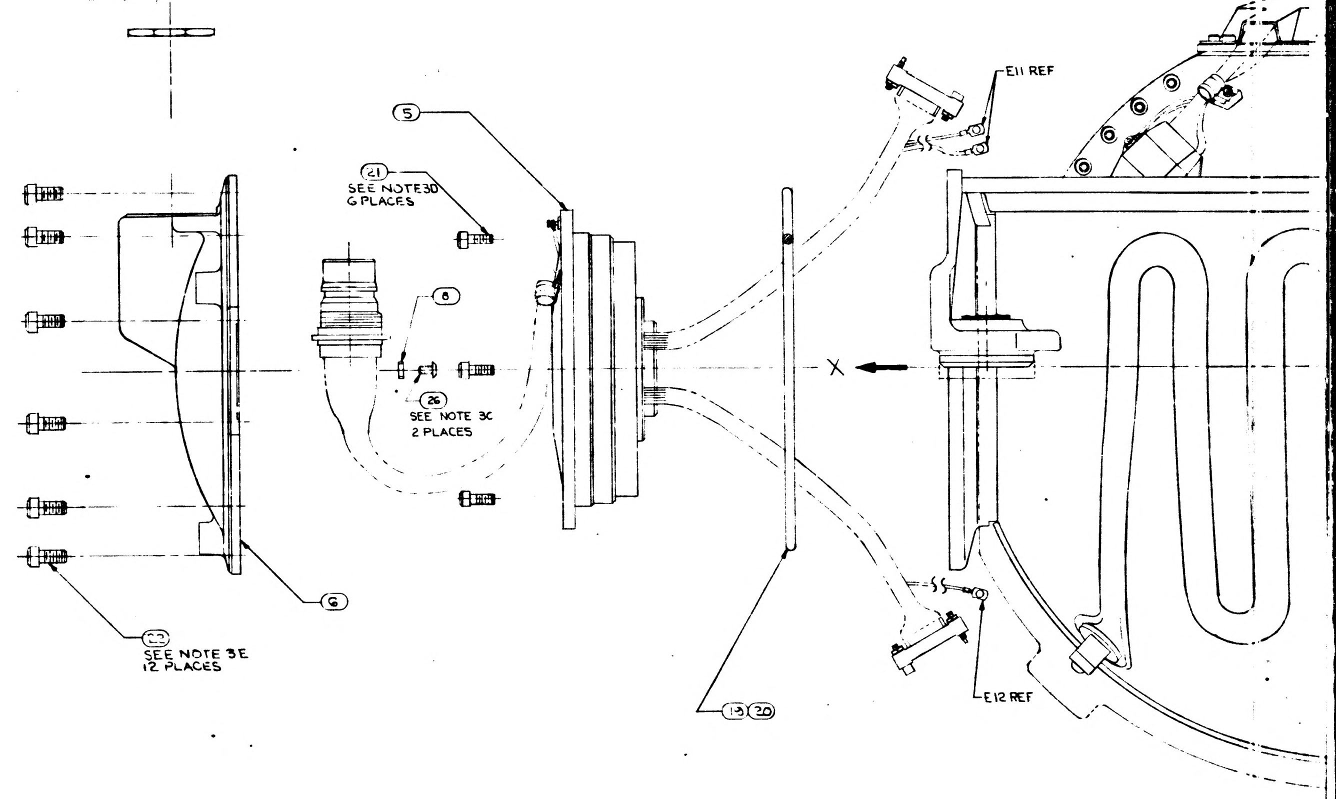


DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2012154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154





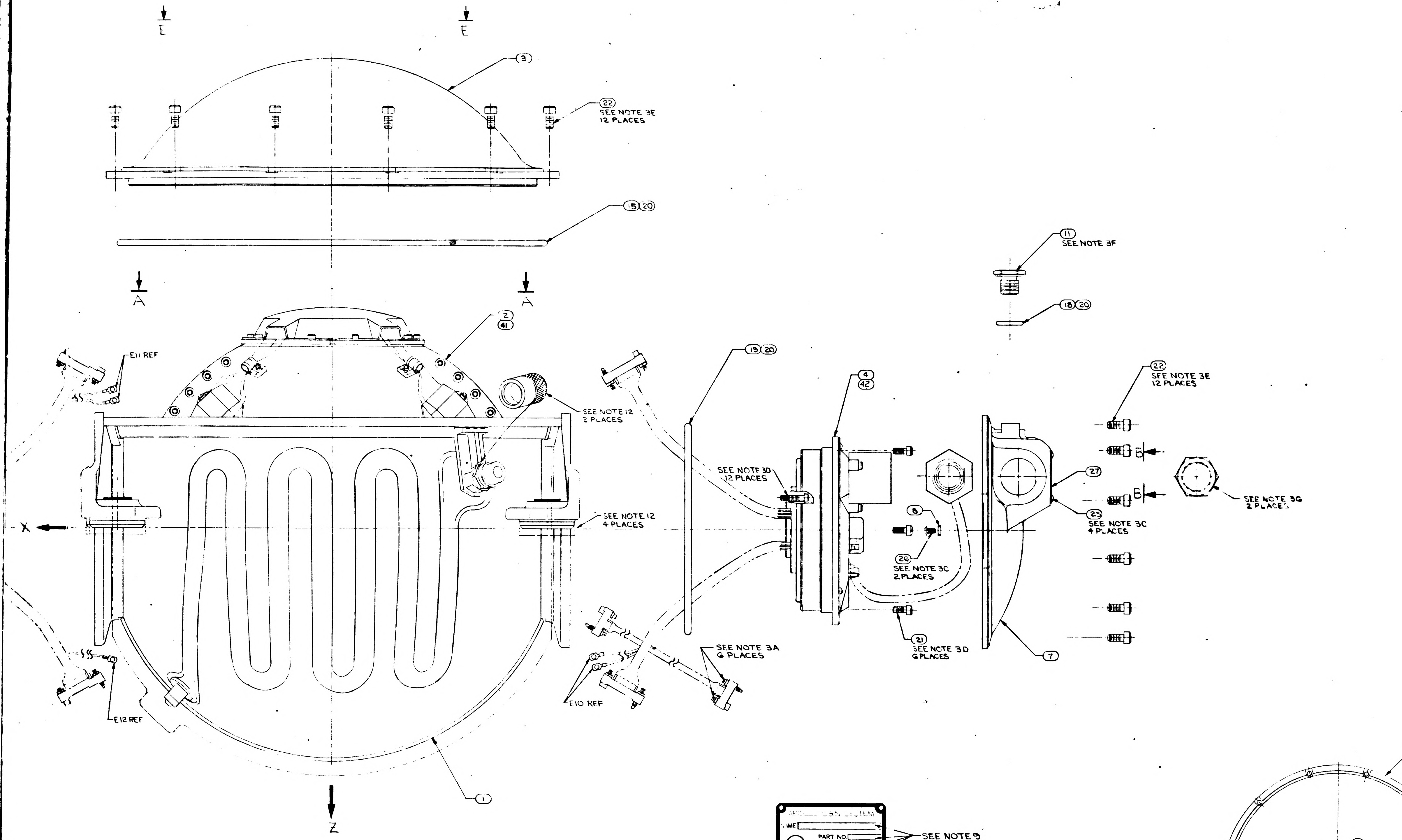
NOTES

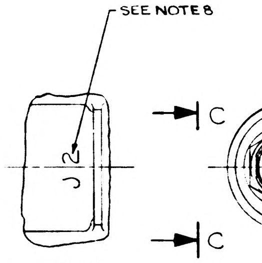
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM ㉝ NASA DWG NO 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭. *ADJOINING SURFACES OF ITEMS ⑫ + ⑬ TO BE BONDED TO EACH OTHER*
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS ⑩, ⑰ AND ⑳ ARE ASSEMBLED TO CASE, ITEM ①
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018216, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.

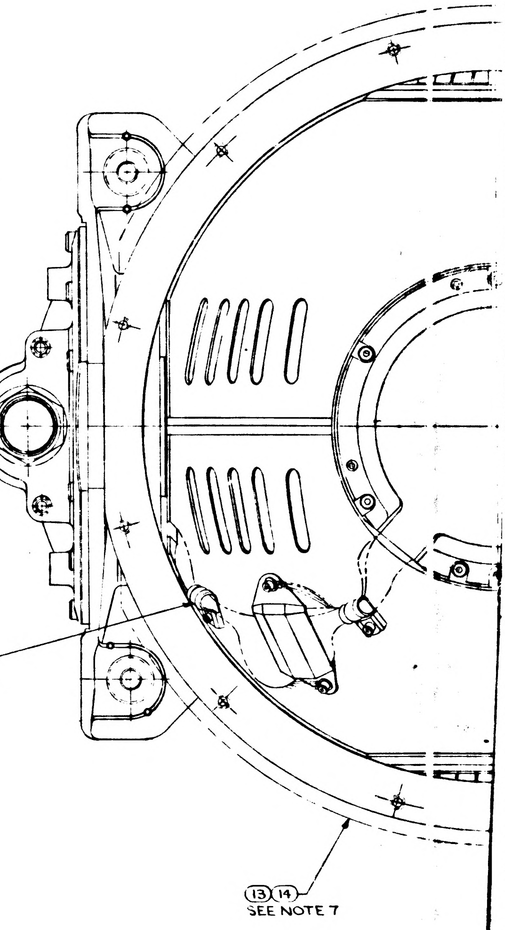
34

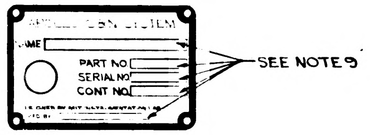
	REV	SHEET
2018601	AP	1

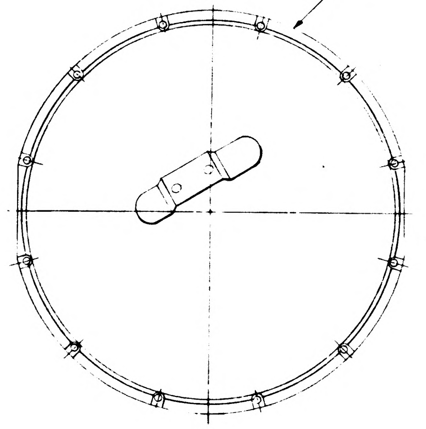
1/2018601


E
E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
A
2
41
E11 REF
SEE NOTE 12
2 PLACES
X
SEE NOTE 12
4 PLACES
E12 REF
E10 REF
SEE NOTE 3A
6 PLACES
1
Z
19 20
SEE NOTE 3D
12 PLACES
4
42
8
24
SEE NOTE 3C
2 PLACES
21
SEE NOTE 3D
6 PLACES
11
SEE NOTE 3F
18 20
22
SEE NOTE 3E
12 PLACES
B
B
27
25
SEE NOTE 3C
4 PLACES
7
SEE NOTE 3G
2 PLACES


SEE NOTE 8
J2
C
C
VIEW C-C


30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
VIEW

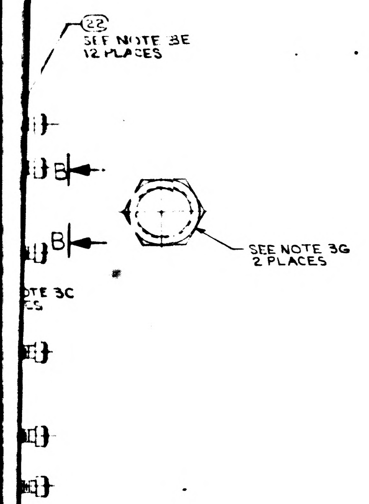

NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9
VIEW B-B

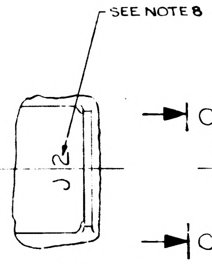


VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

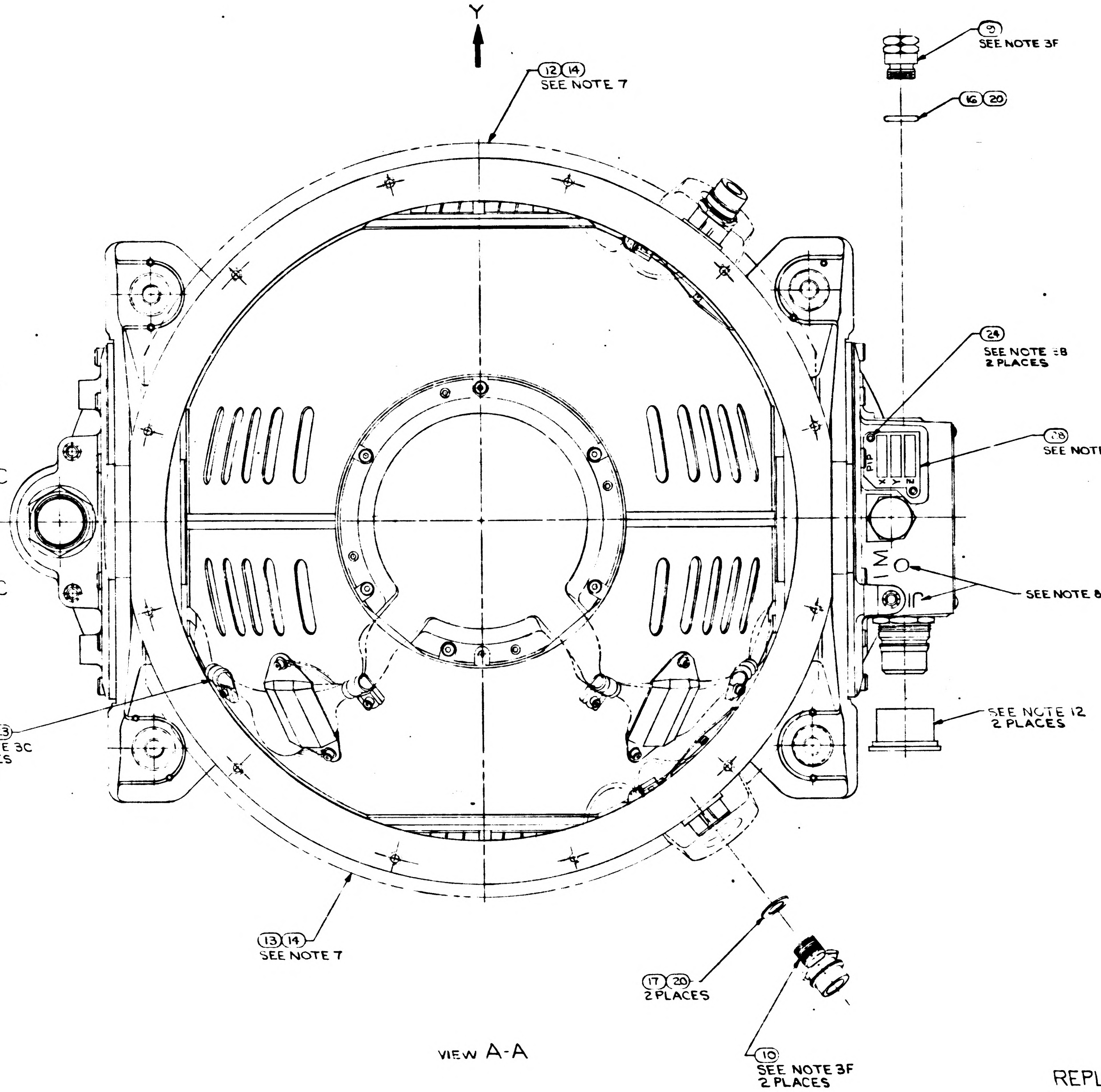
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	WK
V	REVISED TDRR 19275	2 Jun 65	WK
W	REVISED TDRR 21187	26 Jul 65	WK
Y	REVISED PER TDRR 21814	8 Sep 65	
Z	REVISED TDRR 22594	19 Oct 65	
Ⓜ AA	REVISED TDRR 23700	19 Oct 65	WK
AB	REVISED TDRR 24308	14 Dec 65	WK
AC	REVISED TDRR 25485	15 Feb 66	WK
AD	REVISED TDRR 26246	15 Feb 66	WK
AE	REVISED TDRR 26247	23 Feb 66	WK
AF	REVISED TDRR 26258	23 Feb 66	WK
Ⓜ AG	REVISED TDRR 26260	23 Feb 66	WK
AH	REVISED TDRR 26879	14 Mar 66	WK
AJ	REVISED TDRR 27347	25 Mar 66	WK
Ⓜ AK	REVISED TDRR 27776	12 Apr 66	WK
AL	REVISED TDRR 28126	22 Apr 66	WK
Ⓜ AM	REVISED TDRR 29026	25 May 66	
Ⓜ AN	REVISED PER TDRR 29571	2 JUN 66	JNP
AP	REVISED PER TDRR 31076	29 SEP 66	MS

Y

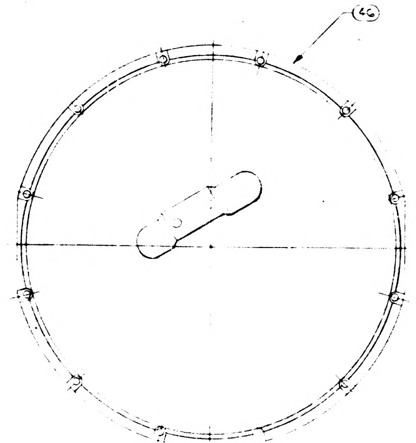




VIEW C-C



VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031 051 CONFIGURATIONS

REPLACES REV T
WITH CHANGES

061	051	041	031	021	011	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
—	—	—	3	—	3	2021500 SEE NOTE 15 & 16	IRIG PREALIGNED ASS'Y	51
3	3	3	—	—	—	2021500-051 SEE NOTE 15	IRIG PREALIGNED ASS'Y	50
—	—	—	—	3	—	20 500-031 SEE NOTE 15	IRIG PREALIGNED ASS'Y	49
—	3	3	3	—	—	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	—	—	—	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
—	1	—	1	—	—	2018839	CASE COVER ASSEMBLY	46
1	1	1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	—	1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	1	1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX SOC	26
4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	1000159-3	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH. (L H)	13
1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R H)	12
1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR OUTER AXIS	7
1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
—	—	—	1	—	1	2018609-011	IGSA. TORQUE MOTOR, OUTER AXIS	5
—	—	—	1	—	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	—	1	—	1	1	2018710	CASE COVER	3
—	—	—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
					QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
061	051	041	031	021	011	LIST OF MATERIALS		

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN /65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

INERTIAL MEASURING UNIT ASSEMBLY

CODE IDENT NO 80230 SIZE J NASA DRAWING NO 2018601
SCALE 1/1 WT SHEET 1 OF 1

2018601 AP

3A

1018601

5601 AF

3/2018601

TABLE II

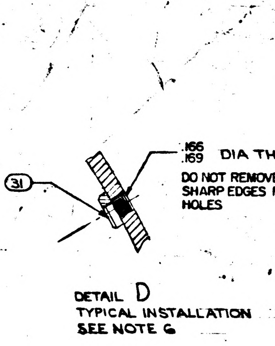
SCREW SELECTION CHART (32)

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

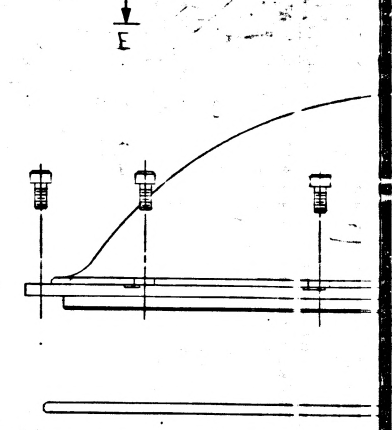
TABLE I

CABLE CLAMP (29)

PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC. SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
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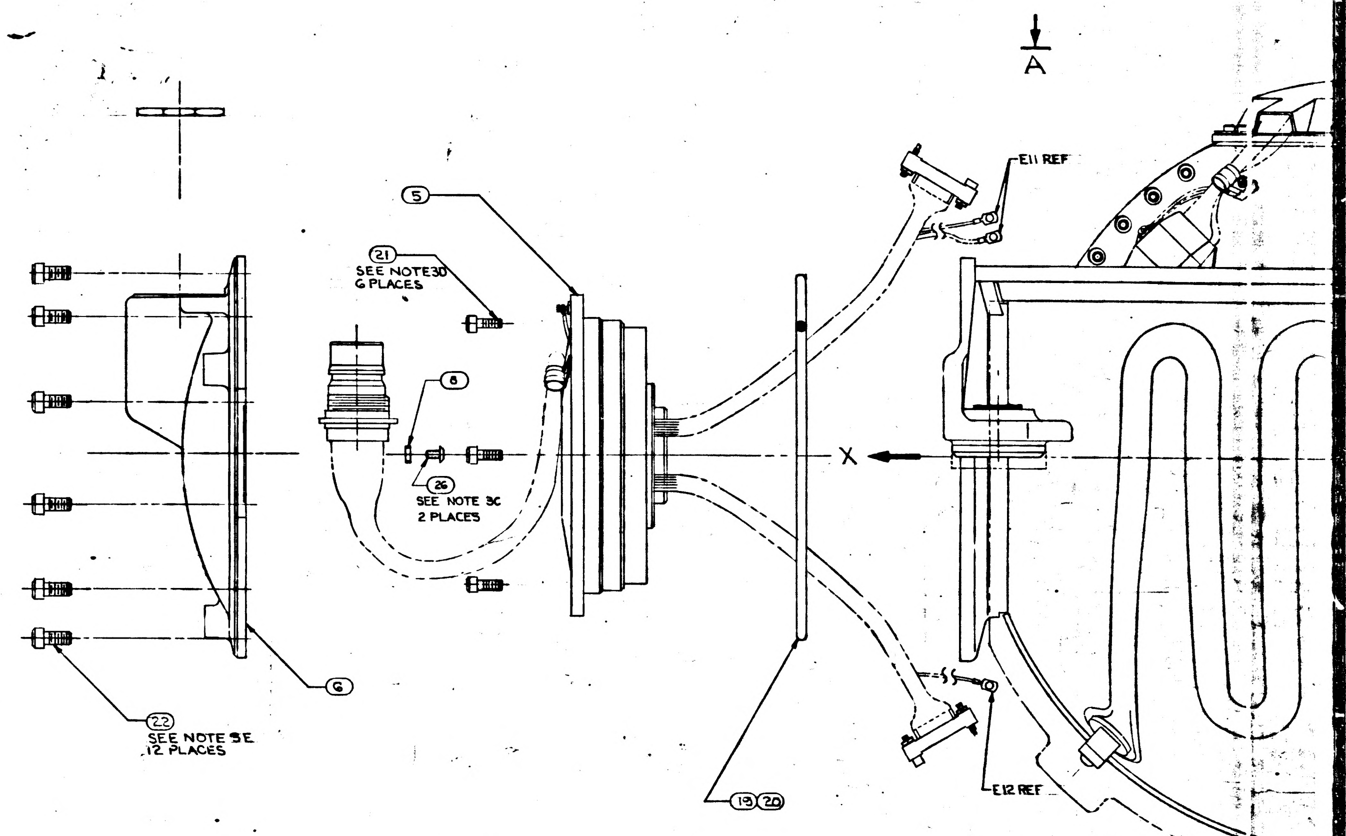
2018601-061	2018618	PS2016154



NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (39) NASA DWG NO 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (83) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

3/4

11 10 9 8 7

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TABLE II

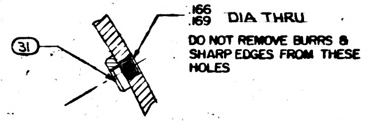
SCREW SELECTION CHART ㉜

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

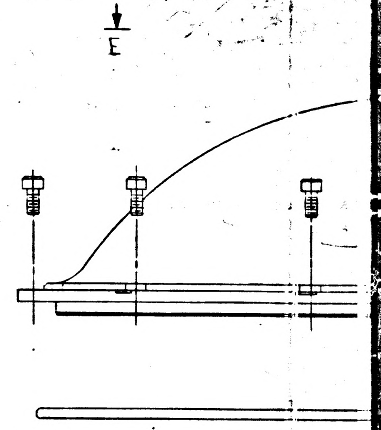
TABLE I

CABLE CLAMP ㉙

PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

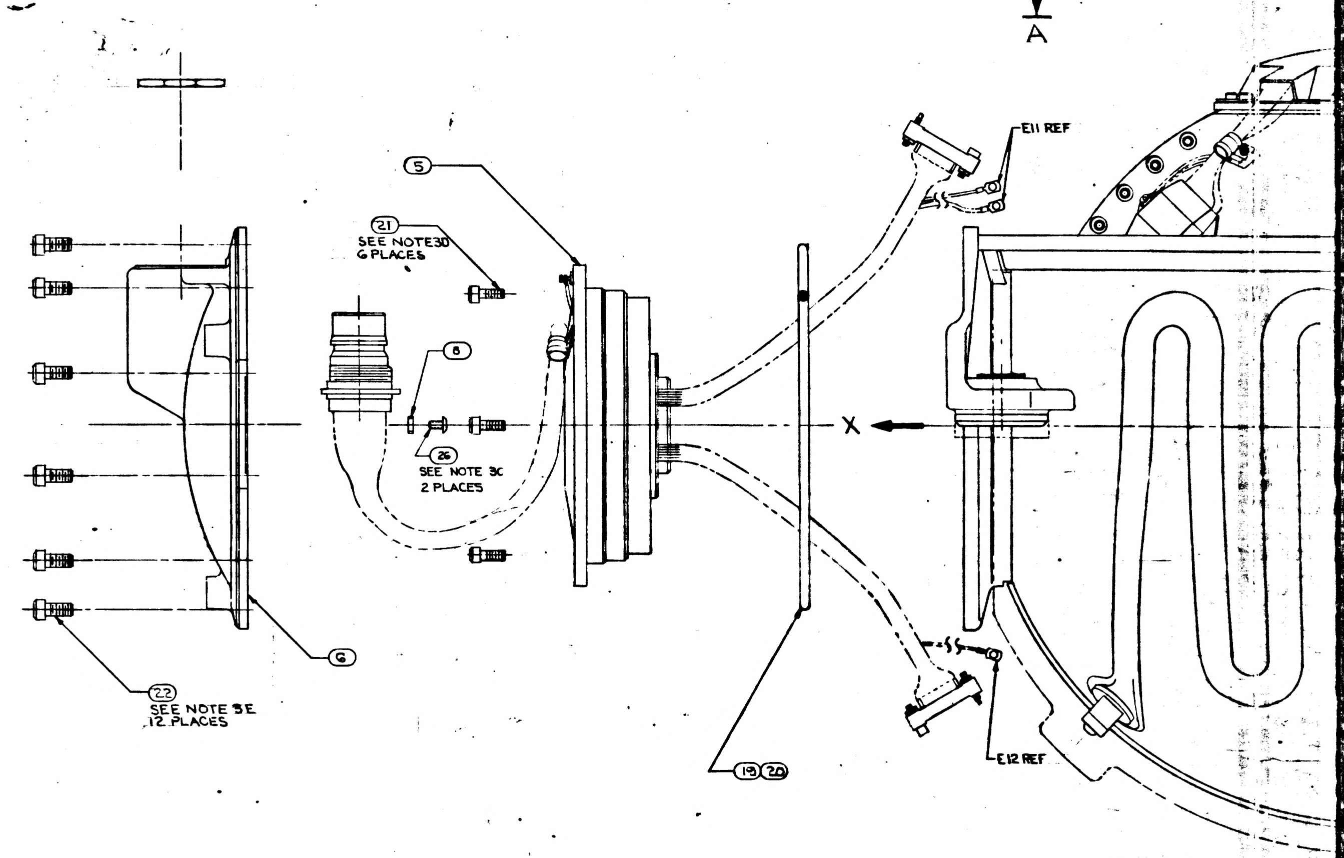

㉛
$\genfrac{}{}{0pt}{}{.166}{.169}$ DIA THRU
DO NOT REMOVE BURRS & SHARP EDGES FROM THESE HOLES

DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC. SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154



C

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM ㉝ NASA DWG NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭. ADJOINING SURFACES OF ITEMS ⑫ + ⑬ TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS ⑩, ⑰ AND ⑳ ARE ASSEMBLED TO CASE, ITEM ①
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

B

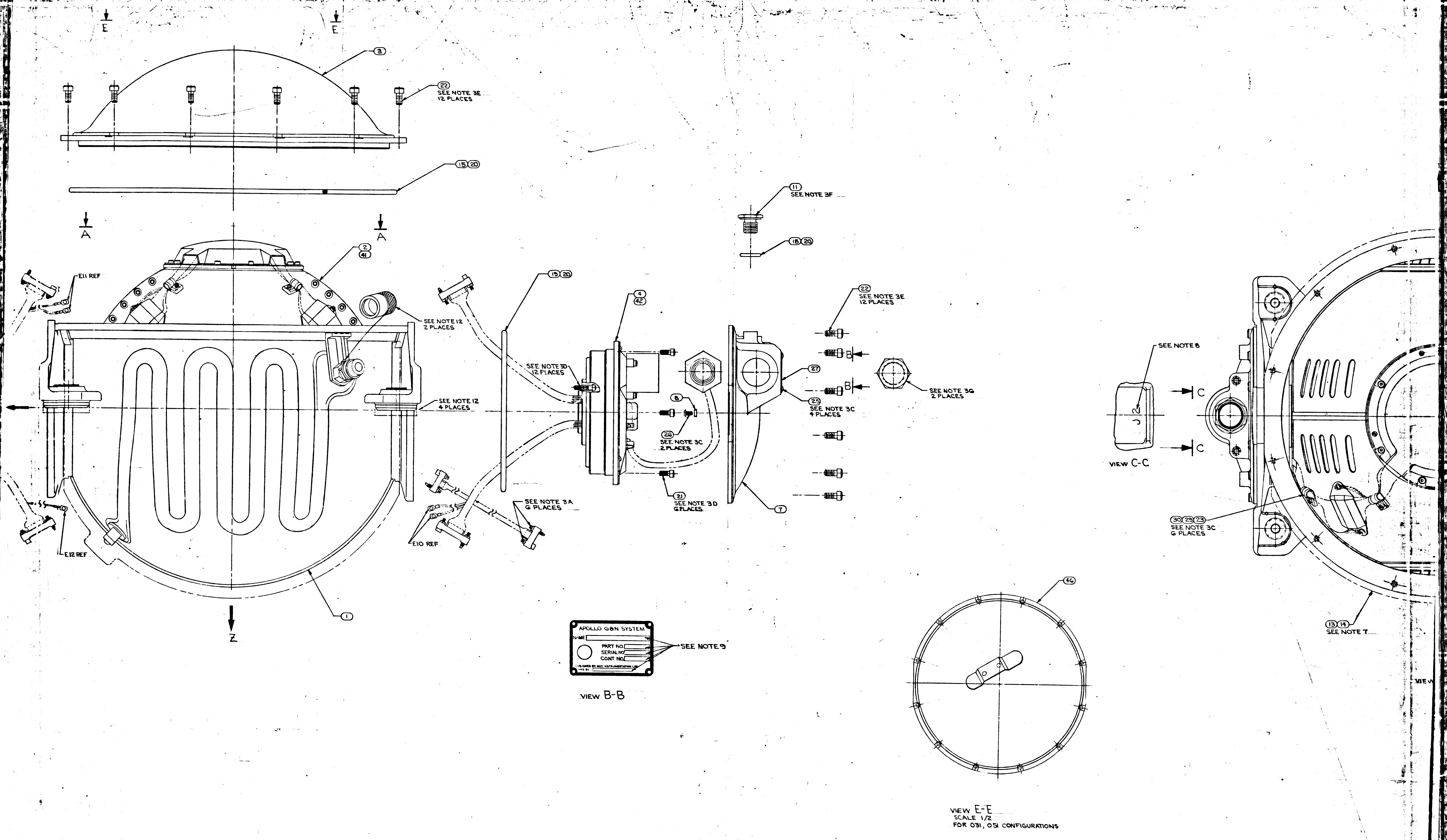
3/4

A

2018601 REV AR SHEET 1

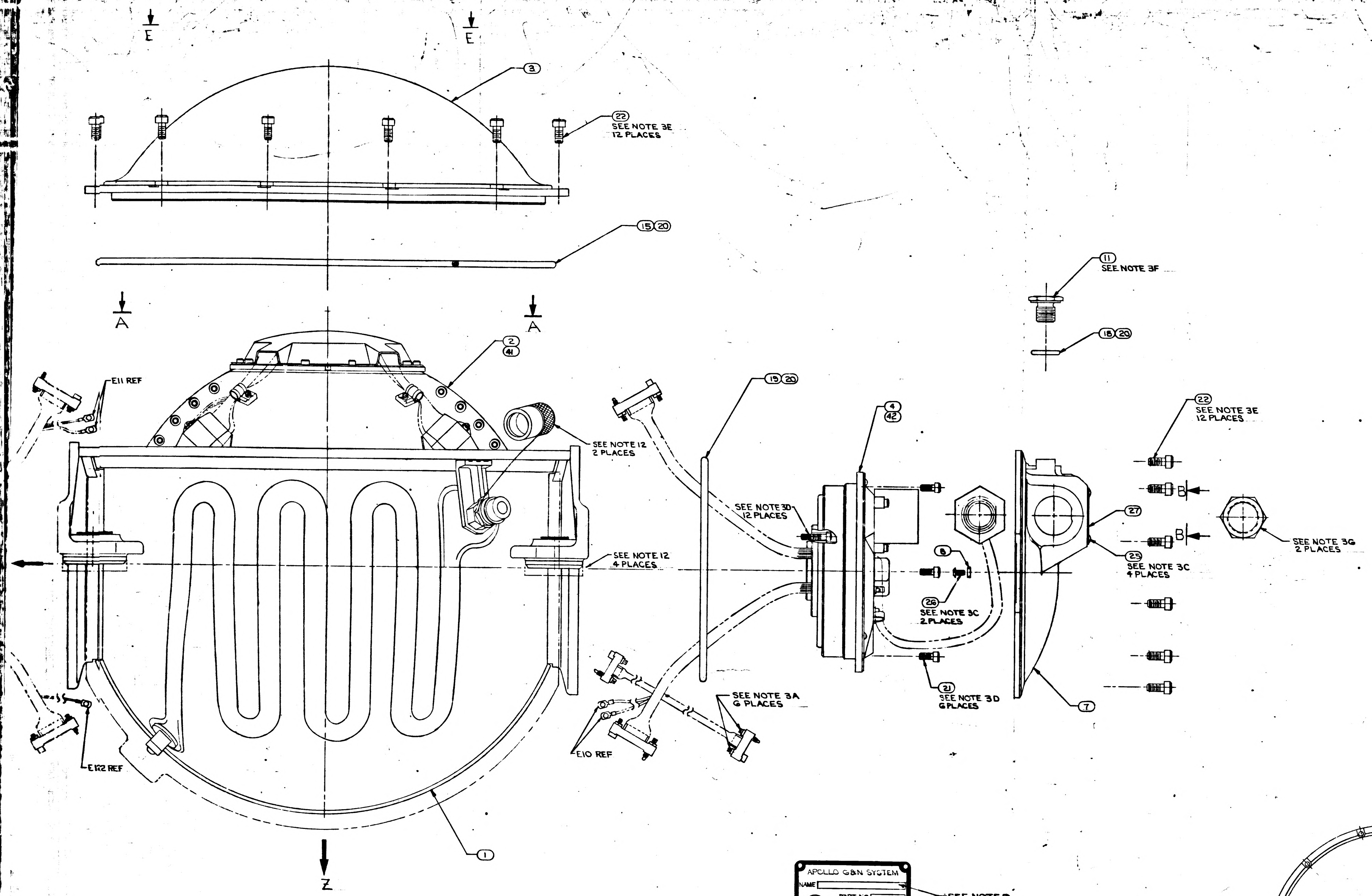
11 10 9 8 7

1/2018601


E
E
③
㉒ SEE NOTE 3E 12 PLACES
⑮⑳
A
A
⑪ SEE NOTE 3F
⑱⑳
② ㊶
E11 REF
SEE NOTE 12 2 PLACES
⑮⑳
④ ㊷
㉒ SEE NOTE 3E 12 PLACES
SEE NOTE 30 12 PLACES
SEE NOTE 12 4 PLACES
㉗
B
B
SEE NOTE 3G 2 PLACES
㉕ SEE NOTE 3C 4 PLACES
⑧
㉖ SEE NOTE 3C 2 PLACES
㉑ SEE NOTE 3D 6 PLACES
⑦
SEE NOTE 3A 6 PLACES
E10 REF
E12 REF
①
Z
SEE NOTE 8
J2
C
C
VIEW C-C
㉚㉙㉓ SEE NOTE 3C 6 PLACES
⑬⑭ SEE NOTE 7
VIEW
㊻
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY M.I.T. INSTRUMENTATION LAB
MFD BY
SEE NOTE 9
VIEW B-B
VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

2018601 REV AR SHEET

2/2018601


E
E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
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E11 REF
SEE NOTE 12
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SEE NOTE 12
4 PLACES
E12 REF
1
Z
15 20
SEE NOTE 3D
12 PLACES
4
42
SEE NOTE 3A
6 PLACES
E10 REF
8
26
SEE NOTE 3C
2 PLACES
21
SEE NOTE 3D
6 PLACES
11
SEE NOTE 3F
18 20
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SEE NOTE 3E
12 PLACES
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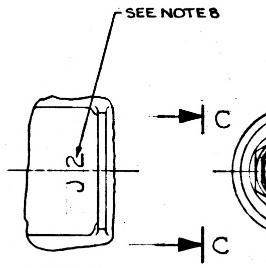
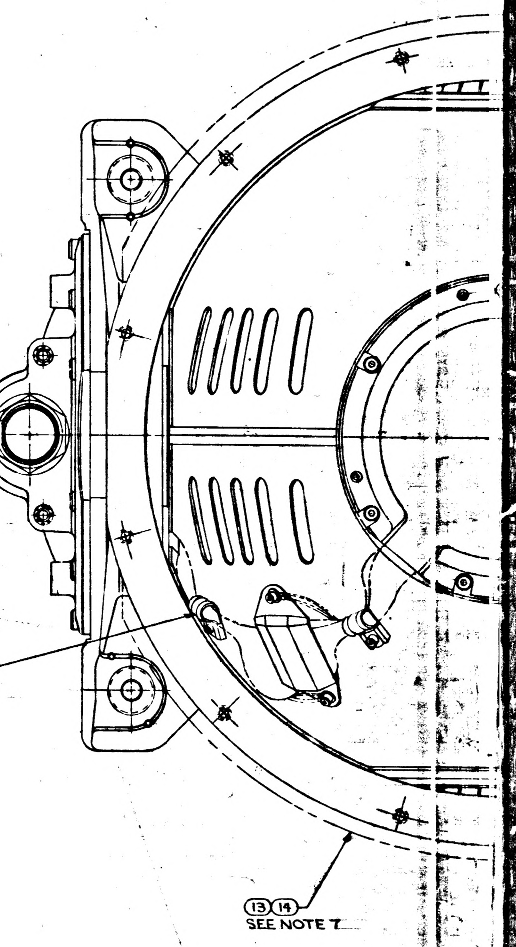
27
25
SEE NOTE 3C
4 PLACES
7
SEE NOTE 3G
2 PLACES


SEE NOTE 8
C
C

VIEW C-C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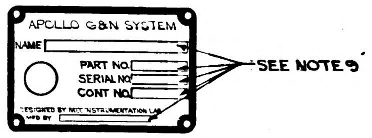
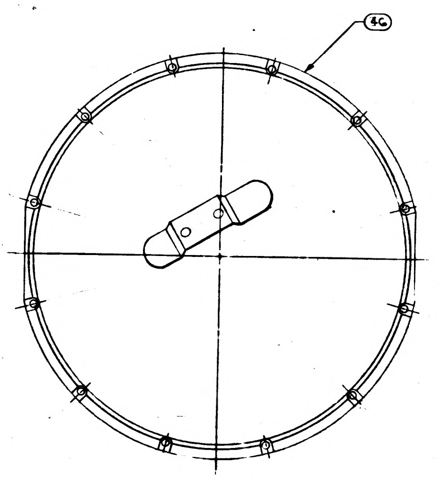
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7

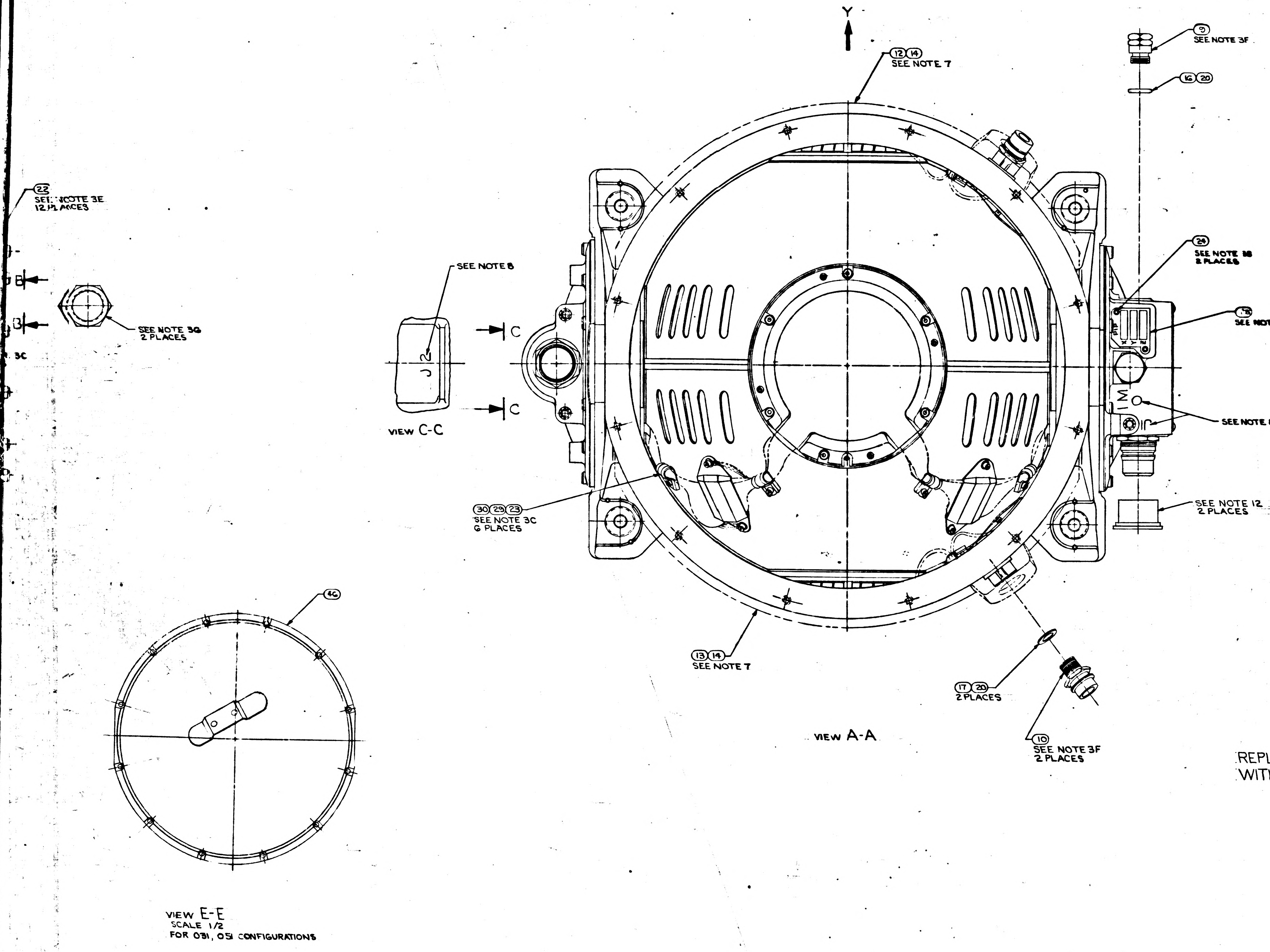

APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY MIT INSTRUMENTATION LAB
SEE NOTE 9

VIEW B-B



VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65		WK
V	REVISED TDRR 19275	2 Jun 65		WK
W	REVISED TDRR 21187	26 Jun 65		WK
Y	REVISED PER TDRR 21814	8 Sep 65		
Z	REVISED TDRR 22594	19 Oct 65		WK
AA	REVISED TDRR 23700	19 Oct 65		WK
AB	REVISED TDRR 24308	[illegible]		WK
AC	REVISED TDRR 25485	15 Feb 66		WK
AD	REVISED TDRR 26246	15 Feb 66		wk
AE	REVISED TDRR 26247	23 Feb 66		WK
AF	REVISED TDRR 26258	23 Feb 66		WK
AG	REVISED TDRR 26260	23 Feb 66		
AH	REVISED TDRR 26879	14 Mar 66		
AJ	REVISED TDRR 27347	25 Mar 66		WK
AK	REVISED TDRR 27776	12 Apr 66		WK
AL	REVISED TDRR 28126	22 Apr 66		WK
AM	REVISED TDRR 29026	23 May 66		
AN	REVISED PER TDRR 29571	21 JUN 66	JNP	
AP	REVISED PER TDRR 31076	20 SEP 66		
AR	REVISED PER TDRR 32105	7 DEC 66		



REPLACES REV T
WITH CHANGES

SEE NOTE 18

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A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
—	—	—	3	—	3	2021500 SEE NOTE 15 & 16	IRIG PREALIGNED ASSY	51
3	3	3	—	—	—	2021500-051 SEE NOTE 15	IRIG PREALIGNED ASS'Y	50
—	—	—	—	3	—	2021500-031 SEE NOTE 15	IRIG PREALIGNED ASS'Y	49
—	3	3	3	—	—	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	—	—	—	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
—	1	—	1	—	—	2018839	CASE COVER ASSEMBLY	46
1	1	1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	—	1	—	2018612 - 021	IGSA RESOLVER OUTER AXIS	42
1	1	1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX. SOC	26
4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH.(L.H)	13
1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
—	—	—	1	—	1	2018609-011	I.G.SA. TORQUE MOTOR, OUTER AXIS	5
—	—	—	1	—	1	2018612-011	I.G.SA, RESOLVER OUTER AXIS	4
1	—	1	—	1	1	2018710	CASE COVER	3
—	—	—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

LIST OF MATERIALS

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018601
SCALE 1/1 WT SHEET 1 OF 1

2018601 AR

3A

2018601 REV AR SHEET 1

3/2018601

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65		WK
V	REVISED TDRR 19275	2 Jun 65		WK
W	REVISED TDRR 21187	26 Jun 65		WK
Y	REVISED PER TDRR 21814	8 Sep 65		
Z	REVISED TDRR 22594	19 Oct 65		WK
AA	REVISED TDRR 23700	19 Oct 65		WK
AB	REVISED TDRR 24308	14 Dec 65		WK
AC	REVISED TDRR 25485	15 Feb 66		WK
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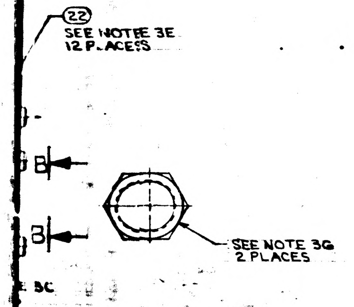
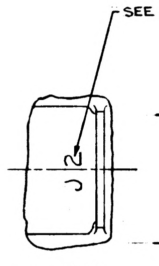
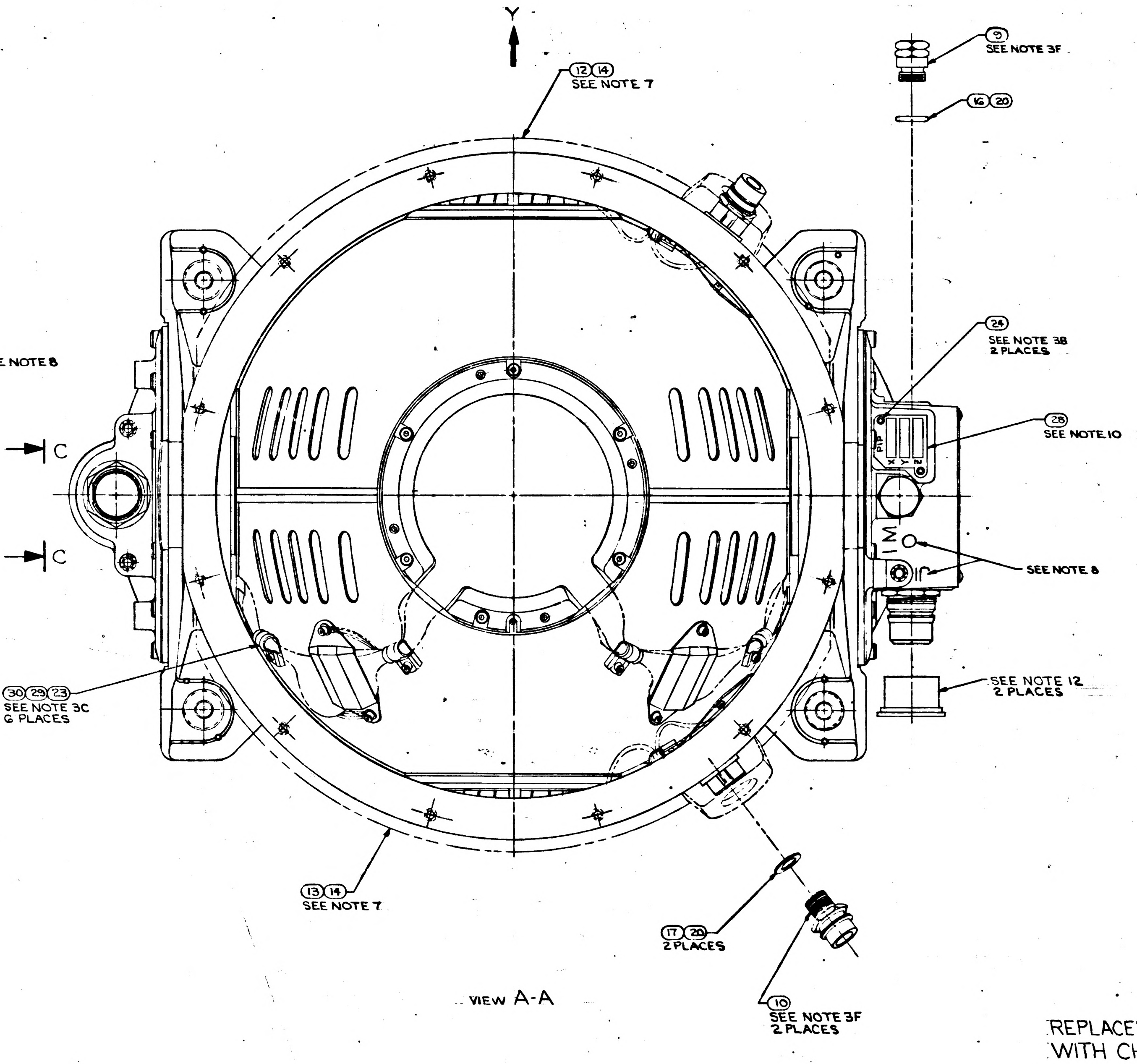
AF	REVISED TDRR 26258	23 Feb 66		WK
AG	REVISED TDRR 26260	23 Feb 66		WK
AH	REVISED TDRR 26879	14 Mar 66		WK
AJ	REVISED TDRR 27347	25 Mar 66		WK
AK	REVISED TDRR 27776	12 Apr 66		WK
AL	REVISED TDRR 28126	22 Apr 66		WK
AM	REVISED TDRR 29026	23 May 66		
AN	REVISED PER TDRR 29571	21 JUN 66	JNP	
AP	REVISED PER TDRR 31076	20 SEP 66	JSP MS	
AR	REVISED PER TDRR 32105	7 DEC 66		

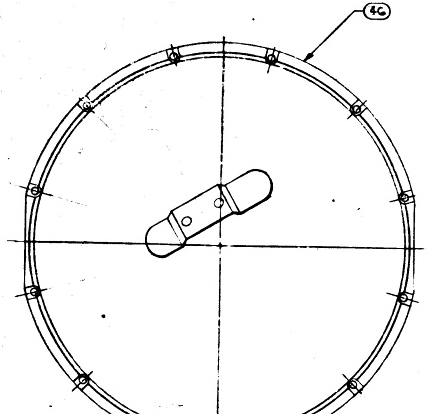




VIEW C-C



VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

SEE NOTE 18

REPLACES REV T
WITH CHANGES

					QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE "ACT	TAPE, ADH. ELEC. PRESS SENSITIVE	
A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
—	—	—	3	—	3	2021500 SEE NOTE 15&16	IRIG PREALIGNED ASS'Y	51
3	3	3	—	—	—	2021500-051 SEE NOTE 15	IRIG PREALIGNED ASS'Y	50
—	—	—	—	3	—	2021500-031 SEE NOTE 15	IRIG PREALIGNED ASS'Y	49
—	3	3	3	—	—	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	—	—	—	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
—	1	—	1	—	—	2018839	CASE COVER ASSEMBLY	46
1	1	1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	—	1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	1	1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	20
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1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
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1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH. (L.H.)	13
1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
—	—	—	1	—	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
—	—	—	1	—	1	2018612-011	I.G.S.A. RESOLVER OUTER AXIS	4
1	—	1	—	1	1	2018710	CASE COVER	3
—	—	—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
061	051	041	031	021	011	LIST OF MATERIALS		

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL W. Cuyler 23/3/65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
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SHEET 1 OF 1

2018601 AR

3A

2018601 REV AR SHEET

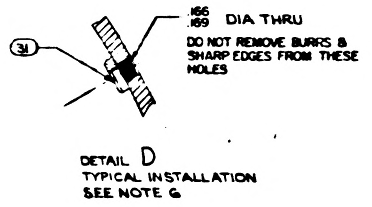
372018601

TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

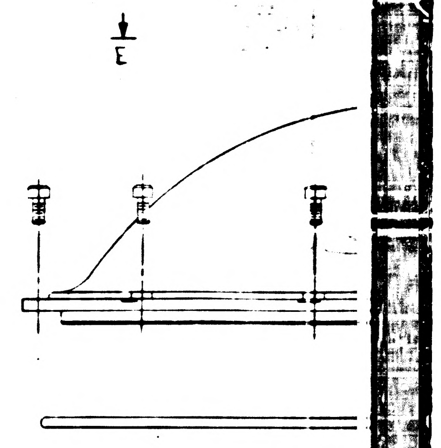
TABLE I	
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

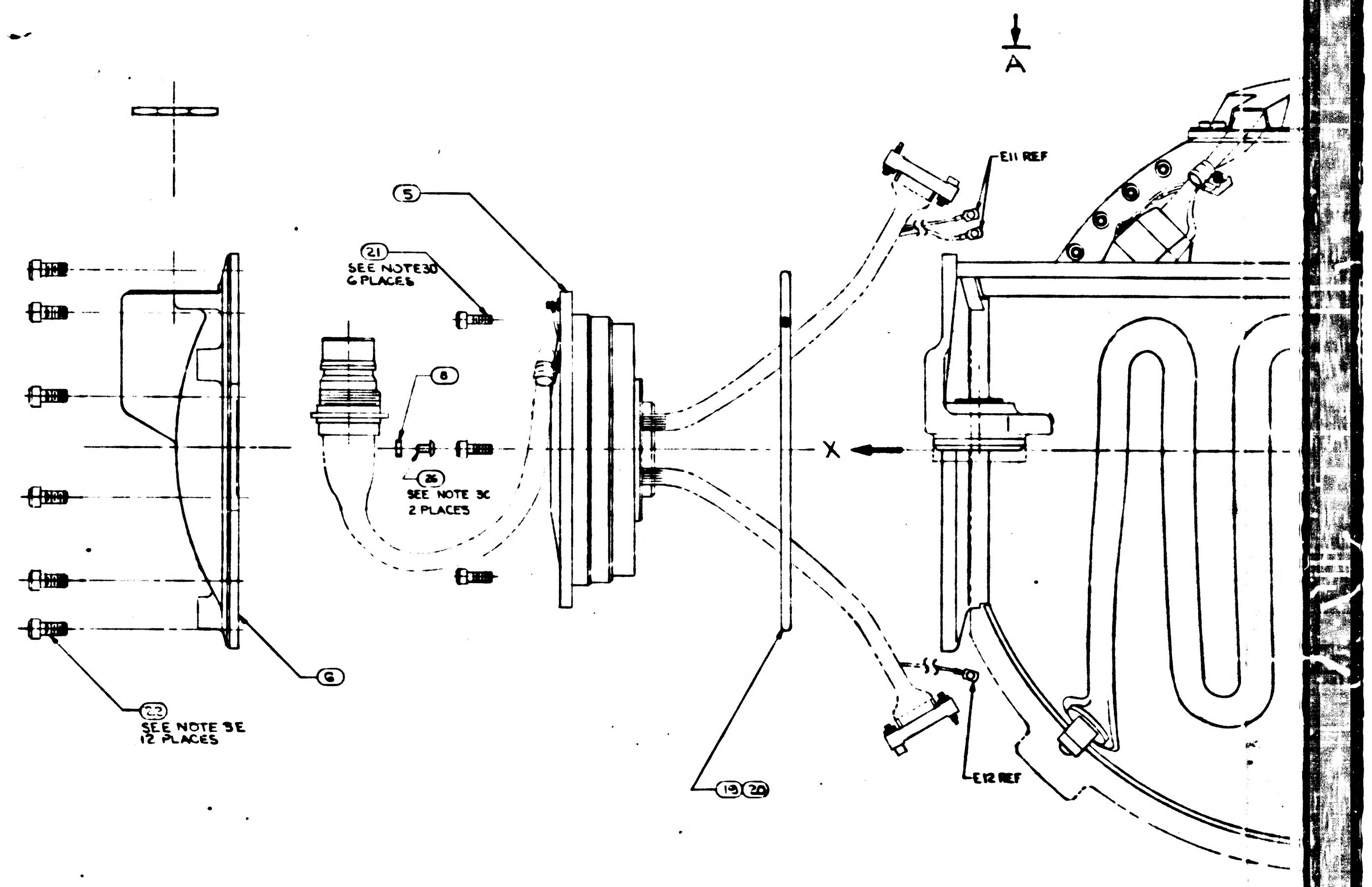
DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC. SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6





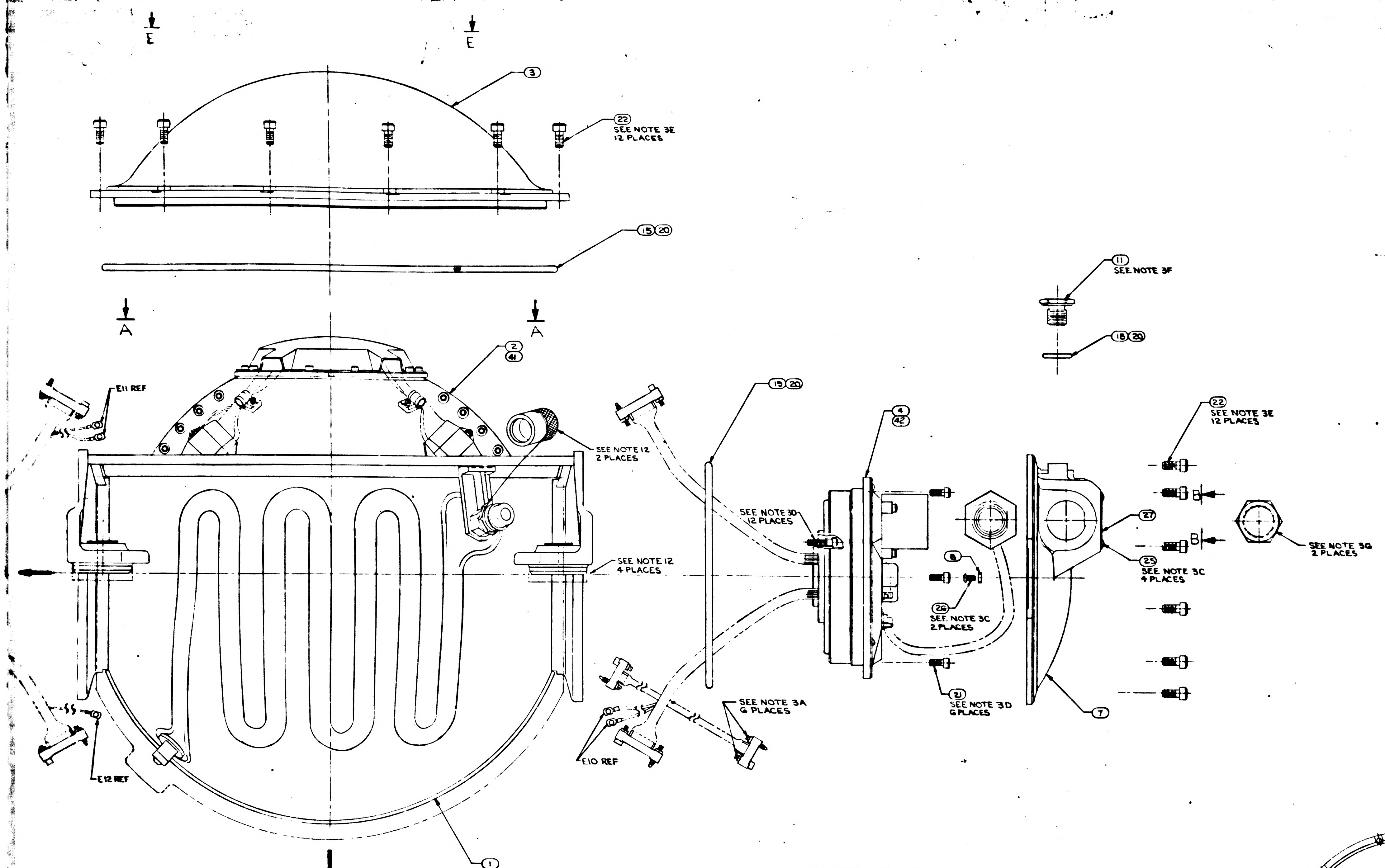
A
E11 REF
(5)
(21) SEE NOTE 3D 6 PLACES
(8)
(26) SEE NOTE 3C 2 PLACES
X
(6)
(22) SEE NOTE 3E 12 PLACES
(19)(20)
E12 REF

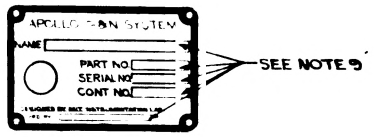
NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (35) NASA DWG NO 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $^{.23}_{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $^{.10}_{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (83) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-061 OR 071 MAY BE USED INTERCHANGEABLY.

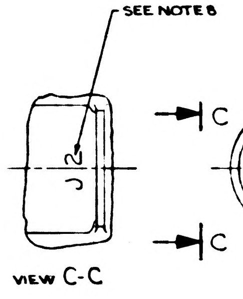
3/4

	REV	SHEET
2018601	AS	1

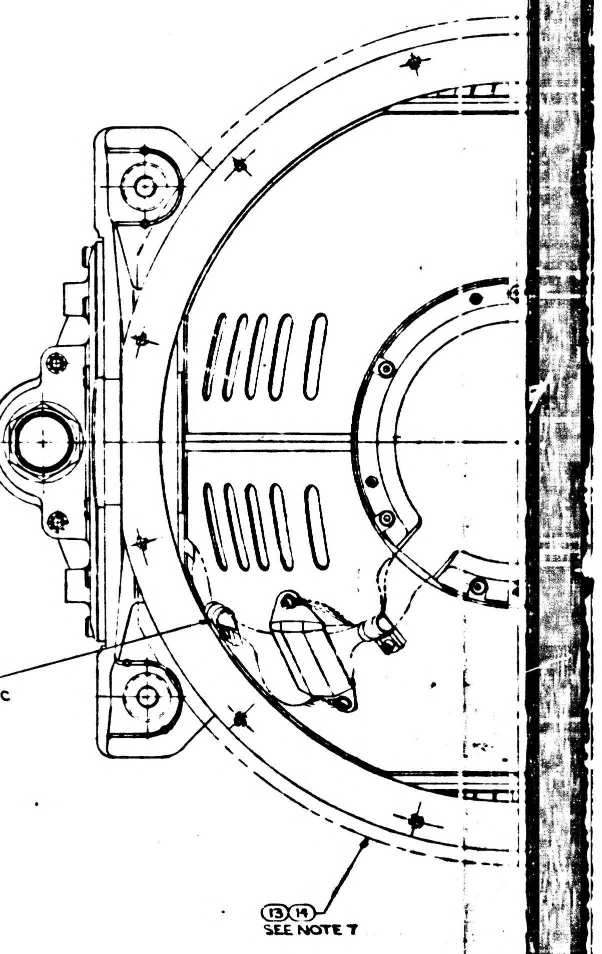

E
E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
A
2
41
E11 REF
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
E12 REF
1
Z
15 20
SEE NOTE 3D
12 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
4
42
8
26
SEE NOTE 3C
2 PLACES
21
SEE NOTE 3D
6 PLACES
11
SEE NOTE 3F
18 20
27
25
SEE NOTE 3C
4 PLACES
7
22
SEE NOTE 3E
12 PLACES
B
B
SEE NOTE 3G
2 PLACES

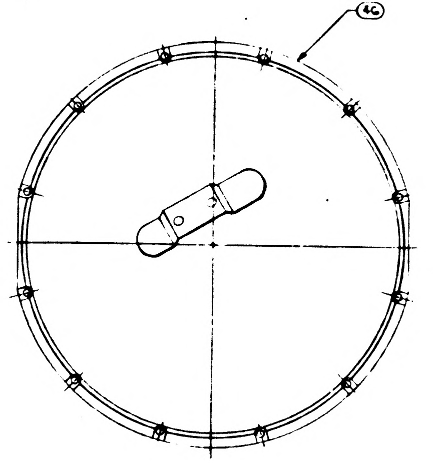

APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
SEE NOTE 9

VIEW B-B


SEE NOTE 8
J2
C
C

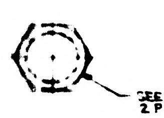
VIEW C-C

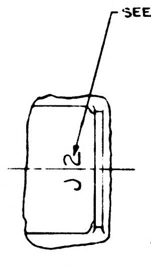

Y
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7



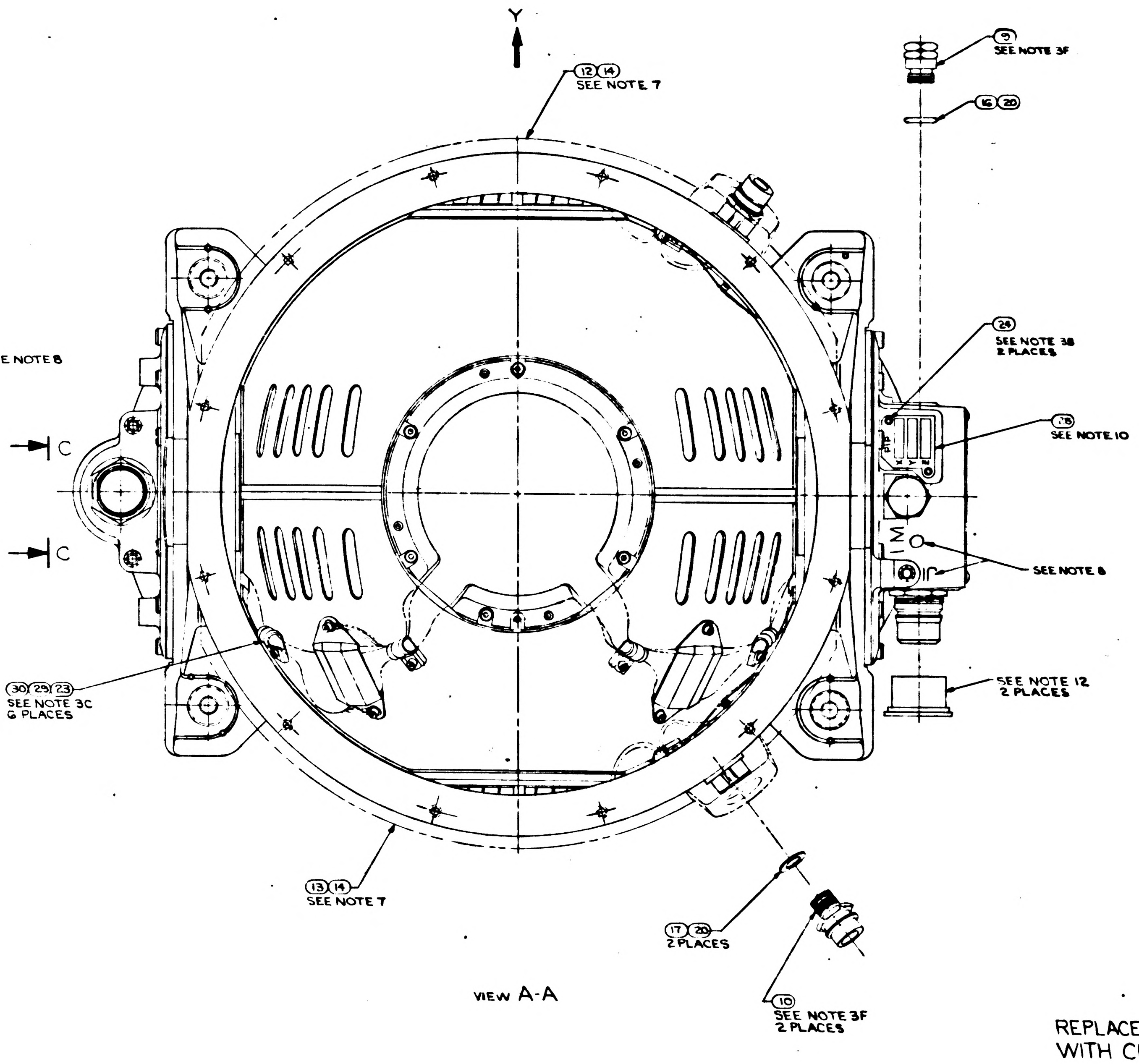
VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar	[illegible]
V	REVISED TDRR 19275	2 June	[illegible]
W	REVISED TDRR 21187	25 Jun 65	[illegible]
Y	REVISED PER TDRR 21814	8 Sep 65	[illegible]
Z	REVISED TDRR 22594	19 Oct 65	[illegible]
AA	REVISED TDRR 23700	[illegible]	[illegible]
AB	REVISED TDRR 24308	[illegible]	[illegible]
AC	REVISED TDRR 25485	[illegible]	[illegible]
AD	REVISED TDRR 26246	[illegible]	[illegible]
AE	REVISED TDRR 26247	[illegible]	[illegible]
AF	REVISED TDRR 26258	[illegible]	[illegible]
AG	REVISED TDRR 26260	[illegible]	[illegible]
AH	REVISED TDRR 26879	[illegible]	[illegible]
A	REVISED TDRR 27347	[illegible]	[illegible]
AK	REVISED TDRR 27776	[illegible]	[illegible]
AL	REVISED TDRR 28126	[illegible]	[illegible]
AM	REVISED TDRR 29026	[illegible]	[illegible]
AN	REVISED PER TDRR 29571	21 JUN	[illegible]
AP	REVISED PER TDRR 31076	20 SEP 66	[illegible]
AR	REVISED PER TDRR 32108	7 DEC 66	ME GB
AS	REVISED PER TDRR 33113	9 MAR 67	LEE RCB

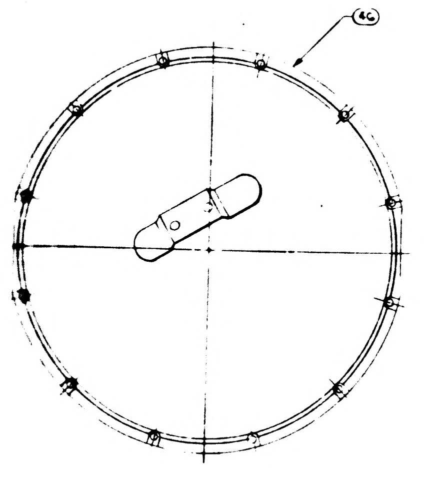




VIEW C-C



VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

REPLACES REV T
WITH CHANGES

SEE NOTE 18

A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE ACT	TAPE, ADH. ELEC. PRESS SENSITIVE	
A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
—	—	—	3	—	3	2021500 SEE NOTE 15&16	IRIG PREALIGNED ASSY	51
3	3	3	—	—	—	2021500 (SEE NOTE 15&16)	IRIG PREALIGNED ASS'Y	50
—	—		—	3	—	20[illegible]500-031 SEE NOTE 15	IRIG PREALIGNED ASSY	49
—	3	3	3	—	—	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	—	—	—	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
—	1	—	1	—	—	2018835	CASE COVER ASSEMBLY	46
1	1	1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	—	1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	1	1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	39
A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
		~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L.H.)	13
1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R.H.)	12
1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR OUTER AXIS	7
1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
—	—	—	1	—	1	2018609-011	IGSA. TORQUE MOTOR, OUTER AXIS	5
—	—	—	1	—	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	—	1	—	1	1	2018710	CASE COVER	3
—	—	—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
					QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
061	051	041	031	021	011	LIST OF MATERIALS		

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN DTB DATE 3/5/65
CHECKED G Quinn [illegible]/65
APPROVAL
APPROVAL
NASA APPROVAL [illegible] 3-23-65
MIT APPROVAL [illegible] 23 [illegible] 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL MEASURING UNIT ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET

2018601 AS

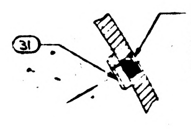
3A

MASTER

3/2018601

TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
…5-11	

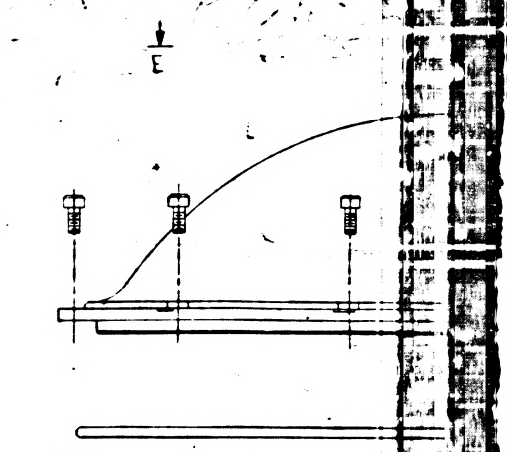
TABLE I	
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
7	3/8

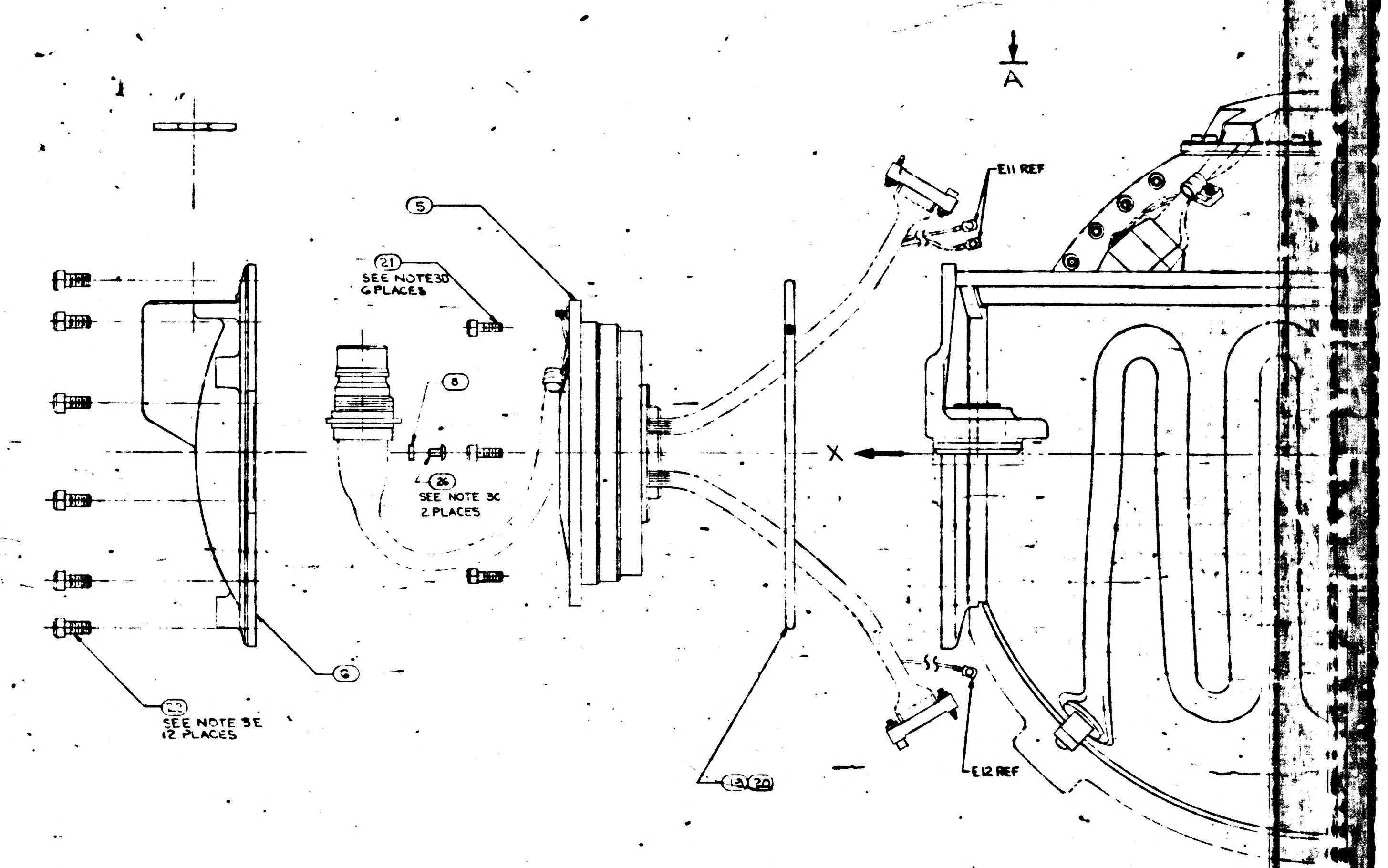


DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154





NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (39) NASA DWG~~ NO 1000260 USE ~~1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
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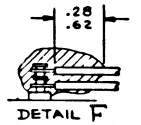
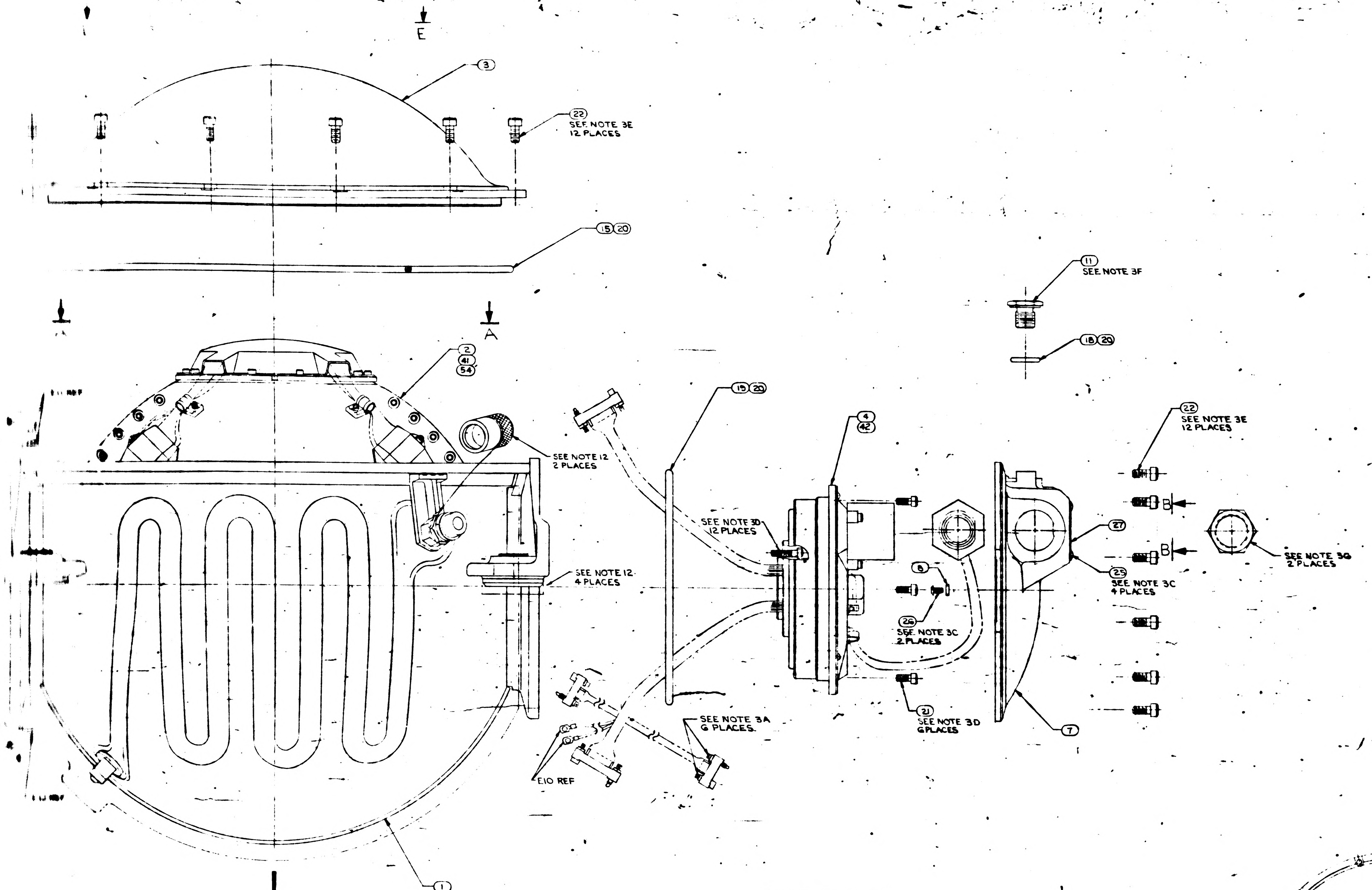
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (16), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-620-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (63) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-061 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "a" AND "b" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE.
    - a. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
    - b. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "a" ABOVE.

    CURE APPLIED COATINGS AT 130°±10°F FOR A MINIMUM OF 24 HOURS.



DETAIL F
(-081 CONFIGURATION ONLY)


E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
A
2
41
54
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
1
Z
19 20
SEE NOTE 3D
12 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
4
42
5
26
SEE NOTE 3C
2 PLACES
21
SEE NOTE 3D
6 PLACES
11
SEE NOTE 3F
18 20
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SEE NOTE 3E
12 PLACES
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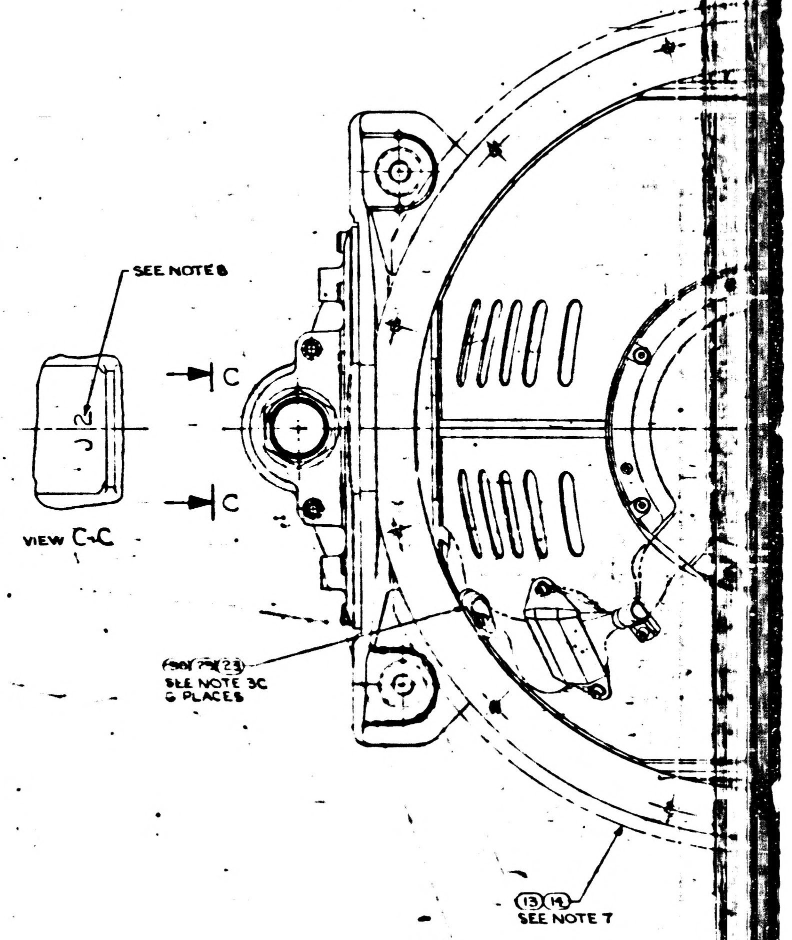
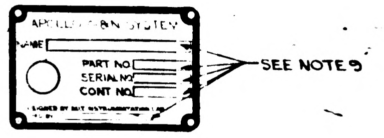
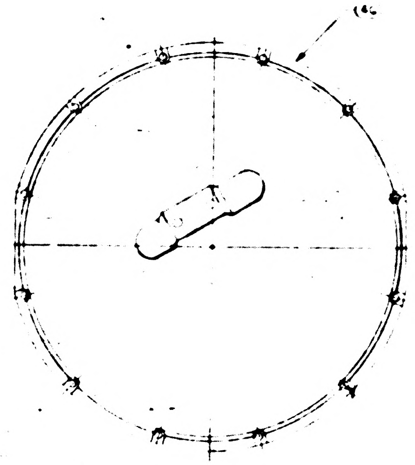
27
25
SEE NOTE 3C
4 PLACES
7
SEE NOTE 3G
2 PLACES


SEE NOTE 8
J2
C
C
23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7

VIEW C-C

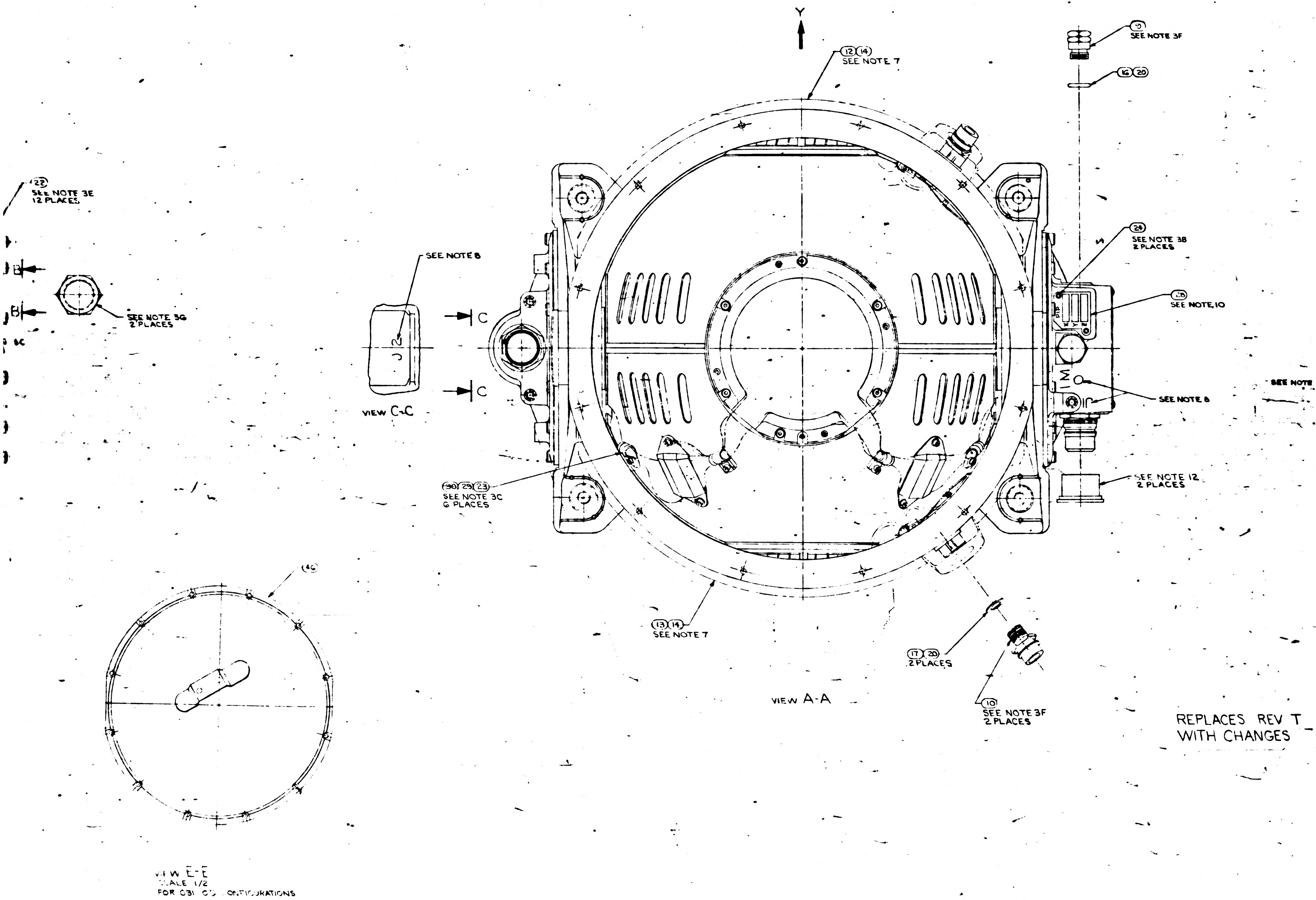

APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9

VIEW B-B



VIEW E-E
SCALE 1/2
FOR 031 [illegible] CONFIGURATIONS

SYM	REVISIONS DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	[illegible]		
V	REVISED TDRR 19275	[illegible]		
W	REVISED TDRR 21187	[illegible]		
Y	REVISED PER TDRR 21814	[illegible]		
Z	REVISED TDRR 22594	[illegible]		
AA	REVISED TDRR 23700	[illegible]		
AB	REVISED TDRR 24308	[illegible]		
AC	REVISED TDRR 25485	[illegible]		
AD	REVISED TDRR 26246	[illegible]		
AE	REVISED TDRR 26247	[illegible]		
AF	REVISED TDRR 26258	[illegible]		
AG	REVISED TDRR 26260	[illegible]		
AH	REVISED TDRR 26675	[illegible]		
AJ	REVISED TDRR 27347	[illegible]		
AK	REVISED TDRR 27776	[illegible]		
AL	REVISED TDRR 28126	[illegible]		
AM	REVISED TDRR 29026	[illegible]		
AN	REVISED PER TDRR 29571	21 JUN		
AP	REVISED PER TDRR 31076	20 SEP 66		
AR	REVISED PER TDRR 32105	7 DEC 66	ME	[illegible]
AS	REVISED PER TDRR 33113	MAR 67	LLE	RCD
AT	REVISED PER TDRR 33316	6 APR 67	ME	RCD



REPLACES REV T WITH CHANGES

SEE NOTE 18

-081	-071	-061	-051	-041	-031	-021	-011	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
A/R	-	-	-	-	-	-	-	1006277	SILICA, PULVERIZED, PYROGENIC	58
A/R	-	-	-	-	-	-	-	1008822-1	COLORANT	57
A/R	-	-	-	-	-	-	-	1008821-2	CURING AGENT	56
A/R	-	-	-	-	-	-	-	1008821-1	EPOXY RESIN	55
1	1	-	-	-	-	-	-	2018602-031	OUTER AXIS ASSEMBLY	54
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE ACT	TAPE, ADH. ELEC. PRESS SENSITIVE	53
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
-	-	-	-	-	3	-	3	2021500 SEE NOTE 15 & 16	IRIG PREALIGNED ASSY	51
3	3	3	3	3	-	-	-	2021500 (SEE NOTE 15 & 19)	IRIG PREALIGNED ASSY	50
-	-	-	-		-	3	-	20[illegible]00-031 SEE NOTE 15	IRIG PREALIGNED ASSY	49
-	3	-	3	3	3	-	-	2018644-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	-	3	-	-	-	3	3	2018644-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
-	1	-	1	-	1	-	-	2018839	CASE COVER ASSEMBLY	46
1	1	1	1	1	-	1	-	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	2	2	[illegible]1625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	1	1	-	1	-	2018612-021	IGSA RESOLVER OUTER AXIS	42
-	-	1	1	1	-	1	-	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
				~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	39
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
				~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX SOC	26
4	4	4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	2	2	1010891-7	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L H)	13
1	1	1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R H)	12
1	1	1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR OUTER AXIS	7
1	1	1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
-	-	-	-	-	1	-	1	2018609-011	IGSA TORQUE MOTOR, OUTER AXIS	5
-	-	-	-	-	1	-	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	-	1	-	1	-	1	1	2018710	CASE COVER	3
-	-	-	-	-	1	-	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
							QTY REQD			

LIST OF MATERIALS

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DTB DATE 3/5/65
CHECKED G D W 3/4/65
APPROVAL
APPROVAL
NASA APPROVAL 3-25-65
MIT APPROVAL W Kupfer

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

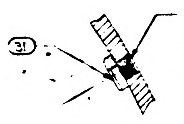
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

2018601 AT

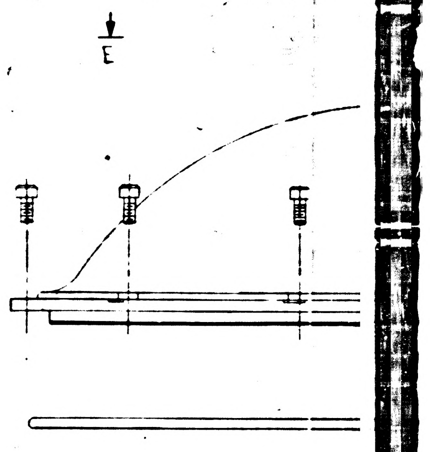
37 2018601

TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
[illegible] S-11	

TABLE I	
CABLE CLAMP (29)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

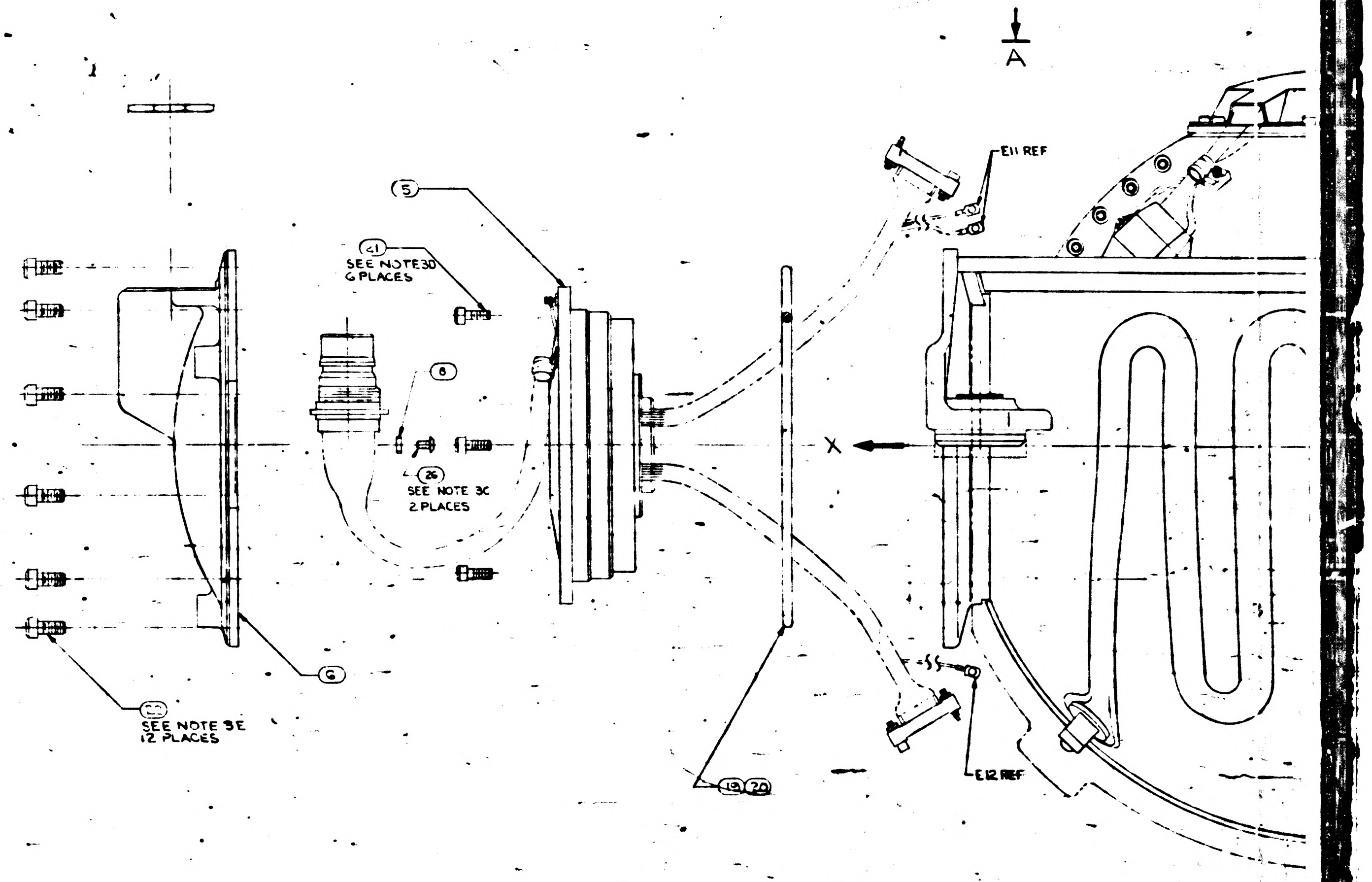


DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



DOCUMENT CHART

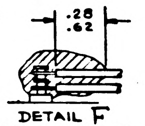
ASSEMBLY NO.	SCHEMATIC (REF	PROC. SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016157



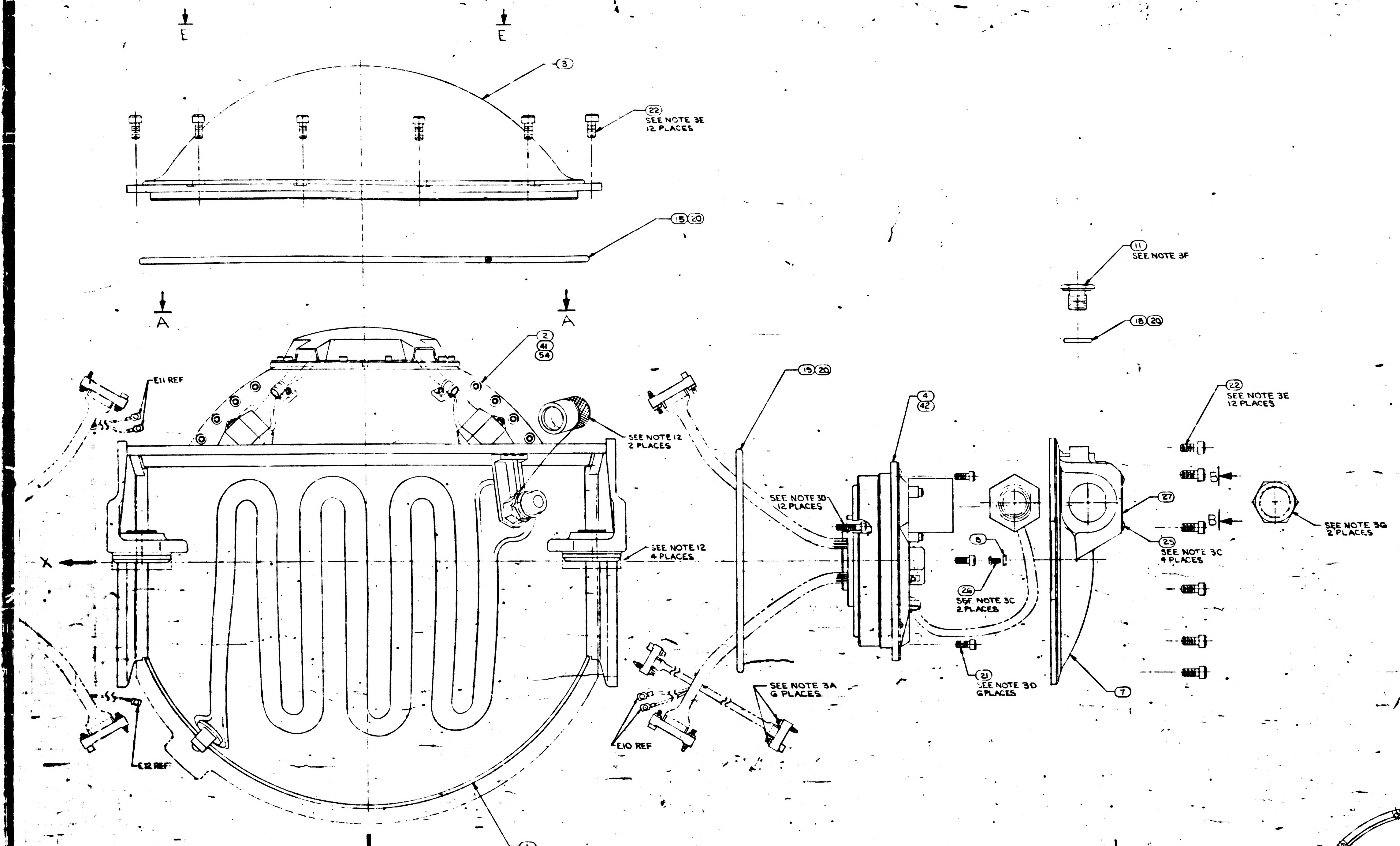
NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (35) NASA DWG NO 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS .23/.27 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. ENGRAVE CHARACTERS .10/.14 HIGH AND FILL, COLOR BLACK PER ND 1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 ~~WHEN ITEMS (10), (19) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)~~
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERE 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (83) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-061 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "a" AND "b" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE.
    - a. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
    - b. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "a" ABOVE.

    CURE APPLIED COATINGS AT 130° ± 10° F FOR A MINIMUM OF 24 HOURS.



DETAIL F
(-071 & -081 CONFIGURATION ONLY)


E
E
3
22
SEE NOTE 3E
12 PLACES
5 20
A
A
2
41
54
E11 REF
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
X
E12 REF
1
Z
19 20
E10 REF
SEE NOTE 3A
6 PLACES
SEE NOTE 3D
12 PLACES
4
42
8
24
SEE NOTE 3C
2 PLACES
21
SEE NOTE 3D
6 PLACES
11
SEE NOTE 3F
18 20
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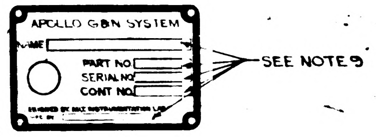
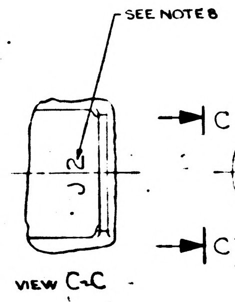
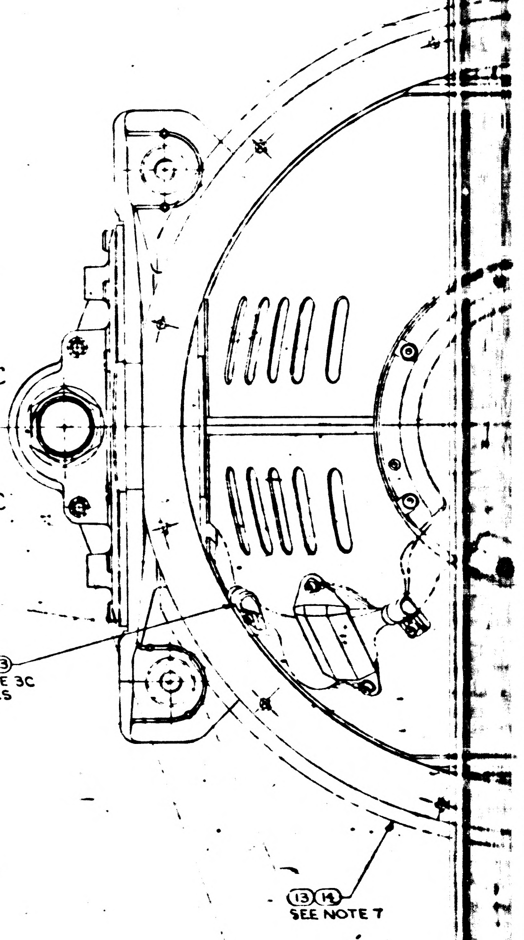
SEE NOTE 3E
12 PLACES
B
B
27
25
SEE NOTE 3C
4 PLACES
7
SEE NOTE 3G
2 PLACES

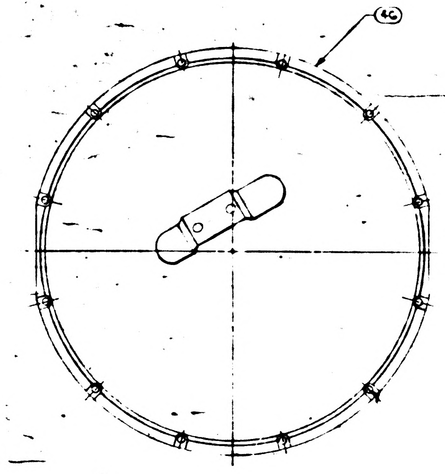

APOLLO G&N SYSTEM
PART NO
SERIAL NO
CONT NO
SEE NOTE 9

VIEW B-B


SEE NOTE 8
C
C

VIEW C-C


30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7



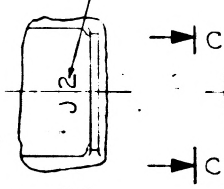
VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

2018601 AU

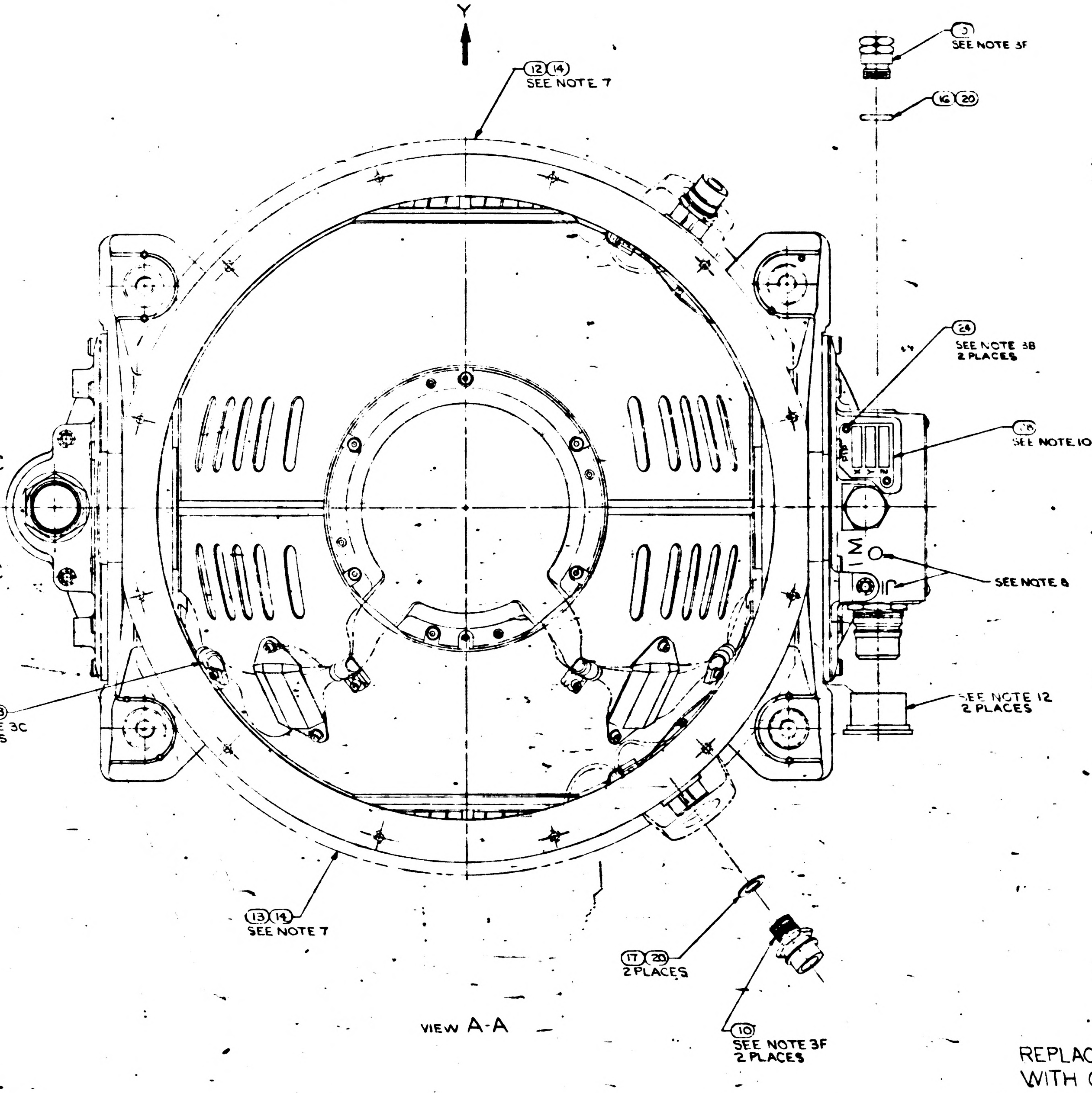
2-/2018601

SYM	DESCRIPTION	DATE	APPROVED	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar		
V	REVISED TDRR 19275	[illegible]		
W	REVISED TDRR 21187	[illegible]		
Y	REVISED PER TDRR 21814	8 Sep 65		
Z	REVISED TDRR 22594	[illegible]		
AA	REVISED TDRR 23700	[illegible]		
AB	REVISED TDRR 24308	[illegible]		
AC	REVISED TDRR 25485	[illegible]		
AD	REVISED TDRR 26296	[illegible]		
AE	REVISED TDRR 26247	[illegible]		
AF	REVISED TDRR 26258	[illegible]		
AG	REVISED TDRR 26260	[illegible]		
AH	REVISED TDRR 26879	[illegible]		
[illegible]	REVISED TDRR [illegible]	[illegible]		
AK	REVISED TDRR 27776	[illegible]		
AL	REVISED TDRR 28126	[illegible]		
AM	REVISED TDRR 29026	[illegible]		
AN	REVISED PER TDRR 29571	2 JUN		
AP	REVISED PER TDRR 31076	20 SEP 66		
AR	REVISED PER TDRR 32105	7 DEC 66	ME	
AS	REVISED PER TDRR 33113	9 MAR 67	LEE	RCD
AT	REVISED PER TDRR 33316	6 APR 67	ME	RCD
AU	REVISED PER TDRR 33352	6 APR 67	ME	

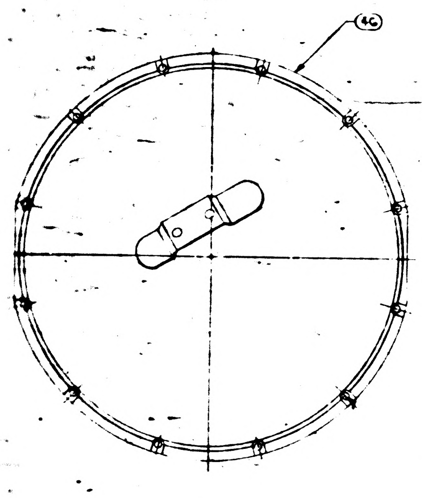
SEE NOTE 3G
2 PLACES



VIEW C-C



VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

REPLACES REV T
WITH CHANGES

SEE NOTE 18

-081	-071	-061	-051	-041	-031	-021	-011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	-	-	-	-	-	-	1006277	SILICA, PULVERIZED, PYROGENIC	58
A/R	A/R	-	-	-	-	-	-	1008822-1	COLORANT	57
A/R	A/R	-	-	-	-	-	-	1008821-2	CURING AGENT	56
A/R	A/R	-	-	-	-	-	-	1008821-1	EPOXY RESIN	55
1	1	-	-	-	-	-	-	2018602-031	OUTER AXIS ASSEMBLY.	54
AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	53
AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
-	-	-	-	-	3	-	3	2021500 SEE NOTE 15 & 16	IRIG PREALIGNED ASSY	51
3	3	3	3	3	-	-	-	2021500 (SEE NOTE 15 & 16)	IRIG PREALIGNED ASS'Y	50
-	-	-	-		-	3	-	20[illegible]500-031 SEE NOTE 15	IRIG PREALIGNED ASS'Y	49
-	3	-	3	3	3	-	-	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	-	3	-	-	-	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
-	1	-	1	-	1			2018839	CASE COVER ASSEMBLY	46
1	1	1	1	1	-	1	-	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	2	2	[illegible]1625-1 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	1	1	-	1	-	2018612-021	IGSA RESOLVER OUTER AXIS	42
-	-	1	1	1	-	1	-	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018833-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
				A/R	A/R	A/R	A/R	~~1000260-SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	39
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	[illegible]832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000263-SEE NOTE 5	WEIGHT BALANCE OUT AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000261-SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
				~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~[illegible] SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1001488 SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN ℄ INCH	31
6	6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	6	6	1000220-SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX SOC	26
4	4	4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	2	2	1010891-7	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	2	2	1000159-3	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L.H.)	13
1	1	1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R.H.)	12
1	1	1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	1	1	2018773	VALVE, PRESS. RE ASSEMBLY	9
2	2	2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR OUTER AXIS	7
1	1	1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
-	-	-	-	-	1	-	1	2018609-011	IGSA, TORQUE MOTOR, OUTER AXIS	5
-	-	-	-	-	1	-	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	-	1	-	1	-	1	1	2018710	CASE COVER	3
-	-	-	-	-	1	-	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASSY	1

LIST OF MATERIALS

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DTB DATE 3/5/65
CHECKED G Quinn 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET OF

2018601 AU

3/2018601

TABLE II

SCREW SELECTION CHART (32)

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
[illegible]5-11	

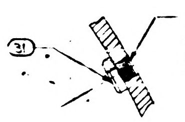
TABLE I

CABLE CLAMP (29)

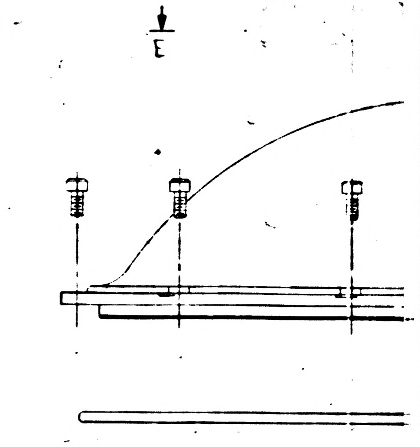
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
7	3/8

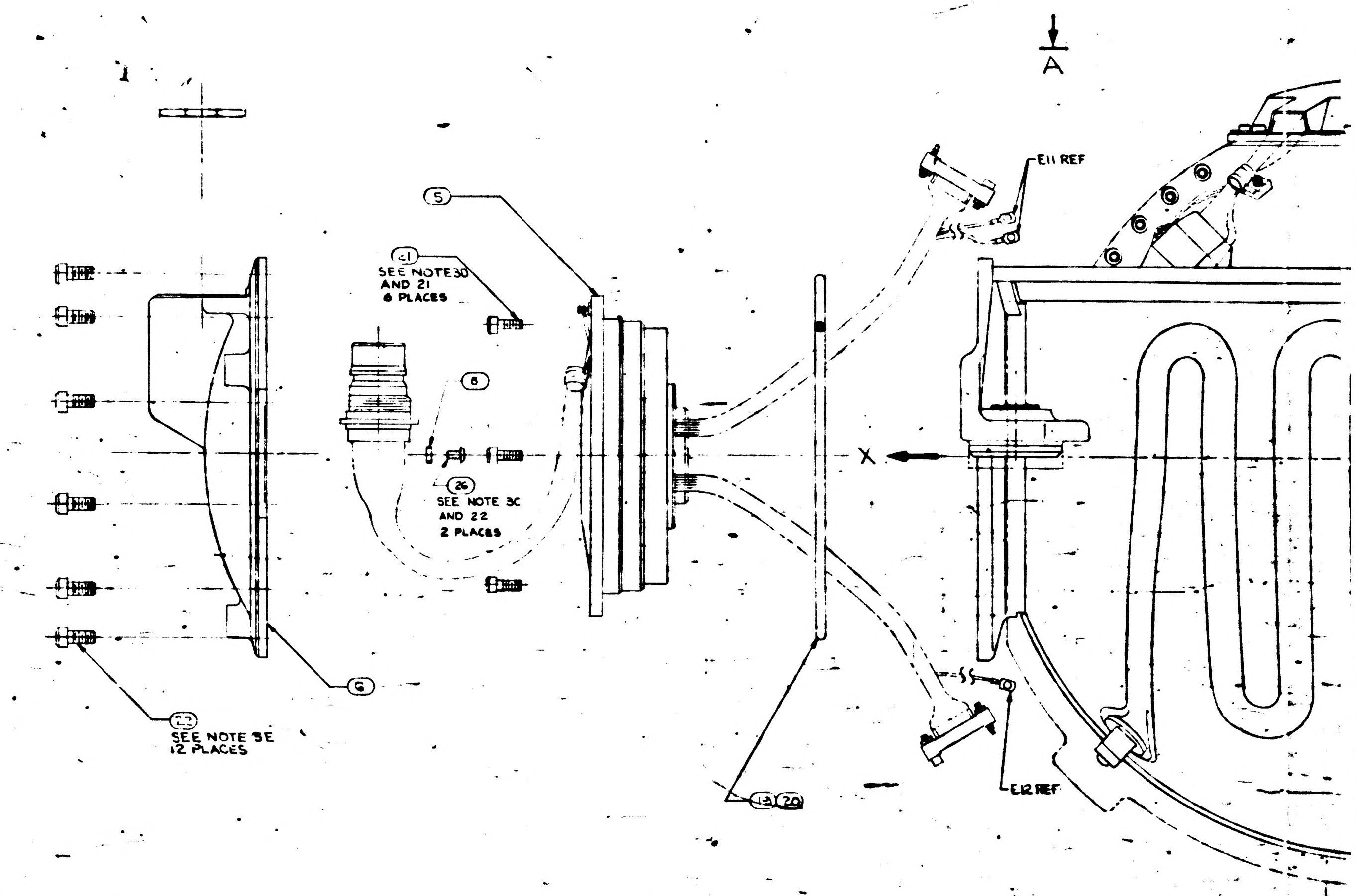
DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC. SPEC
2018601-011	2018615	PS2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

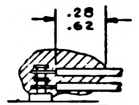



(5)
(41) SEE NOTE 3D AND 21 6 PLACES
(8)
(26) SEE NOTE 3C AND 22 2 PLACES
(6)
(22) SEE NOTE 3E 12 PLACES
(19) (20)
X
E11 REF
E12 REF

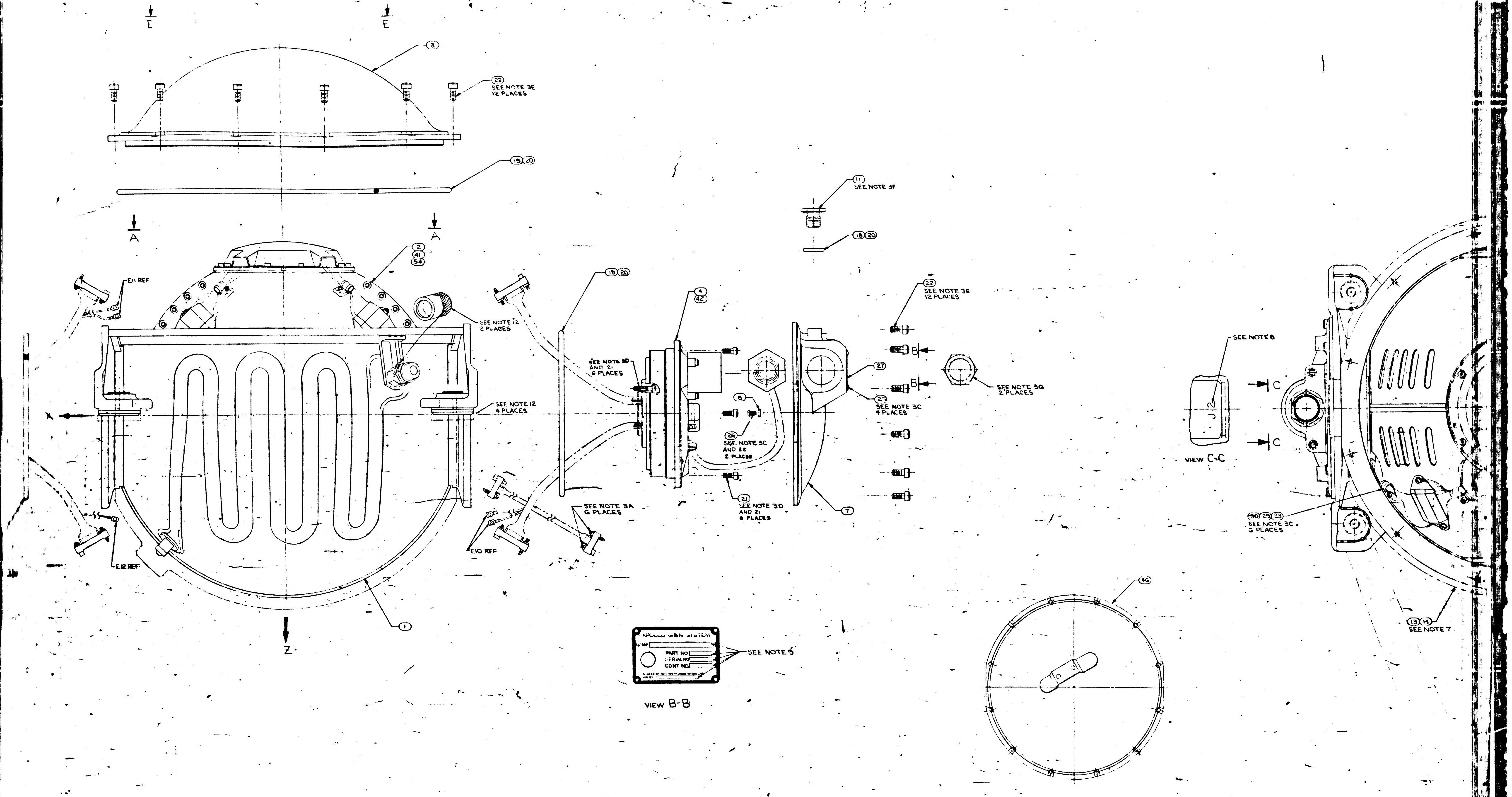
NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (35) NASA DWG NO 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (83) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-061 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "a" AND "b" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE.
    - a. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
    - b. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "a" ABOVE.

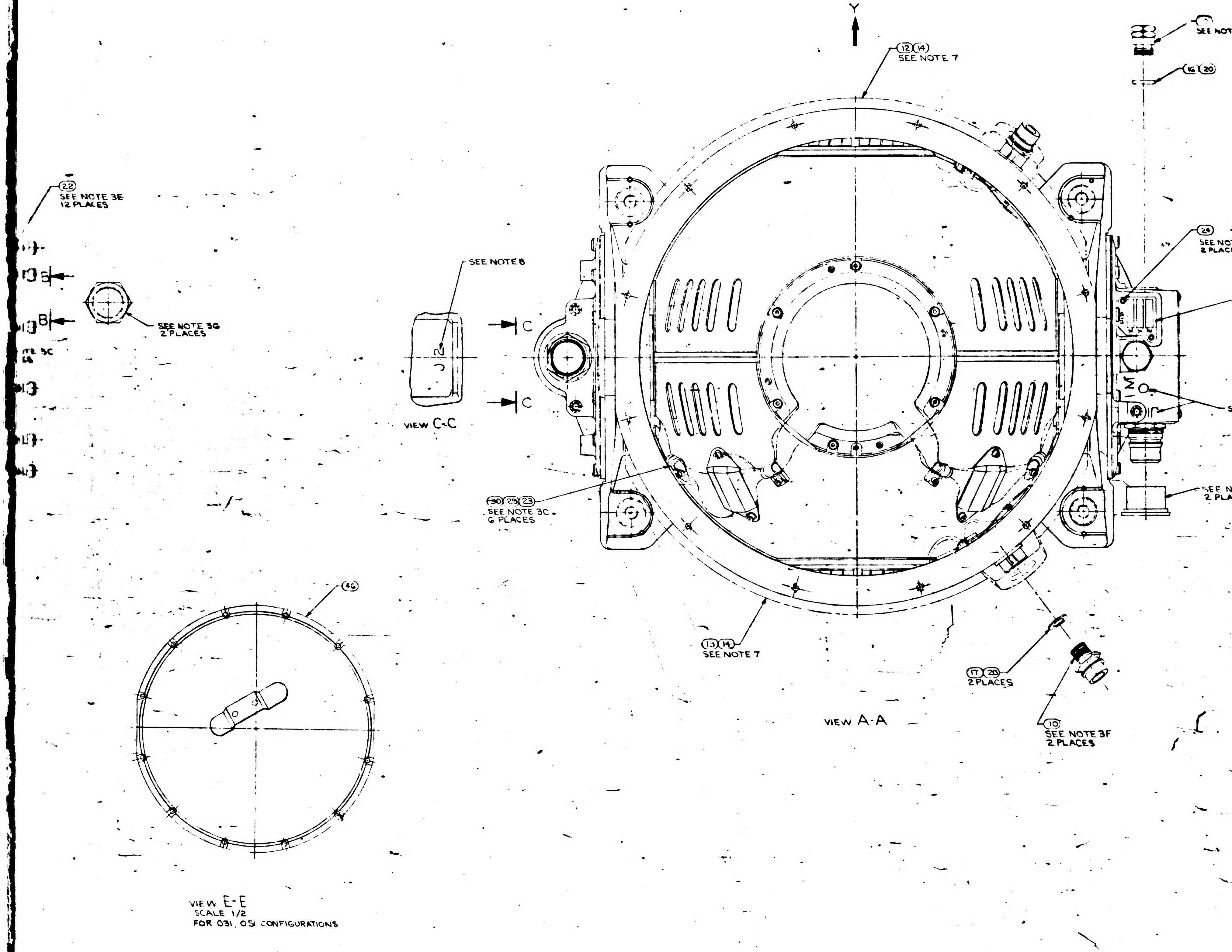
    CURE APPLIED COATINGS AT 130°±10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.



DETAIL F
(-071 & -081 CONFIGURATION ONLY)


E
E
③
㉒ SEE NOTE 3E 12 PLACES
⑮⑳
A
A
② ㊶ (54)
E11 REF
SEE NOTE 12 2 PLACES
SEE NOTE 12 4 PLACES
X
E12 REF
①
Z
⑮⑳
SEE NOTE 3D AND 21 6 PLACES
④ ㊷
E10 REF
SEE NOTE 3A 6 PLACES
⑧
㉖ SEE NOTE 3C AND 22 2 PLACES
㉑ SEE NOTE 3D AND 21 6 PLACES
⑪ SEE NOTE 3F
⑱⑳
㉒ SEE NOTE 3E 12 PLACES
B
B
㉗
㉓ SEE NOTE 3C 4 PLACES
⑦
SEE NOTE 3G 2 PLACES
SEE NOTE 8
J12
C
C
VIEW C-C
㉚㉙㉓ SEE NOTE 3C 6 PLACES
⑬⑭ SEE NOTE 7
APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9
VIEW B-B
㊻
VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

REV	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747			
V	REVISED TDRR 19275			
W	REVISED TDRR 21107			
Y	REVISED PER TDRR 21814	8 Sep 65		
Z	REVISED TDRR 22594			
AA	REVISED TDRR 23700			
AB	REVISED TDRR 24308			
AC	REVISED TDRR 25485			
AD	REVISED TDRR 26246			
AE	REVISED TDRR 26247			
AF	REVISED TDRR 26258			
AG	REVISED TDRR 26260			
AH	REVISED TDRR 26875			
AJ	REVISED TDRR 27347			
AK	REVISED TDRR 27776			
AL	REVISED TDRR 28126			
AM	REVISED TDRR 29026			
AN	REVISED PER TDRR 29571	2 JUN		
AP	REVISED PER TDRR 31076	20 SEP 66		
AR	REVISED PER TDRR 32105	7 DEC 66	ME	
AS	REVISED PER TDRR 33113	MAR 67		RCD
AT	REVISED PER TDRR 33316	6 APR 67	ME	RCD
AU	REVISED PER TDRR 33352	6 APR 67	ME	
AV	REVISED PER TDRR 33363	6 APR 67	ME	RCD



REPLACES REV T WITH CHANGES

SEE NOTE 18

QTY REQD								PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
-081	-071	-061	-051	41	[illegible]	-021	[illegible]		LIST OF MATERIALS	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	59
A/R	A/R	-	-	-	-	-	-	1006277	SILICA, PULVERIZED, PYROGENIC	58
A/R	A/R	-	-	-	-	-	-	1008822-1	COLORANT	57
A/R	A/R	-	-	-	-	-	-	1008821-2	CURING AGENT	56
A/R	A/R	-	-	-	-	-	-	1008821-1	EPOXY RESIN	55
1	1	-	-	-	-	-	-	2018802-031	OUTER AXIS ASSEMBLY	54
AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE ACT	TAPE, ADH. ELEC. PRESS SENSITIVE	53
AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
-	-	-	-	-	3	-	3	2021500 SEE NOTE 15 & 16	IRIG PREALIGNED ASSY	51
3	3	3	3	3	-	-	-	2021500 (SEE NOTE 15 & 16)	IRIG PREALIGNED ASS'Y	50
-	-	-	-		-	3	-	20[illegible]500 031 SEE NOTE 15	IRIG PREALIGNED ASSY	49
-	3	-	3	3	3	-	-	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	-	3	-	-	-	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
-	1	-	1	-	1		-	2018839	CASE COVER ASSEMBLY	46
1	1	1	1	1	-	1	-	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	2	2	[illegible]1625-11 - SEE NOTE 6	SCREW, HEX. SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20188[illegible] - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	1	1	-	1	-	2018612-021	IGSA RESOLVER OUTER AXIS	42
-	-	1	1	1	-	1	-	2018802-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
				A/R	A/R	A/R	A/R	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	39
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
				~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~[illegible] SEE NOTE 6~~	~~SCREW, HEX. SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1001488 SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX SOC	26
4	4	4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	2	2	1010891-7	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	2	2	1000159-8	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	+	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L H)	13
1	1	1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R H)	12
1	1	1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR OUTER AXIS	7
1	1	1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
-	-	-	-	-	1	-	1	2018609-011	IGSA TORQUE MOTOR, OUTER AXIS	5
-	-	-	-	-	1	-	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	-	1	-	1	-	1	1	2018710	CASE COVER	3
-	-	-	-	-	1	-	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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HEAT TREATMENT
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MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DTB DATE 3/5/65
CHECKED G D 9/11/65
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL W. Cooper

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

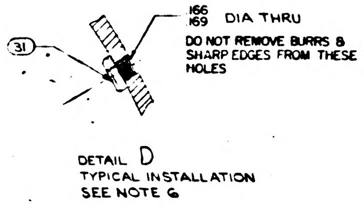
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1

2018601 AV

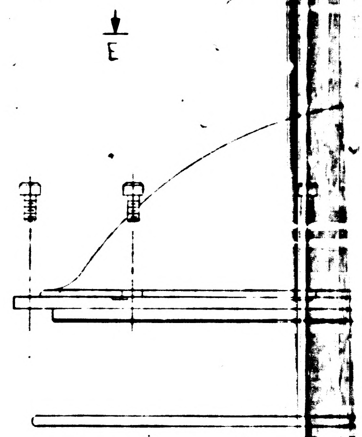
3/ 2018601

TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
[illegible]	

TABLE I	
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
7	3/8

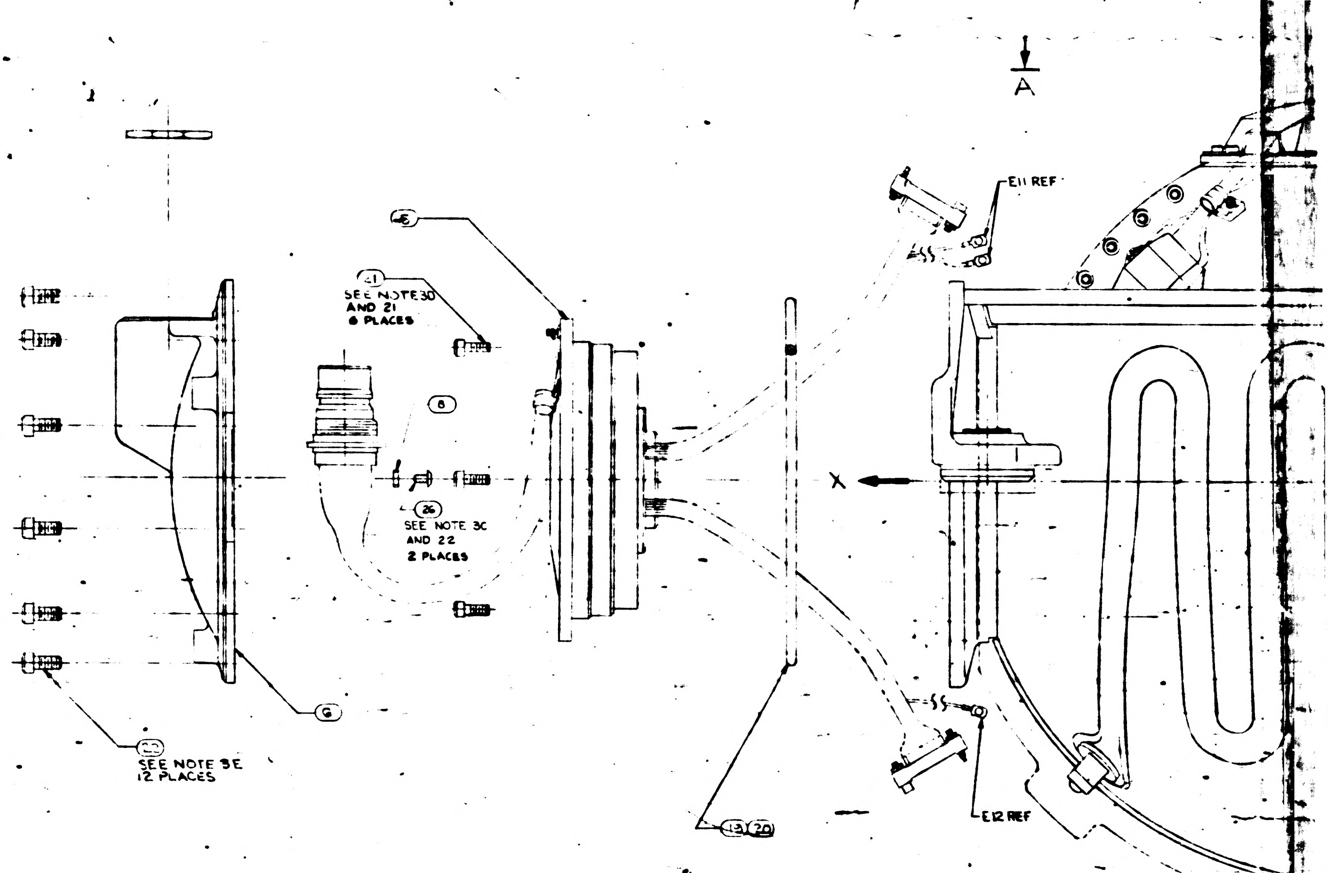


DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



DOCUMENT CHART

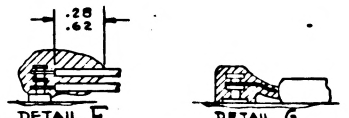
ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154



NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (33) NASA DWG NO 1000260~~ USE 1000260-1 THRU 1000260-12 ONLY.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU ([illegible]) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 20C 730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (16), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO 1001454, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (83) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-081 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (95), (96), (97), (98) PREPARED IN ACCORDANCE WITH ND1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "a" AND "b" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - a. MIX COMPOUND USING 3-4% OF ITEM (98) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
    - b. MIX COMPOUND USING 5-6% OF ITEM (98) FOR ALL AREAS OTHER THAN LISTED IN "a" ABOVE.

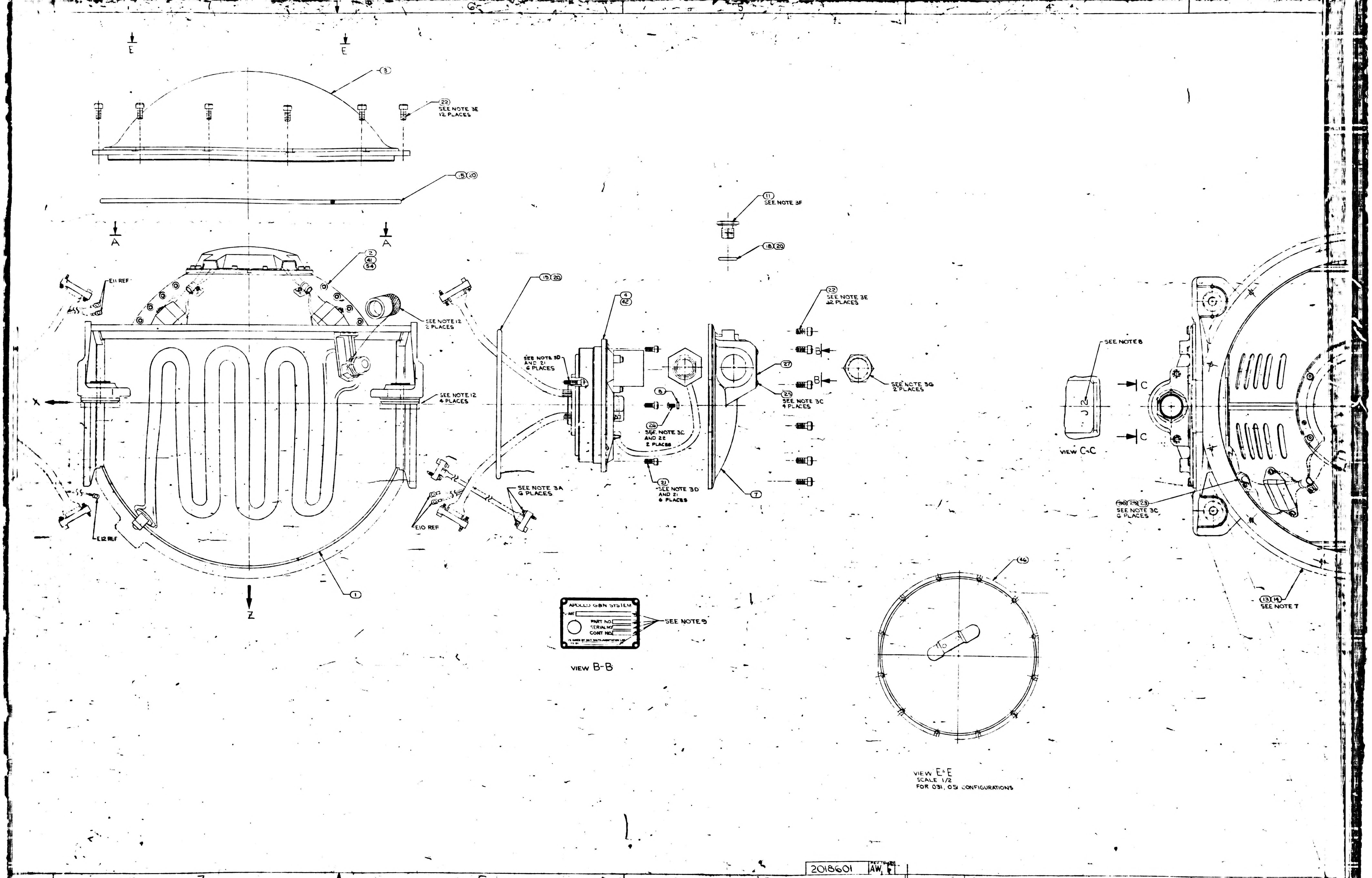
    CURE APPLIED COATINGS AT 130°±10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.



DETAIL F DETAIL G
(-071 AND ON CONFIGURATION)

3/4

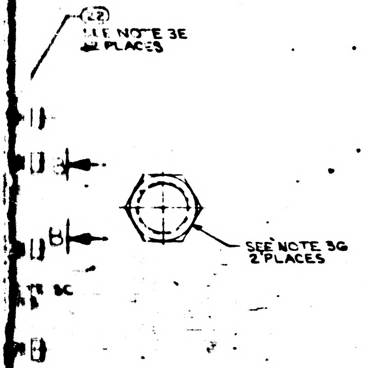
1/2018601

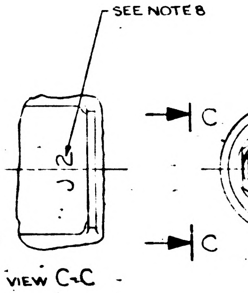
7
6
5
4
E
E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
A
2
41
54
E11 REF
SEE NOTE 12
2 PLACES
X
SEE NOTE 12
4 PLACES
E12 REF
1
Z
19 20
4
42
SEE NOTE 3D
AND 21
6 PLACES
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
11
SEE NOTE 3F
18 20
27
25
SEE NOTE 3C
4 PLACES
7
22
SEE NOTE 3E
12 PLACES
B
B
SEE NOTE 3G
2 PLACES
SEE NOTE 8
C
C
VIEW C-C
30 25 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
SEE NOTE 9
VIEW B-B
46
16
VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS
7
6
5
4
2018601
AW

2/2018601

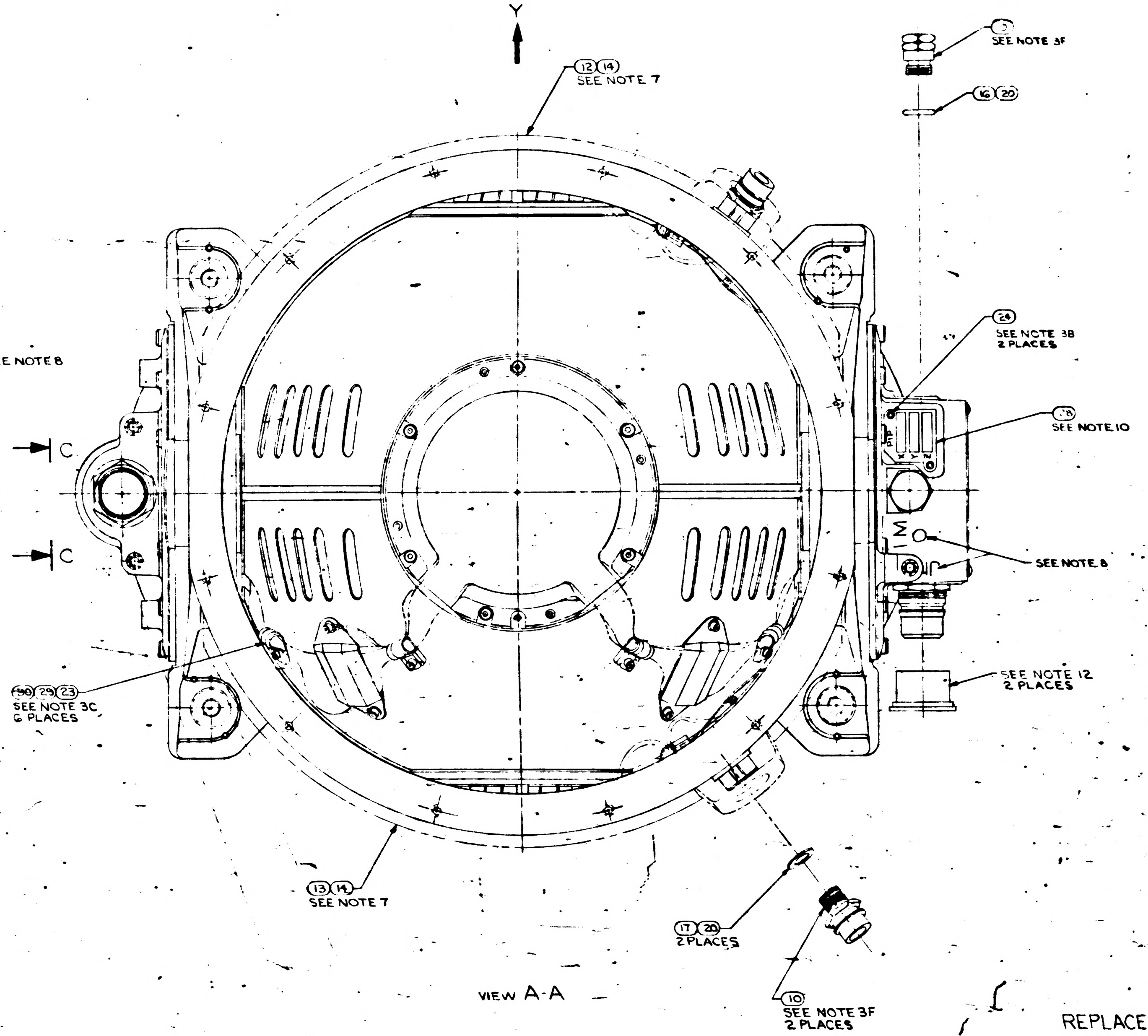
REV	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65		
V	REVISED TDRR 19275	2 Jun 65		
W	REVISED TDRR 21187	26 Jul 65		
Y	REVISED PER TDRR 21814	8 Sep 65		
Z	REVISED TDRR 22594	19 Oct 65		
AA	REVISED TDRR 23700	19 Oct 65		
AB	REVISED TDRR 24308			
AC	REVISED TDRR 25485	15 Feb 66		
AD	REVISED TDRR 26296	15 Feb 66		
AE	REVISED TDRR 26247	23 Feb 66		
AF	REVISED TDRR 26258	23 Feb 66		
AG	REVISED TDRR 26260	23 Feb 66		
AH	REVISED TDRR 26879	11 Mar 66		
AJ	REVISED TDRR 27347	25 Mar 66		
AK	REVISED TDRR 27776	12 Apr 66		
AL	REVISED TDRR 28126			
AM	REVISED TDRR 29026	31 May 66		
AN	REVISED PER TDRR 29571	2 JUN		
AP	REVISED PER TDRR 31076	20 SEP 66		
AR	REVISED PER TDRR 32108	7 DEC 66	ME	
AS	REVISED PER TDRR 33113	7 MAR 67	LEE	RCD
AT	REVISED PER TDRR 33316	6 APR 67	ME	RCD
AU	REVISED PER TDRR 33352	6 APR 67	ME	
AV	REVISED PER TDRR 33353	6 APR 67	ME	RCB
AW	REVISED PER TDRR 33307	6 APR	ME	WH

D



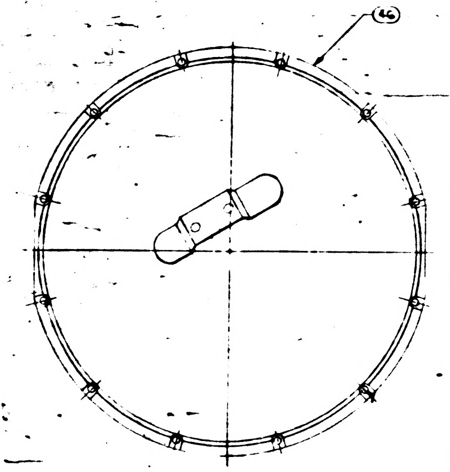


VIEW C-C



VIEW A-A

C



VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

REPLACES REV T
WITH CHANGES

SEE NOTE 18

-081	-071	-061	-051	-041	-031	-021	-011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	59
A/R	A/R	–	–	–	–	–	–	1006277	SILICA, PULVERIZED, PYROGENIC	58
A/R	A/R	–	–	–	–	–	–	1008822-1	COLORANT	57
A/R	A/R	–	–	–	–	–	–	1008821-2	CURING AGENT	56
A/R	A/R	–	–	–	–	–	–	1008821-1	EPOXY RESIN	55
1	1	–	–	–	–	–	–	2018602-031	OUTER AXIS ASSEMBLY	54
AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE ACT	TAPE, ADH. ELEC. PRESS SENSITIVE	53
AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
–	–	–	–	–	3	–	3	2021500 SEE NOTE 15&16	IRIG PREALIGNED ASS'Y	51
3	3	3	3	3	–	–	–	2021500 (SEE NOTE 15&16)	IRIG PREALIGNED ASS'Y	50
–	–	–	–	–	–	3	–	2021500-031 SEE NOTE 15	IRIG PREALIGNED ASS'Y	49
–	3	–	3	3	3	–	–	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY.	48
3	–	3	–	–	–	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
–	1	–	1	–	1	–	–	2018835	CASE COVER ASSEMBLY	46
1	1	1	1	1	–	1	–	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	1	1	–	1	–	2018612-021	IGSA RESOLVER OUTER AXIS	42
–	–	1	1	1	–	1	–	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
				~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
				~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG.	32
4	4	4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CL INCH	31
6	6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	2	2	1010891-7	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	2	2	1000159-8	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L.H)	13
1	1	1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R.H)	12
1	1	1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR OUTER AXIS	7
1	1	1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
–	–	–	–	–	1	–	1	2018609-011	IGSA, TORQUE MOTOR, OUTER AXIS	5
–	–	–	–	–	1	–	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	–	1	–	1	–	1	1	2018710	CASE COVER	3
–	–	–	–	–	1	–	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

LIST OF MATERIALS

B

A

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DTB DATE 3/5/65
CHECKED 9/1/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF

2018601 AW

3/2018601

TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011225-11	

TABLE I	
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
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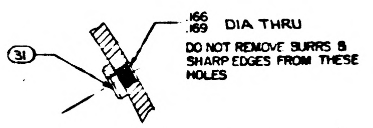
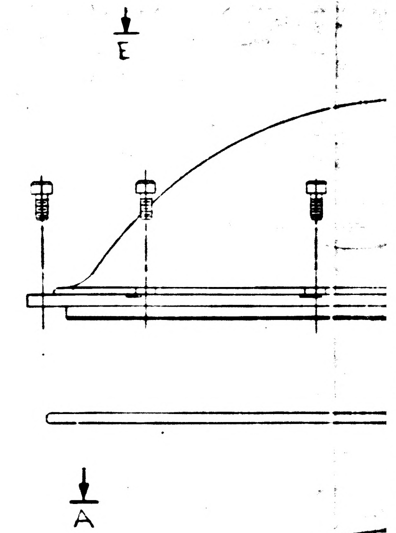
-6	5/16
-16	11/32
-7	3/8



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
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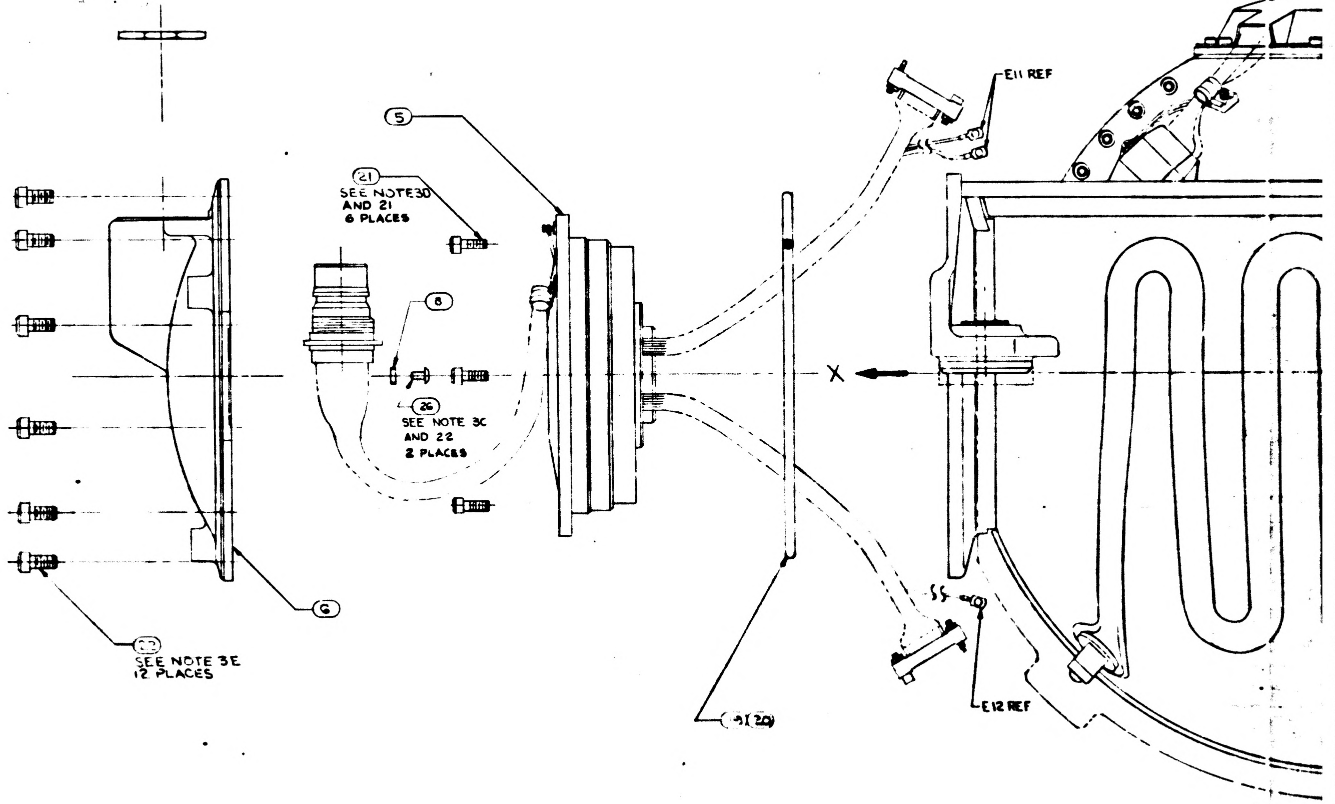

C

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (33) NASA DWG NO 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
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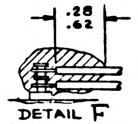
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (83) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-081 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "a" AND "b" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
   - a. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
   - b. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "a" ABOVE.

   CURE APPLIED COATINGS AT 130°±10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.

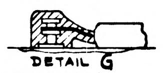
B

A

3/4

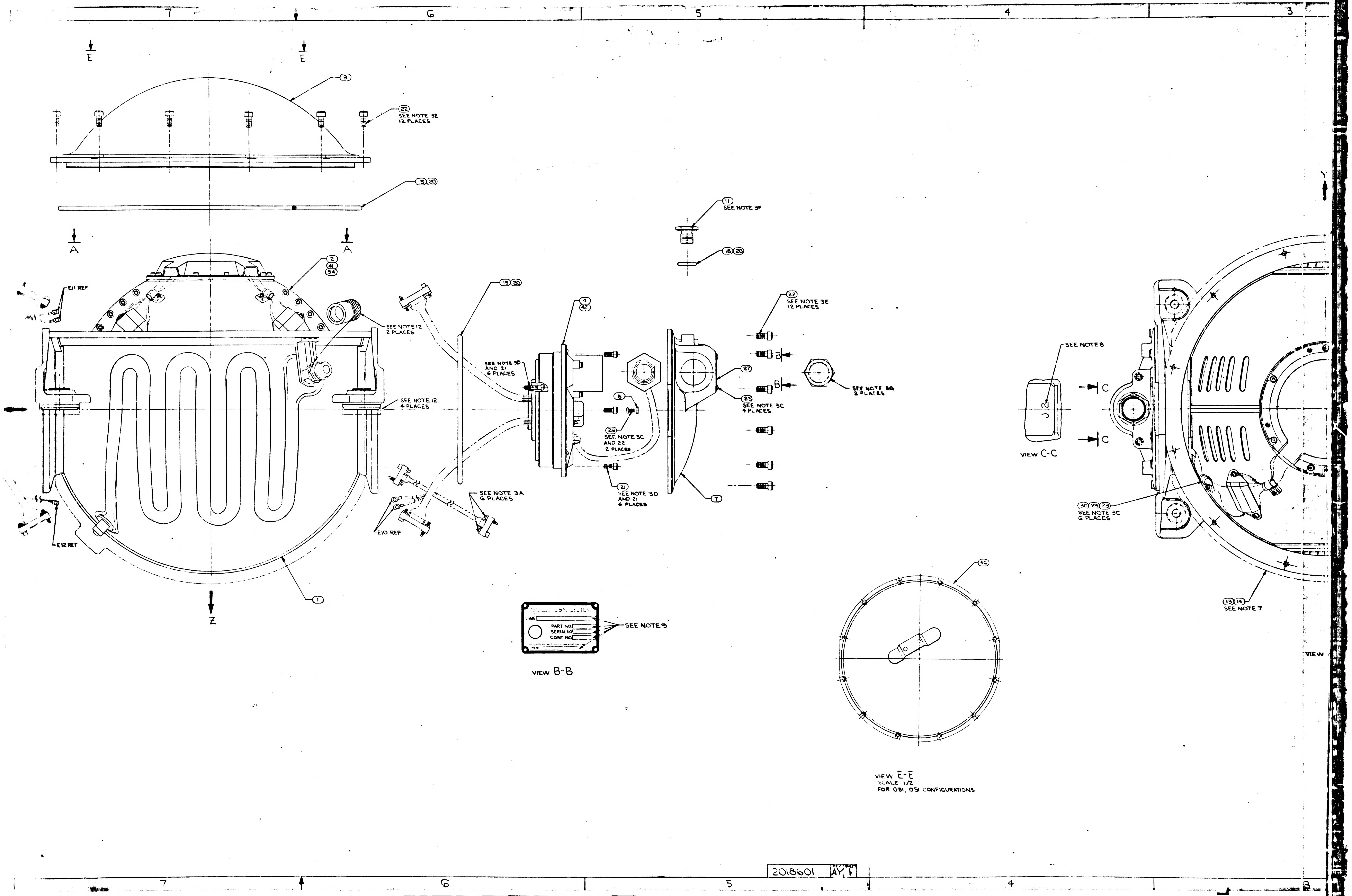


DETAIL F



DETAIL G

(-071 AND ON CONFIGURATION)


7
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SEE NOTE 3E
12 PLACES
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SEE NOTE 3F
18 20
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54
E11 REF
SEE NOTE 12
2 PLACES
15 20
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42
SEE NOTE 3D
AND 21
6 PLACES
SEE NOTE 12
4 PLACES
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
27
25
SEE NOTE 3C
4 PLACES
B
B
22
SEE NOTE 3E
12 PLACES
SEE NOTE 3G
2 PLACES
7
SEE NOTE 3A
6 PLACES
E10 REF
E12 REF
1
Z
SEE NOTE 8
J2
C
C
VIEW C-C
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
Y
PART NO
SERIAL NO
CONT NO
SEE NOTE 9
VIEW B-B
46
VIEW E-E
SCALE 1/2
FOR 081, 051 CONFIGURATIONS
VIEW
7
6
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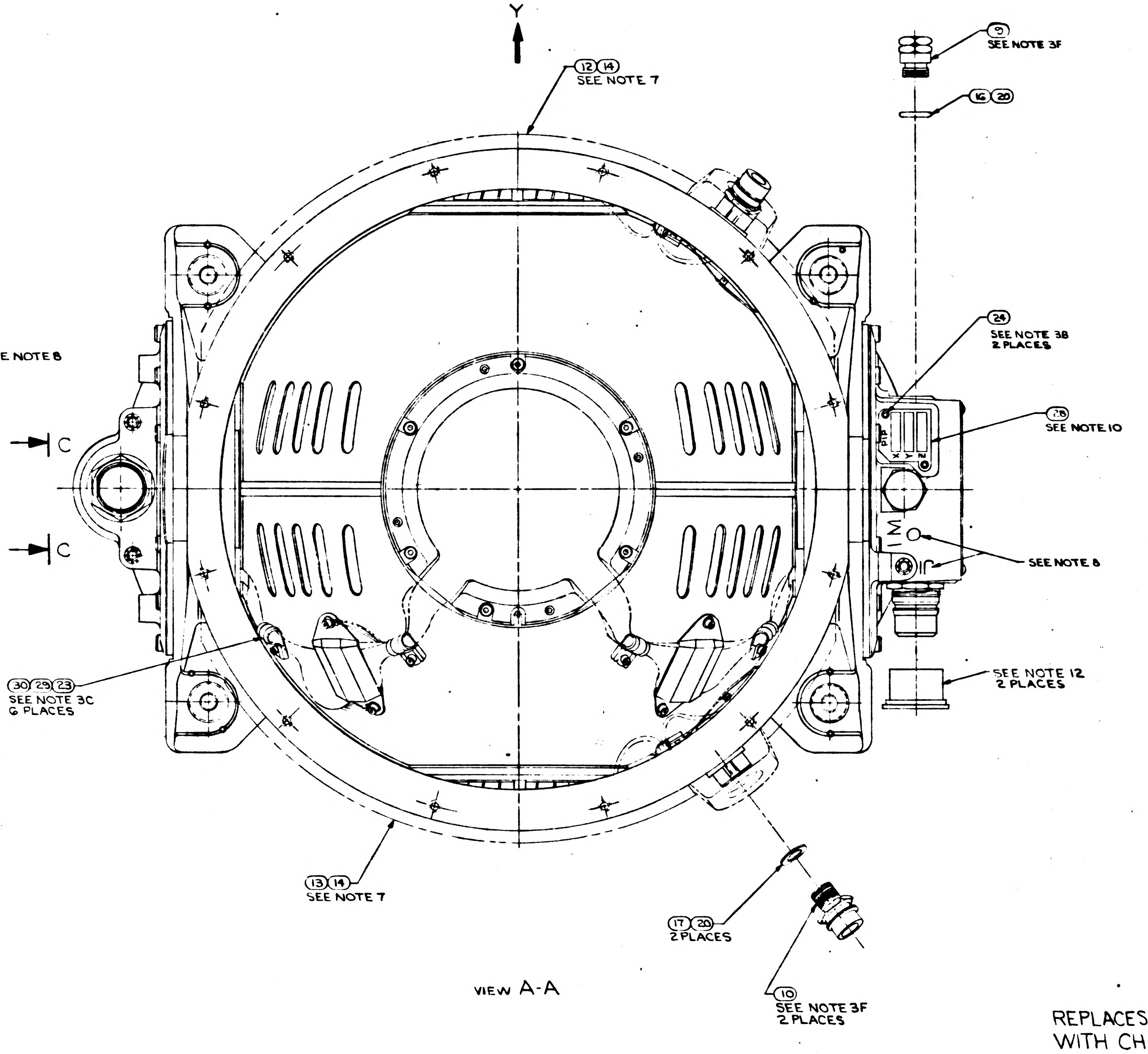
4
3

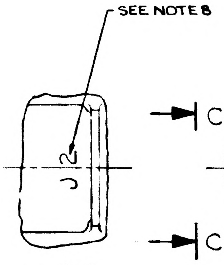
2018601 AY 1

2/2018601

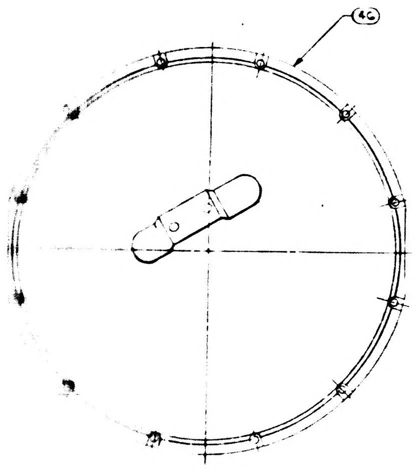
SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	[illegible]	WK
V	REVISED TDRR 19275	2 Jun 65	[illegible]	WK
W	REVISED TDRR 21187	26 Jun 65	[illegible]	WK
Y	REVISED PER TDRR 21814	8 Sep 65	[illegible]	[illegible]
Z	REVISED TDRR 22594	19 Oct 65	[illegible]	WK
AA	REVISED TDRR 23700	19 Oct 65	[illegible]	WK
AB	REVISED TDRR 24 08	[illegible]	[illegible]	WK
AC	REVISED TDRR 25485	[illegible]	[illegible]	WK
AD	REVISED TDRR 26296	[illegible]	[illegible]	WK
AE	REVISED TDRR 26247	[illegible]	[illegible]	WK
AF	REVISED TDRR 26258	[illegible]	[illegible]	WK
AG	REVISED TDRR 26260	[illegible]	[illegible]	WK
AH	REVISED TDRR 26879	[illegible]	[illegible]	WK
AJ	REVISED TDRR 27347	[illegible]	[illegible]	WK
AK	REVISED TDRR 27776	[illegible]	[illegible]	WK
AL	REVISED TDRR 28126	[illegible]	[illegible]	WK
AM	REVISED TDRR 29026	[illegible]	[illegible]	[illegible]
AN	REVISED PER TDRR 29571	2 JUN	[illegible]	
AP	REVISED PER TDRR 31076	20 SEP 66	[illegible]	
AR	REVISED PER TDRR 32105	7 DEC 66	ME	EB
AS	REVISED PER TDRR 33 3	9 MAR 67	LLL	RCB
AT	REVISED PER TDRR 33316	6 APR 67	ME	RCB
AU	REVISED PER TDRR 33352	6 APR 67	ME	EB
AV	REVISED PER TDRR 33353	6 APR 67	ME	FCB
AW	REVISED PER TDRR 33387	6 APR 67	ME	W
AY	REVISED PER TDRR 33388	6 APR 67	ME	JW



VIEW A-A



VIEW C-C



VIEW E-E
SCALE 1/2
FOR 081 051 CONFIGURATIONS

SEE NOTE 18

REPLACES REV T
WITH CHANGES

-091	-081	-071	-061	-051	-041	-031	-021	-011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	59
A/R	A/R	A/R	–	–	–	–	–	–	1006277	SILICA, PULVERIZED, PYROGENIC	58
A/R	A/R	A/R	–	–	–	–	–	–	1008822-1	COLORANT	57
A/R	A/R	A/R	–	–	–	–	–	–	1008821-2	CURING AGENT	56
A/R	A/R	A/R	–	–	–	–	–	–	1008821-1	EPOXY RESIN	55
1	1	1	–	–	–	–	–	–	2018602-031	OUTER AXIS ASSEMBLY	54
A/R	AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE "ACT	TAPE, ADH. ELEC. PRESS SENSITIVE	53
A/R	AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
–	–	–	–	–	–	3	–	3	2021500 SEE NOTE 15 & 16	IRIG PREALIGNED ASSY	51
–	3	3	3	3	3	–	–	–	2021500(SEE NOTE 15&19)	IRIG PREALIGNED ASS'Y	50
3	–	–	–	–	–	–	3	–	20 500-031 SEE NOTE 15	IRIG PREALIGNED ASS'Y	49
–	–	3	–	3	3	3	–	–	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	3	–	3	–	–	–	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
–	–	1	–	1	–	1	–	–	2018839	CASE COVER ASSEMBLY	46
1	1	1	1	1	1	–	1	–	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	1	1	1	–	1	–	2018612-021	IGSA RESOLVER OUTER AXIS	42
–	–	–	1	1	1	–	1	–	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018833 SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
					~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260-SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000263-SEE NOTE 5	WEIGHT BALANCE OUT AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000261-SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
					~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489-SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1001488-SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	6	6	6	1000220-SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	4	4	4	006783-18	SCREW BUTTON HD, HEX SOC	26
4	4	4	4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	6	6	6	001498-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	2	2	2	1000159-8	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L H)	13
1	1	1	1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R H)	12
1	1	1	1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR OUTER AXIS	7
1	1	1	1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
–	–	–	–	–	–	1	–	1	2018609-011	IGSA TORQUE MOTOR, OUTER AXIS	5
–	–	–	–	–	–	1	–	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	1	–	1	–	1	–	1	1	2018710	CASE COVER	3
–	–	–	–	–	–	1	–	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

LIST OF MATERIALS

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN DTB DATE 3/5/65
CHECKED G QUINN 3/11/65
APPROVAL [illegible] 23 Mar 65
APPROVAL
NASA APPROVAL [illegible] 3-23-65
MIT APPROVAL W Cooper 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 2018601
SCALE 1/1
WT
SHEET 1 OF 1

2018601 AY

3A

3/2018601

TABLE II

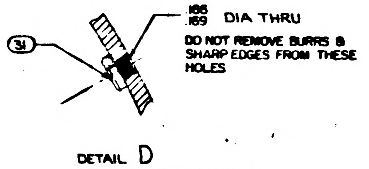
SCREW SELECTION CHART ㉜	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

TABLE I

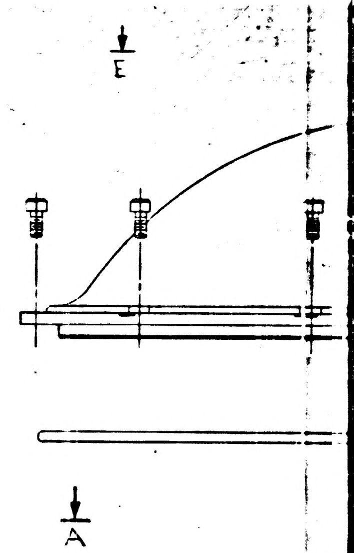
CABLE CLAMP ㉙	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

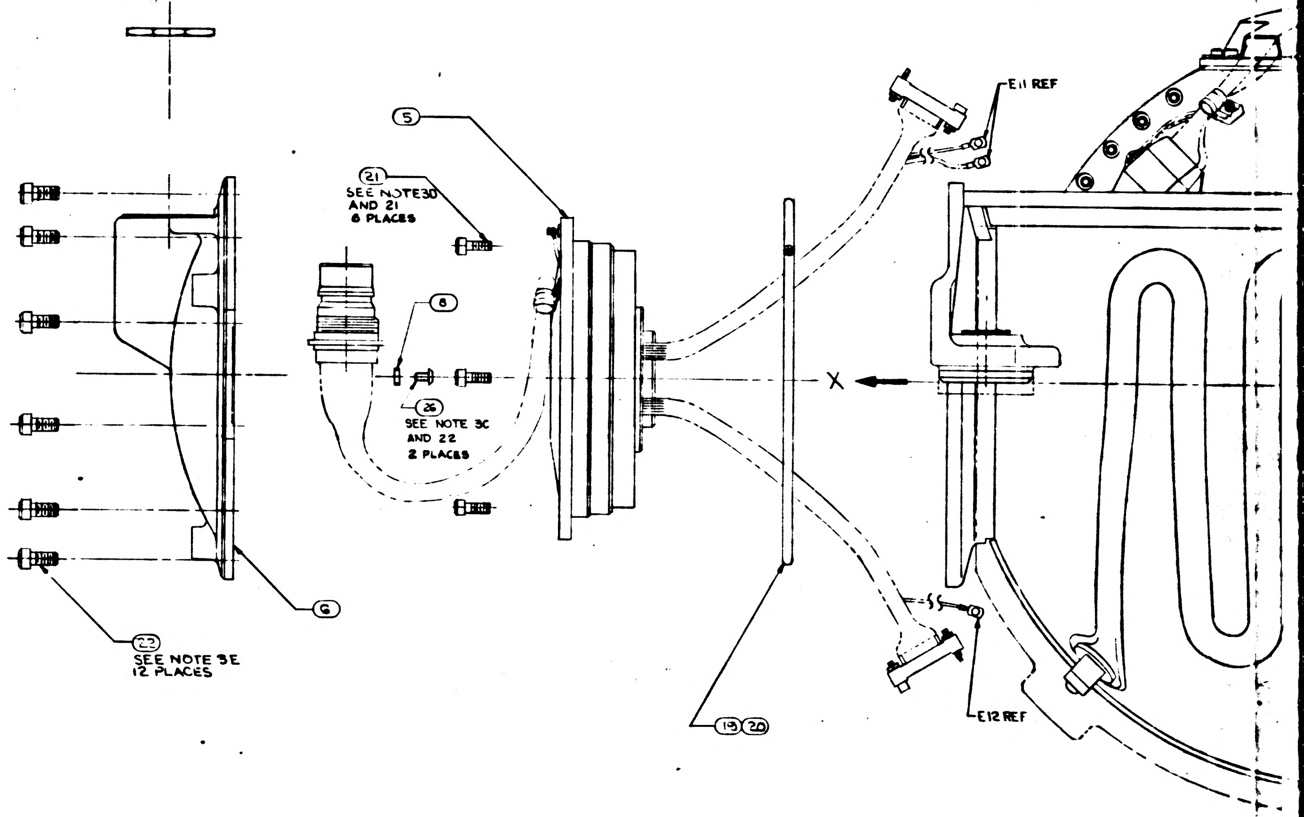
DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



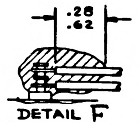


NOTES

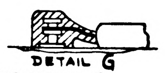
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
    - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
    - B. 3.5 IN-LB
    - C. 5.0 IN-LB
    - D. 10.0 IN-LB
    - E. 30.0 IN-LB
    - F. 70.0 IN-LB
    - G. 80.0 IN-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM ㉝ NASA DWG NO 1000260 USE 1000260 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭. ADJOINING SURFACES OF ITEMS ⑫ + ⑬ TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS ⑩, ⑰ AND ⑳ ARE ASSEMBLED TO CASE, ITEM ①
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-165, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED N -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (83) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-061 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "a" AND "b" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - a. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
    - b. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "a" ABOVE.

    CURE APPLIED COATINGS AT 130°±10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.

34

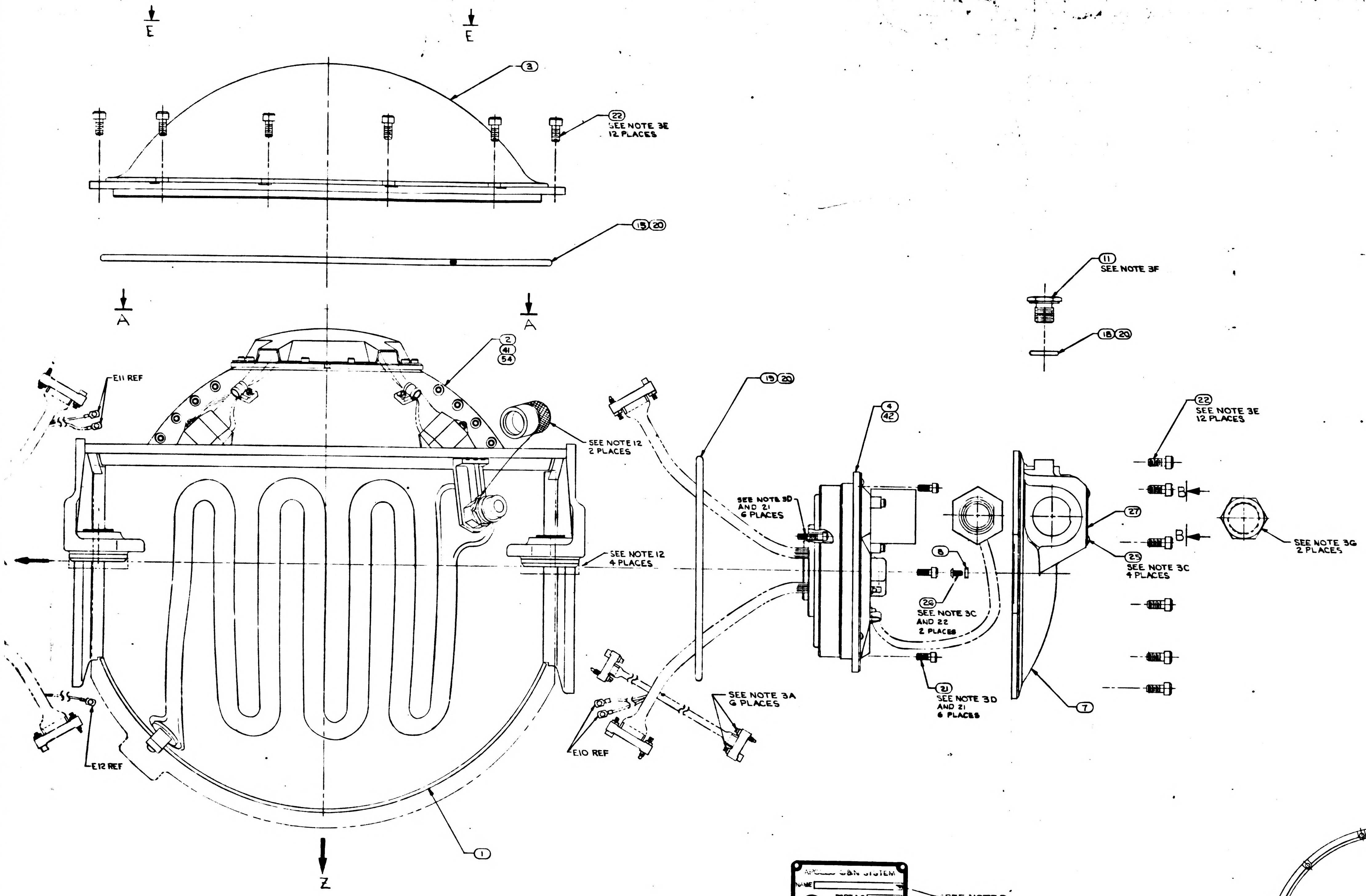


DETAIL F



DETAIL G

(-071 AND ON CONFIGURATION)


E
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3
22
SEE NOTE 3E
12 PLACES
15 20
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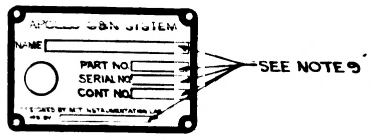
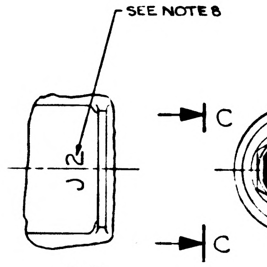
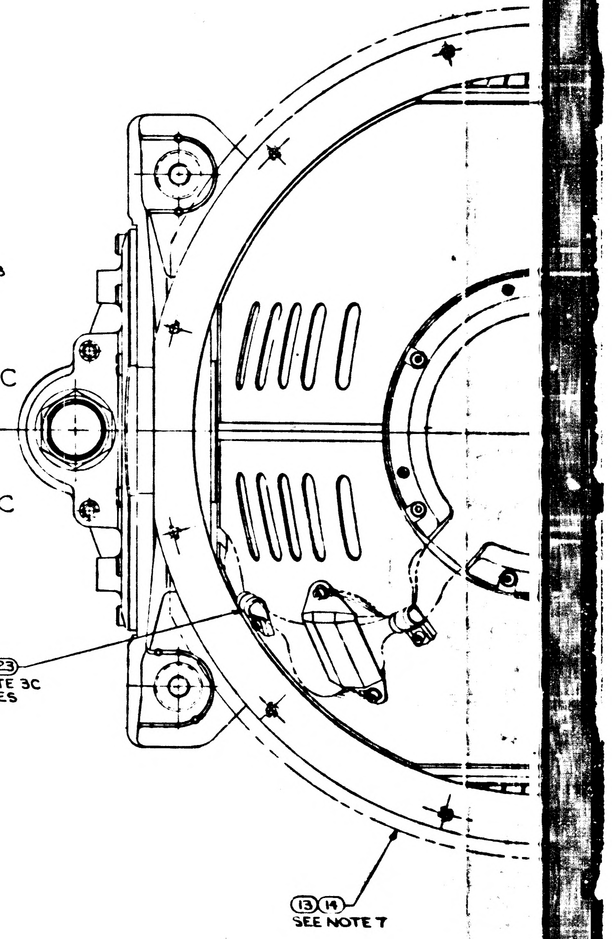
2
41
54
E11 REF
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
E12 REF
1
Z
15 20
SEE NOTE 3D
AND 21
6 PLACES
E10 REF
SEE NOTE 3A
6 PLACES
4
42
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
11
SEE NOTE 3F
18 20
27
25
SEE NOTE 3C
4 PLACES
7
22
SEE NOTE 3E
12 PLACES
B
B
SEE NOTE 3G
2 PLACES

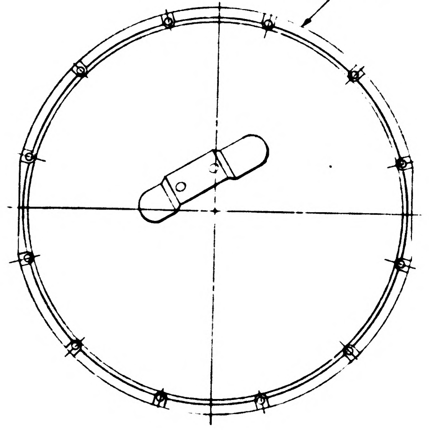

APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
SEE NOTE 9

VIEW B-B


SEE NOTE 8
J2
C
C

VIEW C-C

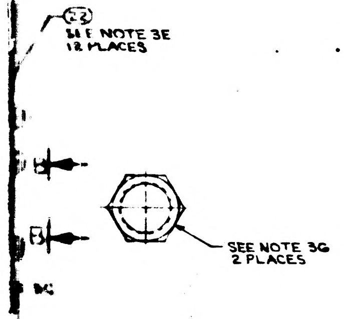

30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7

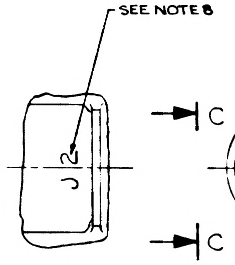


VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

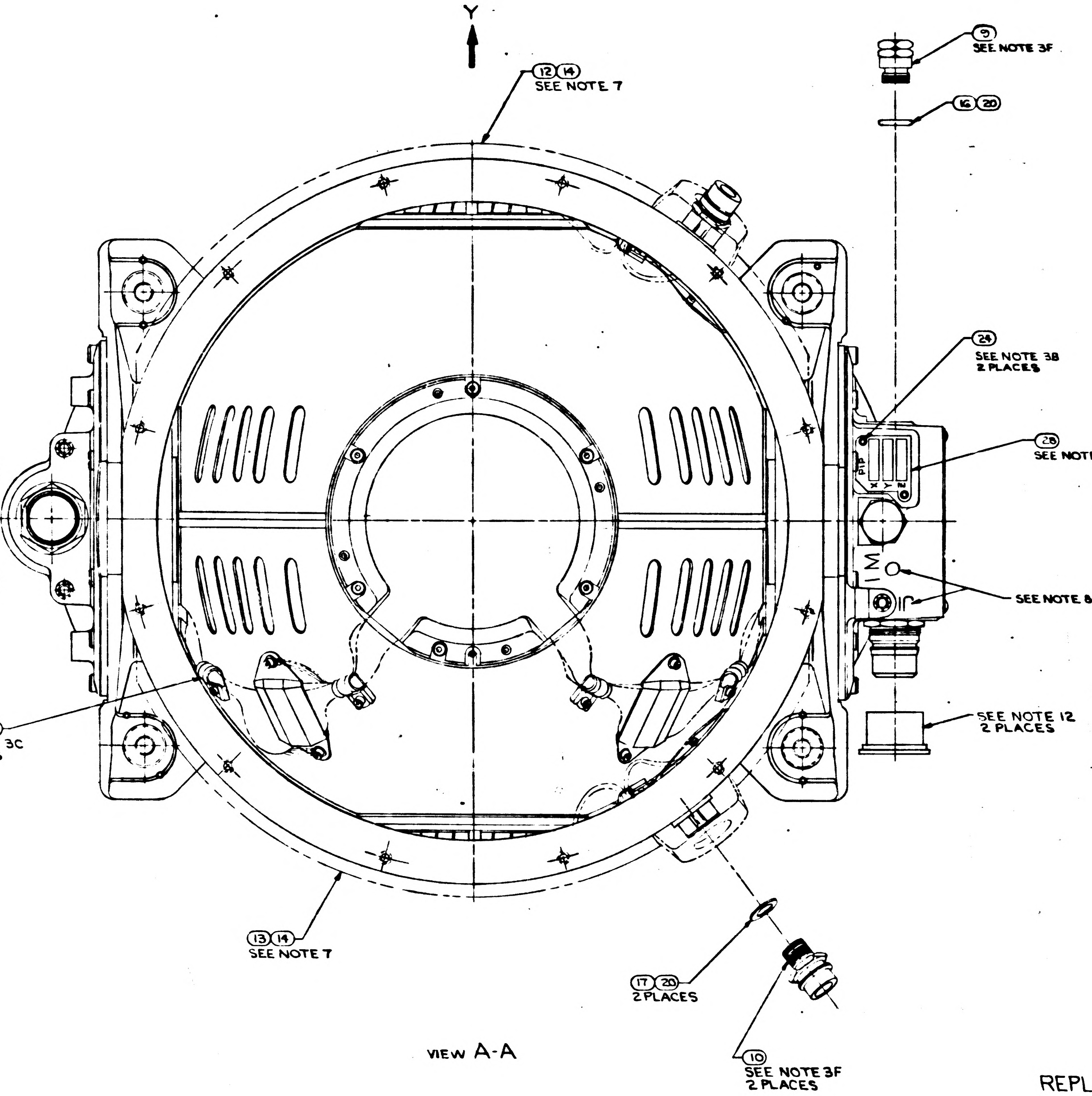
VIEW

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 [illegible]	[illegible]	WK
V	REVISED TDRR 19275	2 Jun 65	[illegible]	WK
W	REVISED TDRR 21187	26 Jun 65	[illegible]	WK
Y	REVISED PER TDRR 21814	13 Sep 65	[illegible]	[illegible]
Z	REVISED TDRR 22594	19 Oct 65	[illegible]	WK
AA	REVISED TDRR 23700	19 Oct 65	[illegible]	WK
AB	REVISED TDRR 24308	[illegible]	[illegible]	WK
AC	REVISED TDRR 25485	[illegible]	[illegible]	WK
AD	REVISED TDRR 26246	[illegible]	[illegible]	WK
AE	REVISED TDRR 26247	[illegible]	[illegible]	WK
AF	REVISED TDRR 26258	[illegible]	[illegible]	WK
AG	REVISED TDRR 26260	[illegible]	[illegible]	WK
AH	REVISED TDRR 26875	[illegible]	[illegible]	WK
AJ	REVISED TDRR 27347	25 [illegible]	[illegible]	WK
AK	REVISED TDRR 27776	[illegible] 66	[illegible]	WK
AL	REVISED TDRR 28126	[illegible]	[illegible]	WR
AM	REVISED TDRR 29026	[illegible]	[illegible]	[illegible]
AN	REVISED PER TDRR 29571	21 JUN	[illegible]	
AP	REVISED PER TDRR 3 076	20 SEP 66	[illegible]	
AR	REVISED PER TDRR 32105	7 DEC 66	ME	[illegible]
AS	REVISED PER TDRR 33113	9 MAR 67	LLE	RCD
AT	REVISED PER TDRR 33316	6 APR 67	ME	RCD
AU	REVISED PER TDRR 33352	6 APR 67	ME	[illegible]
AV	REVISED PER TDRR 33383	6 APR 67	ME	FCB
AW	REVISED PER TDRR 33387	6 APR 67	ME	[illegible]
AY	REVISED PER TDRR 33388	6 APR 67	ME	JW
AZ	REVISED PER TDRR 34197	27 JUL 67	[illegible]	[illegible]

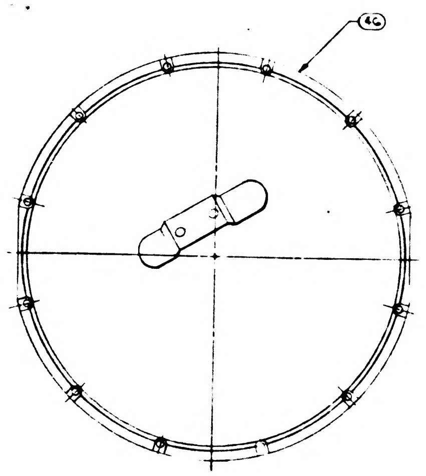




VIEW C-C



VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 051 CONFIGURATIONS

REPLACES REV T
WITH CHANGES

SEE NOTE 18

-091	-081	-071	-061	-051	-041	-031	-021	-011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	59
A/R	A/R	A/R	–	–	–	–	–	–	1006277	SILICA, PULVERIZED, PYROGENIC	58
A/R	A/R	A/R	–	–	–	–	–	–	1008822-1	COLORANT	57
A/R	A/R	A/R	–	–	–	–	–	–	1008821-2	CURING AGENT	56
A/R	A/R	A/R	–	–	–	–	–	–	1008821-1	EPOXY RESIN	55
1	1	1	–	–	–	–	–	–	2018602-031	OUTER AXIS ASSEMBLY	54
A/R	AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE "ACT	TAPE, ADH. ELEC. PRESS SENSITIVE	53
A/R	AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
–	–	–	–	–	–	3	–	3	2021500 SEE NOTE 15&16	IRIG PREALIGNED ASSY	51
–	3	3	3	3	3	–	–	–	2021500(SEE NOTE 15&19)	IRIG PREALIGNED ASS'Y	50
3	–	–	–	–	–	–	3	–	2021500-031 SEE NOTE 15	IRIG PREALIGNED ASS'Y	49
–	–	3	–	3	3	3	–	–	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	3	–	3	–	–	–	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
–	–	1	–	1	–	1	–		2018839	CASE COVER ASSEMBLY	46
1	1	1	1	1	1	–	1	–	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	1	1	1	–	1	–	2018612-021	IGSA RESOLVER OUTER AXIS	42
–	–	–	1	1	1	–	1	–	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018833- SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
					~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260-SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000263-SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000261 -SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
					~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489-SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	4	4	4	1006783-18	SCREW. BUTTON HD., HEX. SOC	26
4	4	4	4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	A/R	A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
1	1	1	1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L.H)	13
1	1	1	1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R.H.)	12
1	1	1	1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	1	1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	1	1	1	1	1	1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
–	–	–	–	–	–	1	–	1	2018609-011	IGSA. TORQUE MOTOR, OUTER AXIS	5
–	–	–	–	–	–	1	–	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	1	–	1	–	1	–	1	1	2018710	CASE COVER	3
–	–	–	–	–	–	1	–	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

LIST OF MATERIALS

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN DTB DATE 3/3/65
CHECKED G QUINN 3/1/65
APPROVAL [illegible] 3/3/65
APPROVAL
NASA APPROVAL [illegible] 3-23-65
MIT APPROVAL W Cooper 3/3/65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

2018601 AZ

3A

MASTER

TABLE II

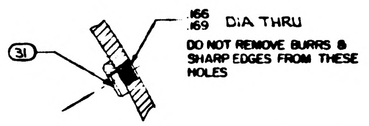
SCREW SELECTION CHART (32)

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

TABLE I

CABLE CLAMP (29)

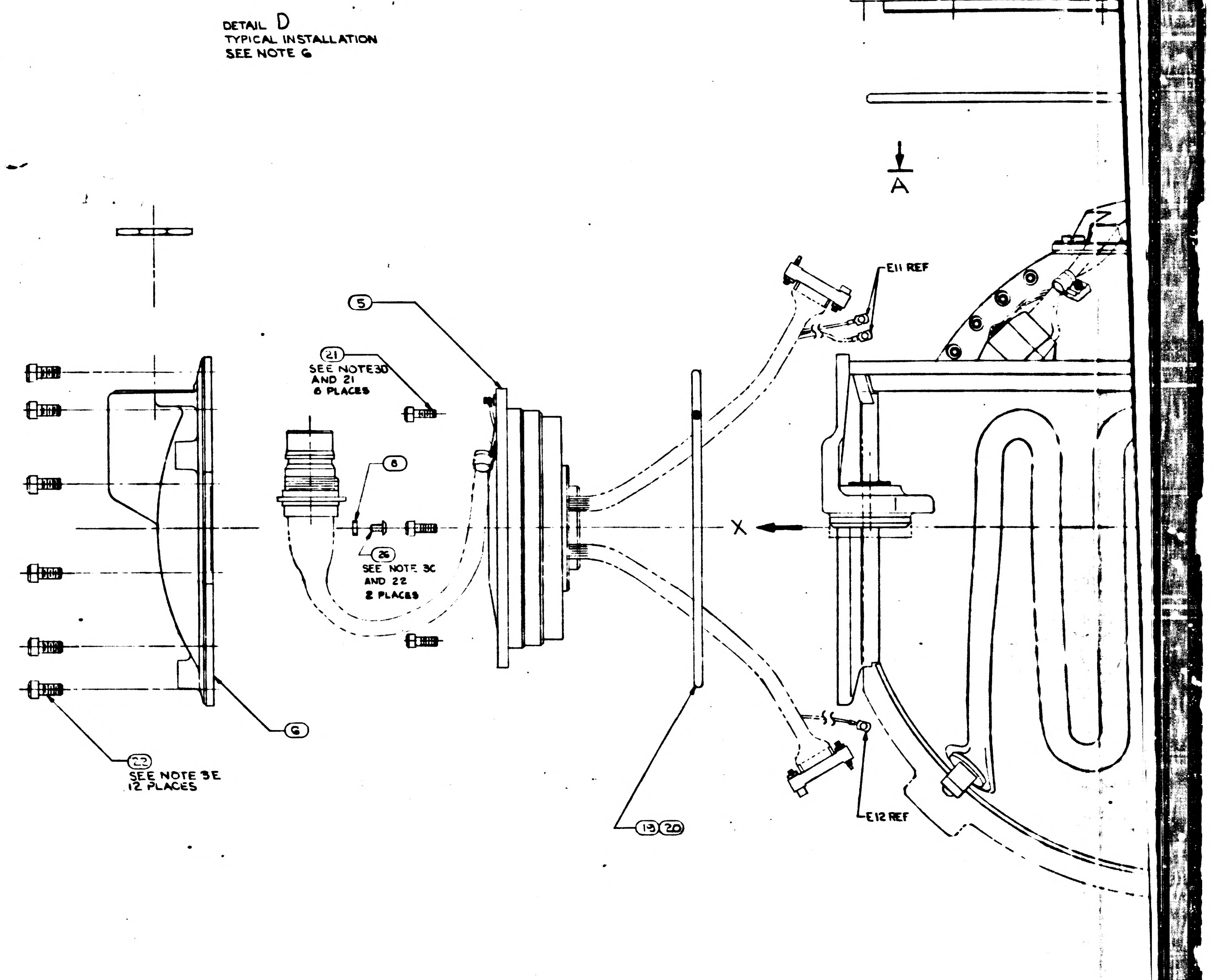
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC. SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154



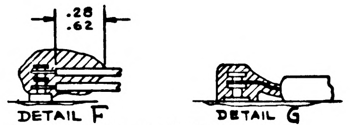
E
A
(5)
(21) SEE NOTE 3D AND 21 6 PLACES
(8)
(26) SEE NOTE 3C AND 22 2 PLACES
(6)
(22) SEE NOTE 3E 12 PLACES
(19)(20)
X
E11 REF
E12 REF

3/4

NOTES

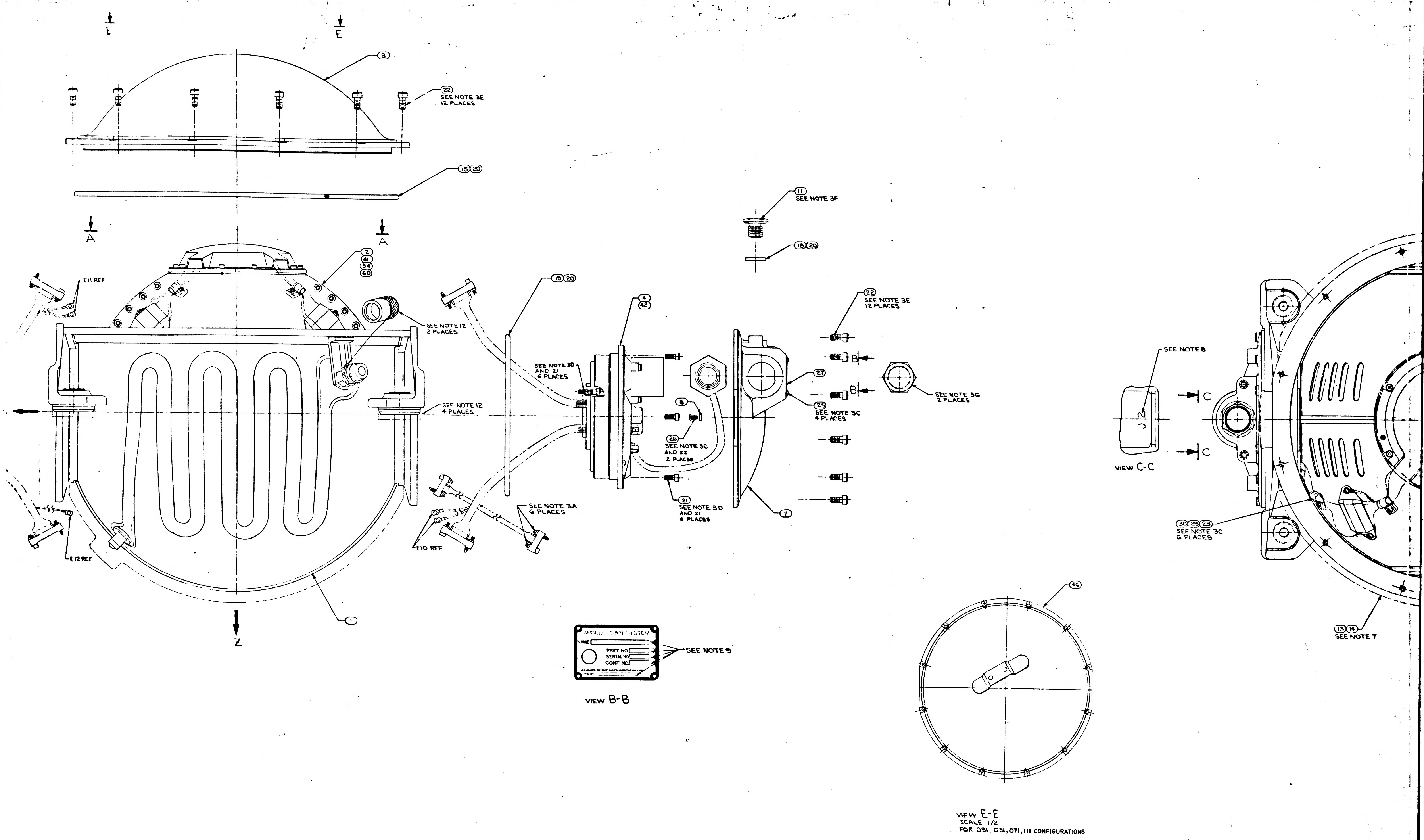
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (39) NASA DWG NO 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). *ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER*
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001434, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001434 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED N -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (83) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-061 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "a" AND "b" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - a. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
    - b. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "a" ABOVE.

    CURE APPLIED COATINGS AT 130°±10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.



DETAIL F DETAIL G
(-071 AND ON CONFIGURATION)

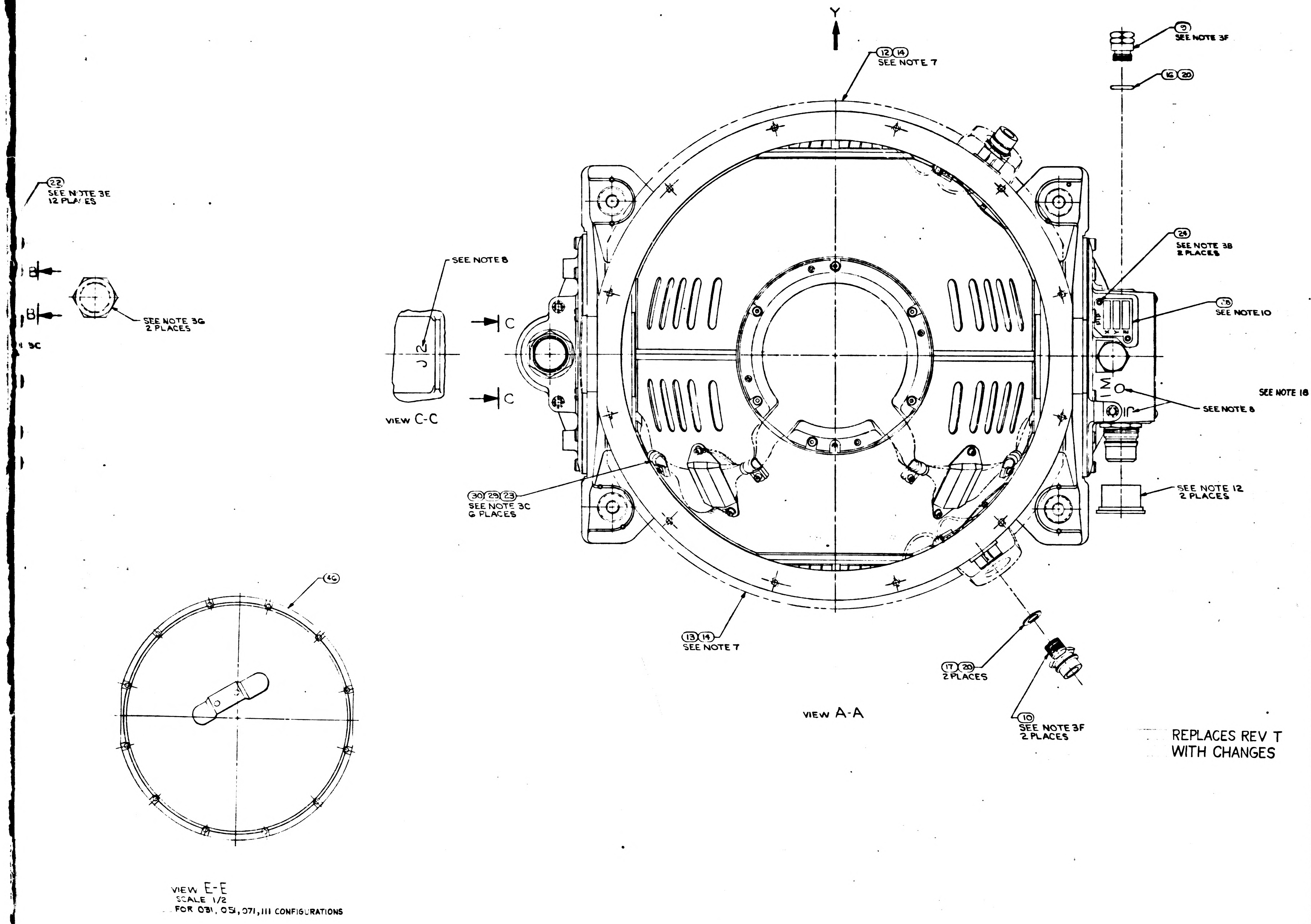
2018601	REV BA	SHEET 1


E
E
③
㉒ SEE NOTE 3E 12 PLACES
⑮⑳
A
A
②
㊶
54
60
E11 REF
SEE NOTE 12 2 PLACES
SEE NOTE 12 4 PLACES
E12 REF
①
Z
⑮⑳
SEE NOTE 3D AND 21 6 PLACES
SEE NOTE 3A 6 PLACES
E10 REF
④
㊷
⑧
㉖ SEE NOTE 3C AND 22 2 PLACES
㉑ SEE NOTE 3D AND 21 6 PLACES
⑪ SEE NOTE 3F
⑱⑳
㉗
㉕ SEE NOTE 3C 4 PLACES
⑦
㉒ SEE NOTE 3E 12 PLACES
B
B
SEE NOTE 3G 2 PLACES
SEE NOTE 8
J2
C
C
VIEW C-C
㉚㉙㉓ SEE NOTE 3C 6 PLACES
⑬⑭ SEE NOTE 7
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
SEE NOTE 9
VIEW B-B
㊻
VIEW E-E
SCALE 1/2
FOR 081, 051, 071, 111 CONFIGURATIONS

2018601 BA 4

2/2018601

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar [illegible]		
V	REVISED TDRR 19275	2 June 65		
W	REVISED TDRR 21187	26 Jun 65		
Y	REVISED PER TDRR 21814	[illegible] 65		
Z	REVISED TDRR 22594	19 Oct 65		
AA	REVISED TDRR 23700	[illegible]		
AB	REVISED TDRR 24308	[illegible]		
AC	REVISED TDRR 25485	15 Feb 66		
AD	REVISED TDRR 26246	15 Feb 66		
AE	REVISED TDRR 26247	23 Feb 66		
AF	REVISED TDRR 26258	23 Feb 66		
AG	REVISED TDRR 26260	23 Feb 66		
AH	REVISED TDRR 26879	17 Mar 66		
AJ	REVISED TDRR 27347	25 Mar 66		
AK	REVISED TDRR 27776	14 Apr 66		
AL	REVISED TDRR 28126	[illegible]		
AM	REVISED TDRR 29026	[illegible]		
AN	REVISED PER TDRR 29571	21 JUN		
AP	REVISED PER TDRR 31076	20 SEP 66		
AR	REVISED PER TDRR 32105	7 DEC 66		
AS	REVISED PER TDRR 33113	[illegible] MAR 67		
AT	REVISED PER TDRR 33316	6 APR 67	ME	
AU	REVISED PER TDRR 33352	6 APR 67	ME	
AV	REVISED PER TDRR 33383	6 APR 67	ME	
AW	REVISED PER TDRR 33387	6 APR 67	ME	
AY	REVISED PER TDRR 33388	6 APR 67	ME	
AZ	REVISED PER TDRR 34197	21 JUL 67		
BA	REVISED PER TDRR 34720	2 OCT 67	J.S.	



VIEW C-C

VIEW A-A

VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111 CONFIGURATIONS

REPLACES REV T
WITH CHANGES

-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
										QTY REQD			
1	1	—	—	—	—	—	—	—	—	—	2018602-041	OUTER AXIS ASSEMBLY	60
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	59
A/R	A/R	A/R	A/R	A/R	—	—	—	—	—	—	1006277	SILICA, PULVERIZED, PYROGENIC	58
A/R	A/R	A/R	A/R	A/R	—	—	—	—	—	—	1008822-1	COLORANT	57
A/R	A/R	A/R	A/R	A/R	—	—	—	—	—	—	1008821-2	CURING AGENT	56
A/R	A/R	A/R	A/R	A/R	—	—	—	—	—	—	1008821-1	EPOXY RESIN	55
—	—	1	1	1	—	—	—	—	—	—	2018602-031	OUTER AXIS ASSEMBLY	54
AR	A/R	A/R	AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE "ACT	TAPE, ADH. ELEC. PRESS SENSITIVE	53
AR	A/R	A/R	AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
—	—	—	—	—	—	—	—	3	—	3	2021500 SEE NOTE 15&16	IRIG PREALIGNED ASS'Y	51
3	3	—	3	3	3	3	3	—	—	—	2021500 (SEE NOTE 15&19	IRIG PREALIGNED ASS'Y	50
—	—	3	—	—	—	—	—	—	3	—	20[illegible]500-031 SEE NOTE 15	IRIG PREALIGNED ASS'Y	49
—	3	—	—	3	—	3	3	3	—	—	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	—	3	3	—	3	—	—	—	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
—	1	—	—	1	—	1	—	1	—	—	2018835	CASE COVER ASSEMBLY	46
1	1	1	1	1	1	1	1	—	1	—	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	1	1	1	1	1	1	1	—	1	—	2018612-021	IGSA RESOLVER OUTER AXIS	42
—	—	—	—	—	1	1	1	—	1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
							~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	~~39~~
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
							~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX, SOC	26
4	4	4	4	4	4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	2	2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
—	—	A/R	A/R	A/R	A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
—	—	1	1	1	1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L H)	13
—	—	1	1	1	1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R.H.)	12
1	1	1	1	1	1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR OUTER AXIS	7
1	1	1	1	1	1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
—	—	—	—	—	—	—	—	1	—	1	2018609-011	IGSA. TORQUE MOTOR, OUTER AXIS	5
—	—	—	—	—	—	—	—	1	—	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	—	1	1	—	1	—	1	—	1	1	2018710	CASE COVER	3
—	—	—	—	—	—	—	—	1	—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

LIST OF MATERIALS

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN DTB DATE 3/5/65
CHECKED G QUINN 3/11/65
APPROVAL 23 [illegible]
APPROVAL
NASA APPROVAL
MIT APPROVAL W. Kupfer 23 [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
SHEET 1 OF 1

2018601 BA

3A

1860 BA

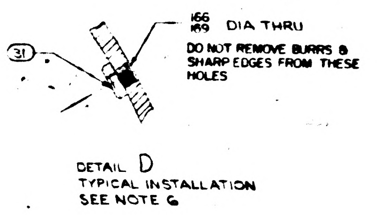
3/2018601

TABLE II	
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001489-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
[illegible]	

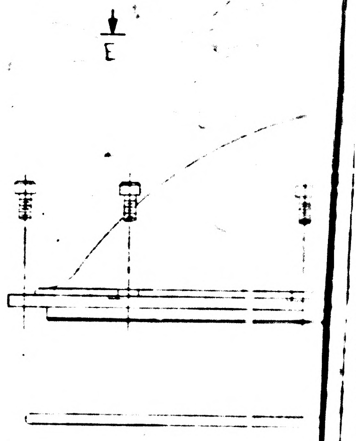
TABLE I	
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
7	3/8

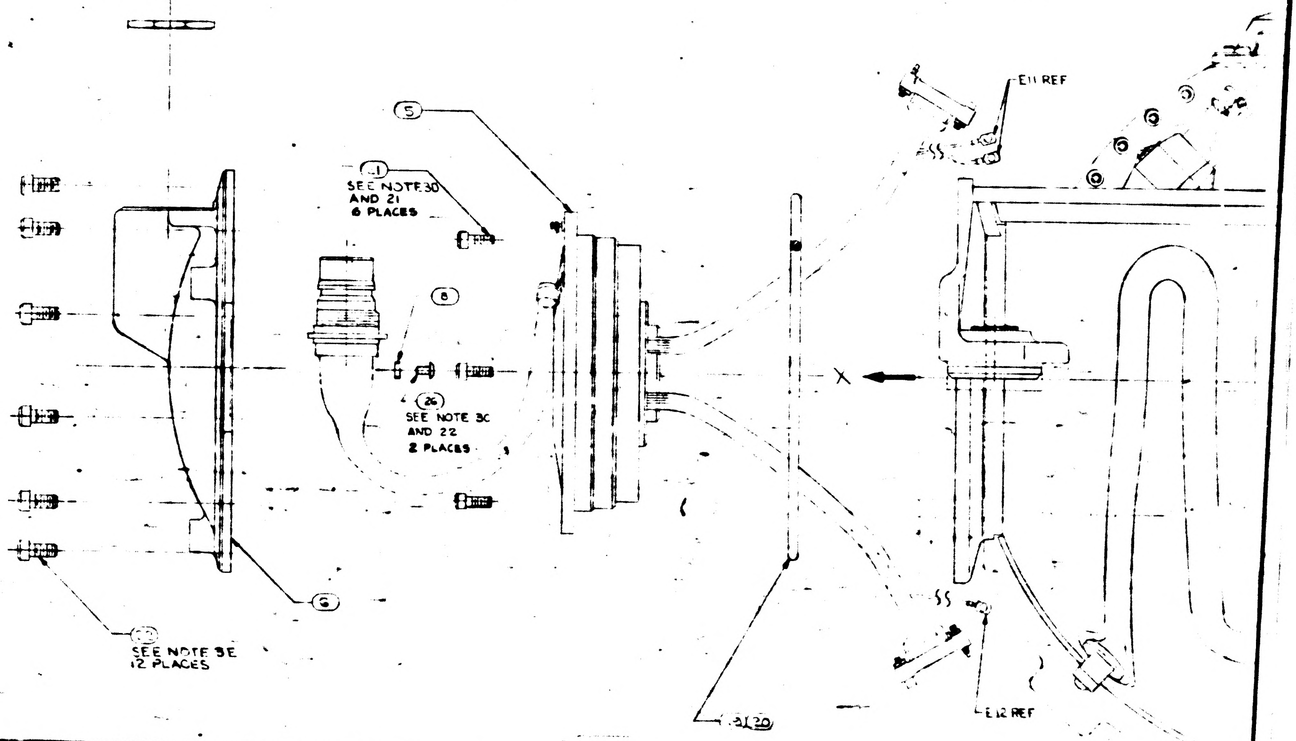
DOCUMENT CHART

ASSEMBLY NO	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS2018601
2018601-041	2018618	PS2016152
2018601-051	2018618	PS2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154
2018601-131	2018615	PS2018601
2018601-141	2018618	PS2016154



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

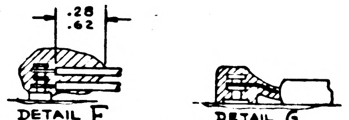




NOTES

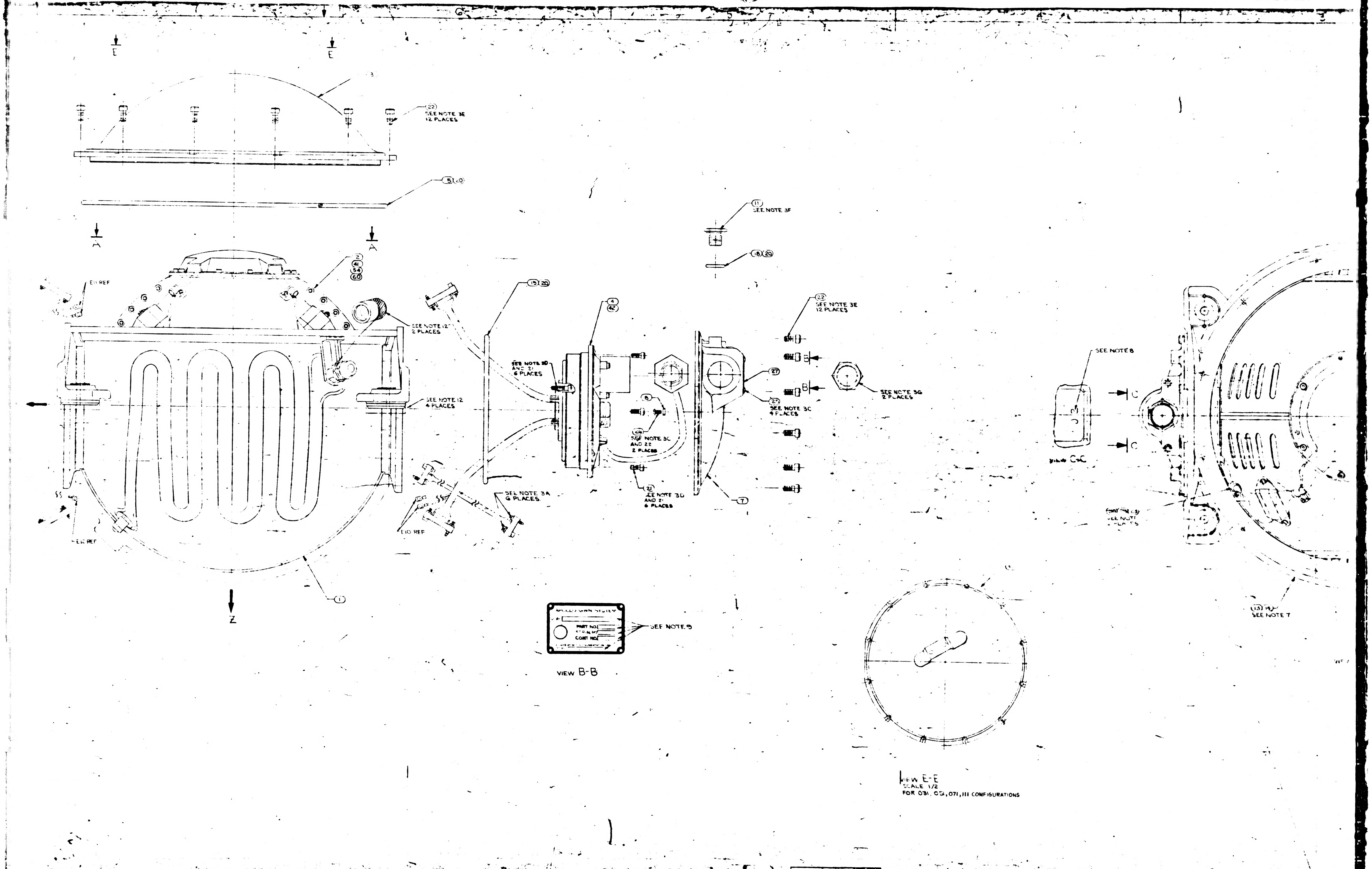
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (39) NASA DWG NO 1000260 USE 1000260-1 THRU 1000260-12 ONLY.~~ [illegible]
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS .23/.27 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS .10/.14 HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-C11 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVER 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616 GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (83) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-061 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "a" AND "b" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - a. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
    - b. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "a" ABOVE.

    CURE APPLIED COATINGS AT 130°±10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-031, -051, -071 MAY BE USED INTERCHANGEABLY.



DETAIL F DETAIL G
(-071 AND ON CONFIGURATION)

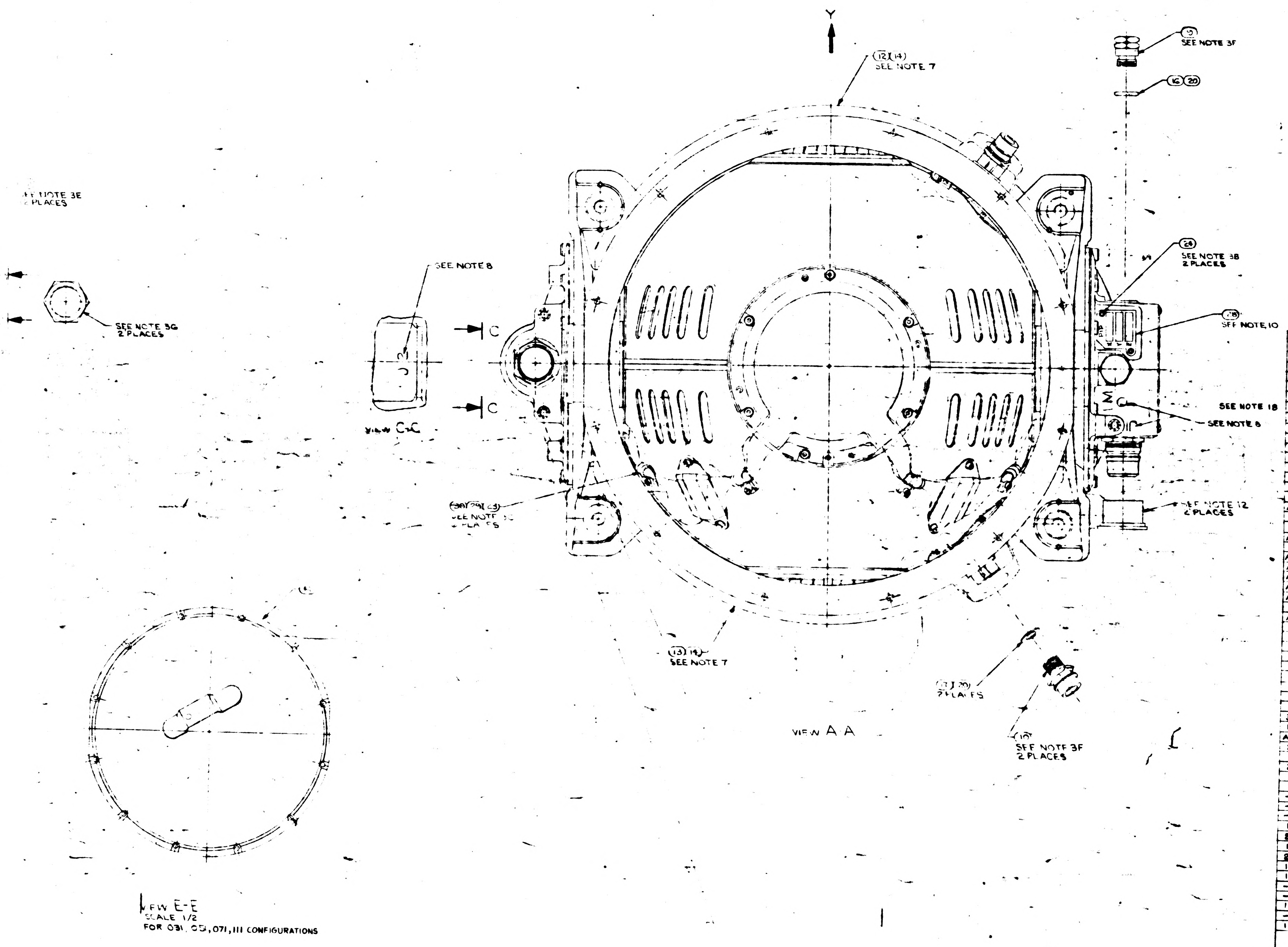
3/4


E
E
3
(22)
SEE NOTE 3E
12 PLACES
(5)(20)
A
A
(2)
(41)
(54)
(60)
E11 REF
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
E10 REF
E10 REF
(1)
Z
(19)(20)
SEE NOTE 3A
6 PLACES
(4)
(42)
SEE NOTE 3D
AND 21
6 PLACES
(8)
(26)
SEE NOTE 3C
AND 22
2 PLACES
(21)
SEE NOTE 3D
AND 21
6 PLACES
(11)
SEE NOTE 3F
(18)(20)
(22)
SEE NOTE 3E
12 PLACES
B
B
(27)
(27)
SEE NOTE 3C
4 PLACES
(7)
SEE NOTE 3G
2 PLACES
SEE NOTE 8
J3
C
C
VIEW C-C
SEE NOTE
PLACES
(13)(14)
SEE NOTE 7
APOLLO G&N SYSTEM
PART NO.
SERIAL NO.
CONT NO.
SEE NOTE 9
VIEW B-B
VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111 CONFIGURATIONS

2018601 86

2/2018601

SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	[illegible]		
V	REVISED TDRR 19275	[illegible]		
W	REVISED TDRR 21187	[illegible]		
Y	REVISED PER TDRR 21814	[illegible]		
Z	REVISED TDRR 22594	[illegible]		
AA	REVISED TDRR 23700	[illegible]		
AB	REVISED TDRR 24[illegible]	[illegible]		
AC	REVISED TDRR 25485	[illegible]		
AD	REVISED TDRR 26216	[illegible]		
AE	REVISED TDRR 26247	[illegible]		
AF	REVISED TDRR 26258	[illegible]		
AG	REVISED TDRR 26260	[illegible]		
AH	REVISED TDRR 26879	[illegible]		
AJ	REVISED TDRR 27347	[illegible]		
AK	REVISED TDRR 27776	[illegible]		
AL	REVISED TDRR 28126	[illegible]		
AM	REVISED TDRR [illegible]026	[illegible]		
AN	REVISED PER TDRR 29571	2 JUN		
AP	REVISED PER TDRR 31076	20 SEP 66		
AR	REVISED PER TDRR 32105	7 DEC 66	ME	EB
AS	REVISED PER TDRR 33113	[illegible] 67	LLE	RCD
AT	REVISED PER TDRR 33316	6 APR 67	ME	RCD
AU	REVISED PER TDRR 33352	6 APR 67	ME	EB
AV	REVISED PER TDRR 33393	6 APR 67	ME	RCD
AW	REVISED PER TDRR 33397	6 APR 67	ME	WH
AY	REVISED PER TDRR 33388	6 APR 67	ME	JW
AZ	REVISED PER TDRR 34197	21 JUL 67		
BA	REVISED PER TDRR 34720	[illegible] OCT 67	J.S.	
BB	REVISED PER TDRR 34903	7 NOV 67	EWB	



-141	-131	-121	-111	-091	-081	-071	-061	-051	[illegible]	[illegible]	-021	[illegible]	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
-	-	1	1	-	-	-	-	-	-	-	-	-	2018602-041	OUTER AXIS ASSEMBLY	60
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	59
-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1006277	SILICA, PULVERIZED, PYROGENIC	58
-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1008822-1	COLORANT	57
-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1008821-2	CURING AGENT	56
-	-	-	-	1	1	1	-	-	-	-	-	-	1008821-1	EPOXY RESIN	55
-	-	-	-	1	1	1	-	-	-	-	-	-	2018602-031	OUTER AXIS ASSEMBLY	54
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	53
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
-	3	-	-	-	-	-	-	-	-	3	-	3	2021500 SEE NOTE 15 & 6	RIG PREALIGNED ASSY	51
-	-	3	3	-	3	3	3	3	3	-	-	-	2021500 (SEE NOTE 15 & 19)	IRIG PREALIGNED ASSY	50
3	-	-	-	3	-	-	-	-	-	-	3	-	20[illegible]00 (SEE NOTE 6 & 23)	IRIG PREALIGNED ASSY	49
-	3	-	3	-	-	3	-	3	3	3	-	-	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	-	3	-	3	3	-	3	-	-	-	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
-	1	-	1	-	-	1	-	1	-	1	-	-	[illegible]	CASE COVER ASSEMBLY	46
1	-	1	1	1	1	1	1	1	1	-	1	-	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	2	2	2	2	2	2	2	[illegible] - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20[illegible]34 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	-	1	1	1	1	1	1	1	1	-	1	-	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	-	-	-	-	-	-	1	1	1	-	1	-	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	[illegible]018633 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
									A/R	A/R	A/R	A/R	1000280 - SEE NOTE 5	WEIGHT, BALANCE S/M	39
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	[illegible] - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	[illegible] - SEE NOTE 5	WEIGHT, BALANCE [illegible]	37
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
									~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	4	4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	6	6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1	1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	1	1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	4	4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX SOC	26
4	4	4	4	4	4	4	4	4	4	4	4	4	[illegible]-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	2	2	2	2	2	2	2	1010891-7	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	6	6	6	6	6	6	6	1006498-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	36	36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	2	2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1	1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	2	2	2	2	2	2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1	1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1	1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1010538	ADHESIVE	14
-	-	-	-	1	1	1	1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L.H)	13
-	-	-	-	1	1	1	1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R.H)	12
1	1	1	1	1	1	1	1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	2	2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	1	1	1	1	1	1	1	2018773	VALVE, PRESS RE[illegible] ASSEMBLY	9
2	2	2	2	2	2	2	2	2	2	2	2	2	2018818	STRAP, ASSY OUTER AXIS	8
1	1	1	1	1	1	1	1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR OUTER AXIS	7
1	1	1	1	1	1	1	1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
-	1	-	-	-	-	-	-	-	-	1	-	1	2018609-011	IGSA TORQUE MOTOR OUTER AXIS	5
-	1	-	-	-	-	-	-	-	-	1	-	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	-	1	-	1	1	-	1	-	1	-	1	1	2018710	CASE COVER	3
-	1	-	-	-	-	-	-	-	-	1	-	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	1	1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASSY	1
QTY REQD															

LIST OF MATERIALS

REPLACE REV T
WITH CHANGES

6007001	6015000
6007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN UTB DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
SHEET OF

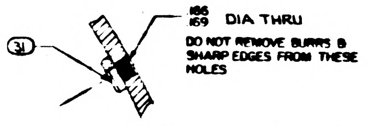
3/2018601

TABLE II

SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

TABLE I

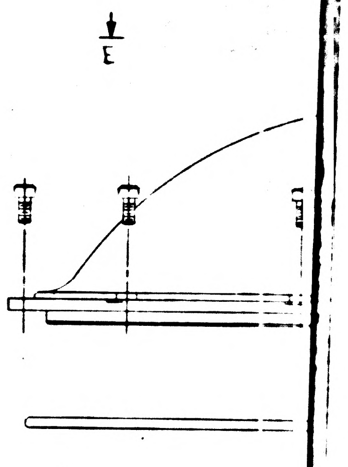
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

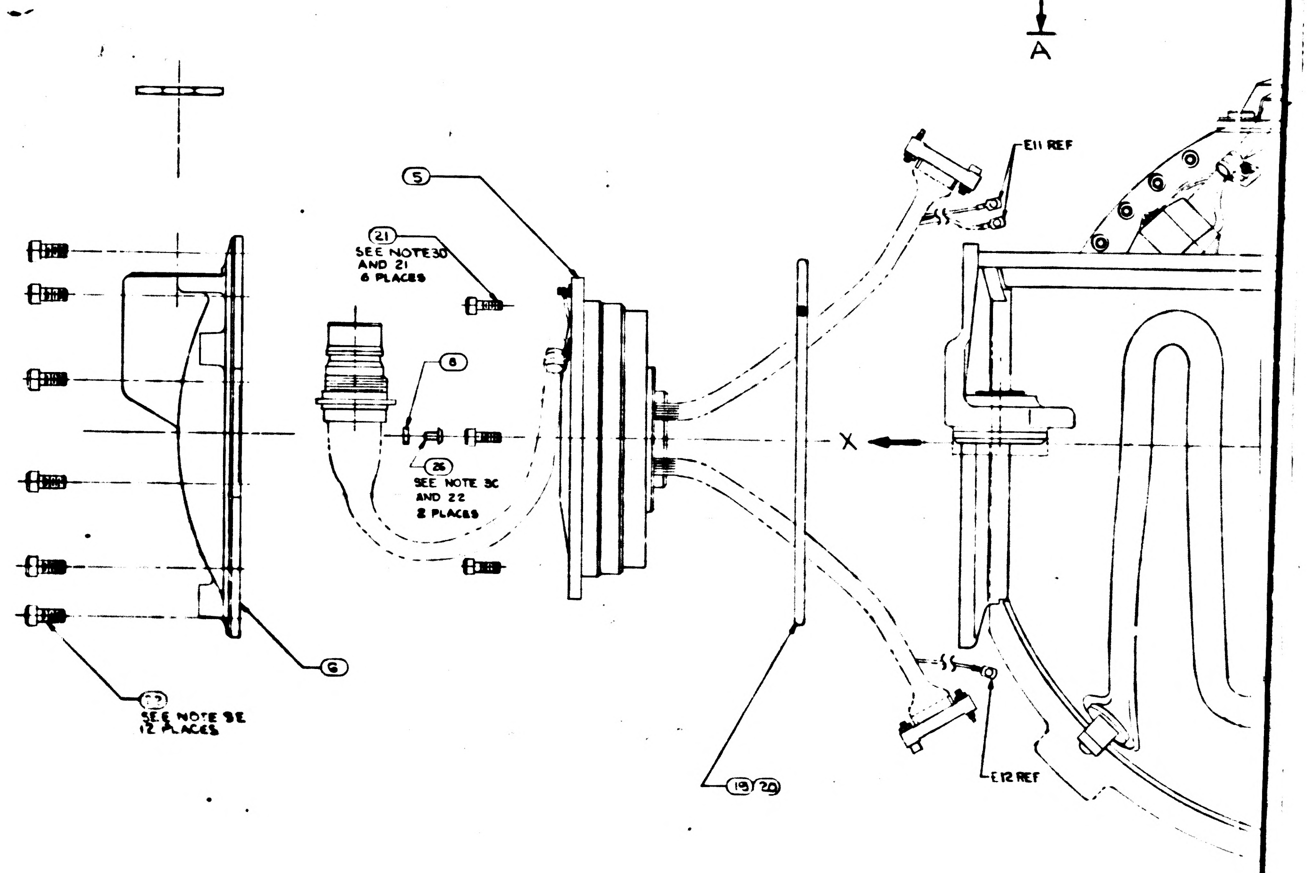


DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154
2018601-071	2018618	PS 2016152
2018601-081	2018618	PS 2016154
2018601-111	2018618	PS 2016152
2018601-121	2018618	PS 2016154
2018601-131	2018615	PS 2018601
2018601-141	2018618	PS 2016154



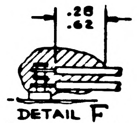


NOTES

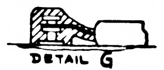
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 60.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (35) NASA DWG NO 1000260 USE 1000260 THRU 1000260-18 ONLY~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED N -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-061 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "a" AND "b" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - a. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
    - b. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "a" ABOVE.

    CURE APPLIED COATINGS AT 130°±10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-031, -051, -071 MAY BE USED INTERCHANGEABLY.

3/4

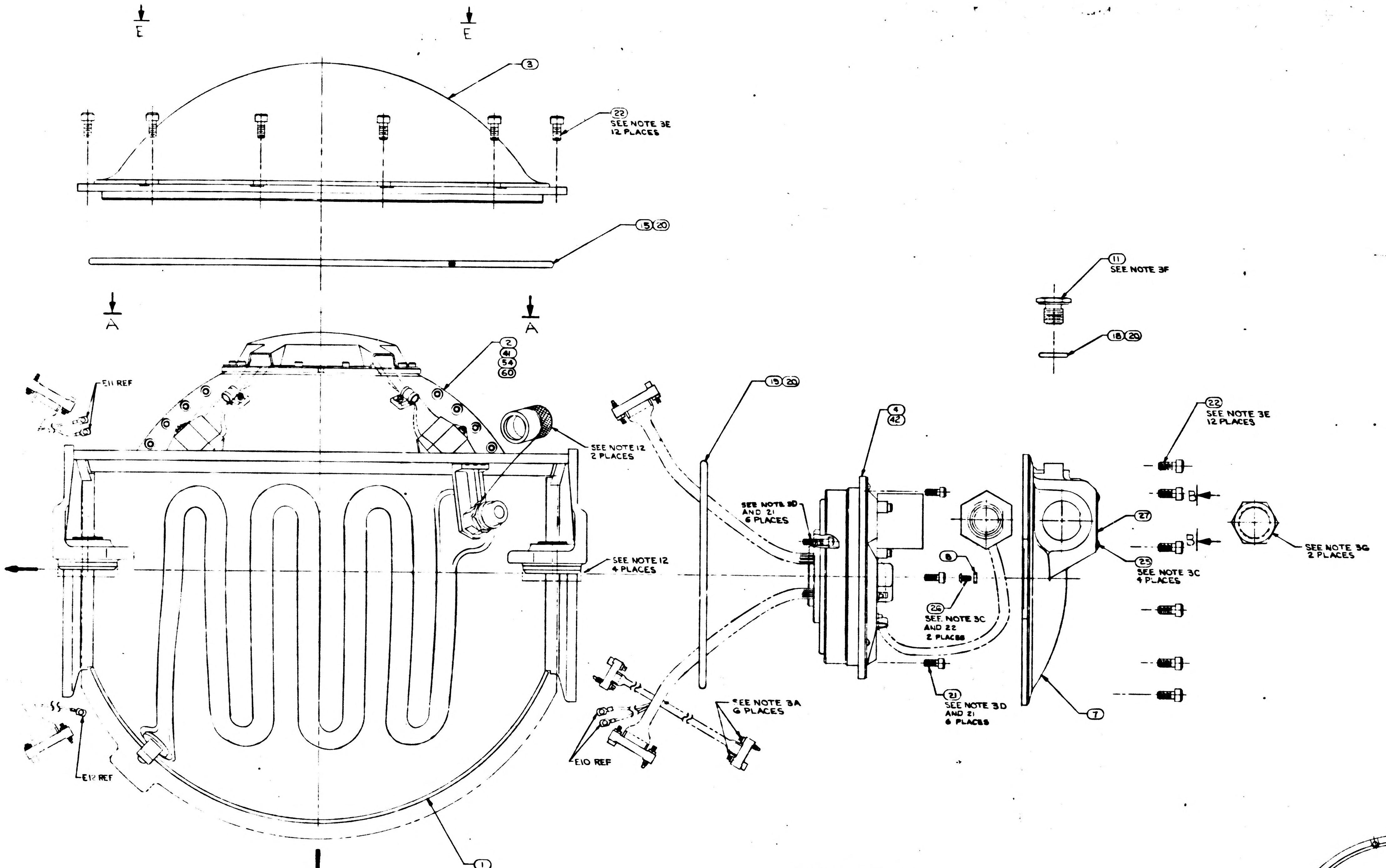


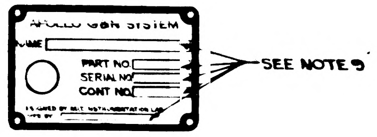
DETAIL F



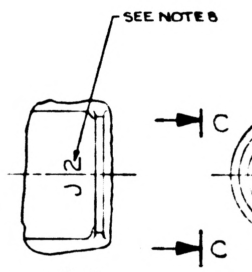
DETAIL G

(-071 AND ON CONFIGURATION)

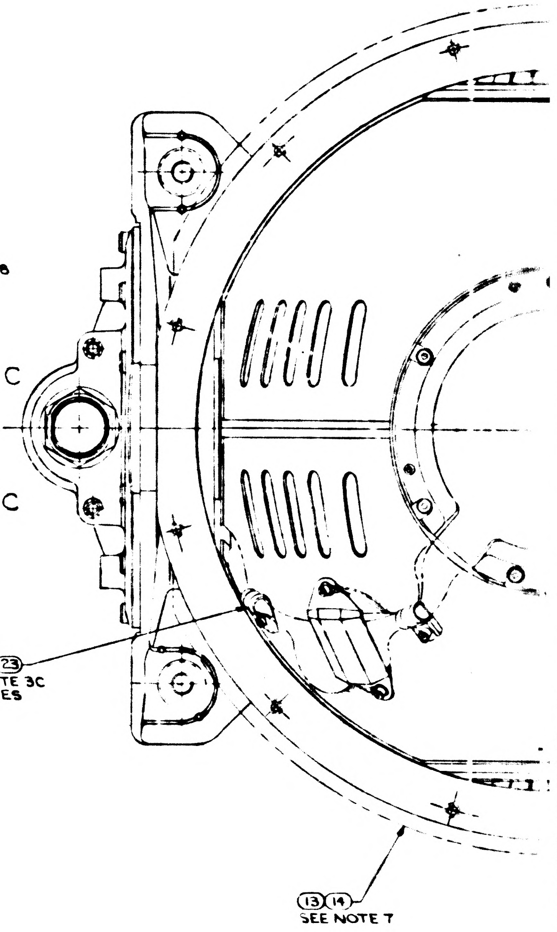

E
E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
A
E11 REF
2
41
54
60
SEE NOTE 12
2 PLACES
19 20
4
42
11
SEE NOTE 3F
18 20
22
SEE NOTE 3E
12 PLACES
SEE NOTE 3D
AND 21
6 PLACES
B
B
27
25
SEE NOTE 3C
4 PLACES
SEE NOTE 3G
2 PLACES
8
26
SEE NOTE 3C
AND 22
2 PLACES
SEE NOTE 12
4 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
7
SEE NOTE 3A
6 PLACES
E10 REF
E12 REF
1
Z


APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
SEE NOTE 9

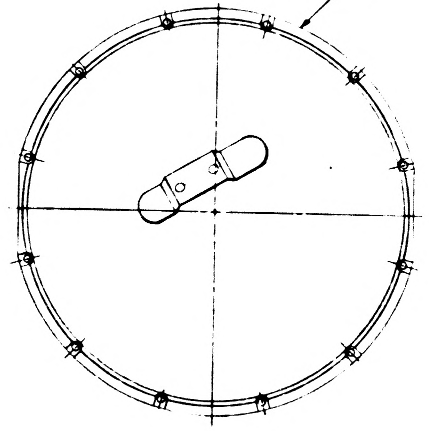
VIEW B-B


SEE NOTE 8
J2
C
C

VIEW C-C


30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7

VIEW

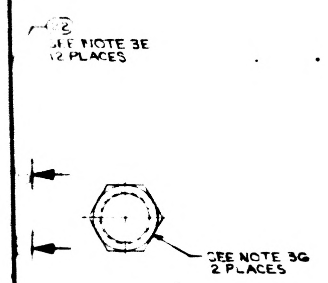


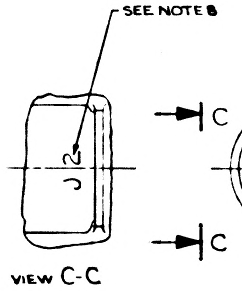
VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111 CONFIGURATIONS

2018601 | BC | 1

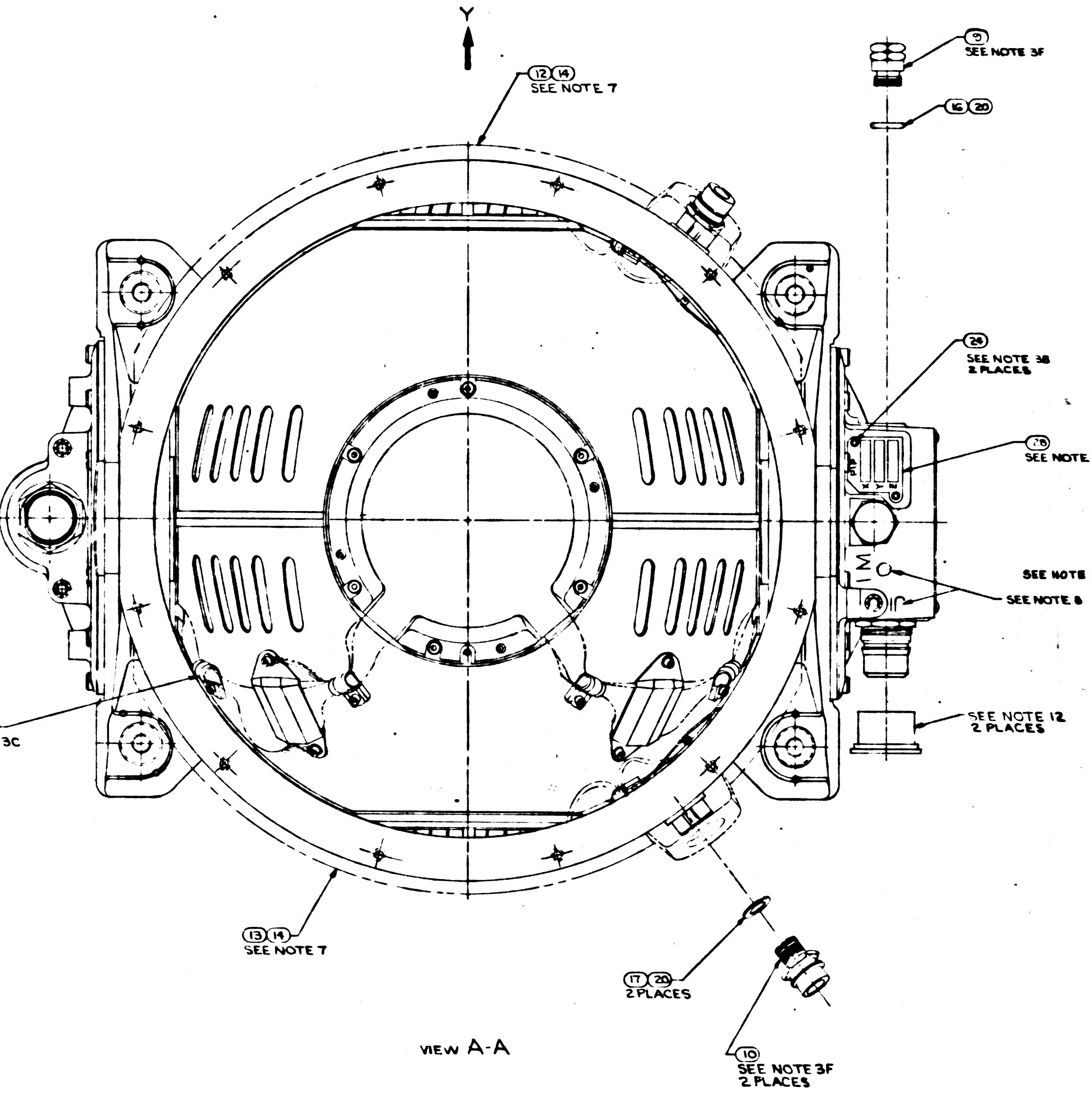
2/2018601

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65		
V	REVISED TDRR 19275	2 Jun 65		
W	REVISED TDRR 21187	26 Jul 65		
Y	REVISED PER TDRR 21814	8 Sep 65		
Z	REVISED TDRR 22594	19 Oct 65		
AA	REVISED TDRR 23700			
AB	REVISED TDRR 24308			
AC	REVISED TDRR 25485			
AD	REVISED TDRR 26296			
AE	REVISED TDRR 26247			
AF	REVISED TDRR 26258			
AG	REVISED TDRR 26260			
AH	REVISED TDRR 26879			
AJ	REVISED TDRR 27347			
AK	REVISED TCRR 27776			
AL	REVISED TDRR 28126			
AM	REVISED TDRR 29026			
AN	REVISED PER TDRR 29571	21 JUN		
AP	REVISED PER TDRR 31076	20 SEP 66		
AR	REVISED PER TDRR 32108	7 DEC 66	ME	
AS	REVISED PER TDRR 33113	MAR 67	LEE	RCD
AT	REVISED PER TDRR 33316	6 APR 67	ME	RCD
AU	REVISED PER TDRR 33352	6 APR 67	ME	
AV	REVISED PER TDRR 33353	6 APR 67	ME	RCD
AW	REVISED PER TDRR 33387	6 APR 67	ME	
AY	REVISED PER TDRR 33388	6 APR 67	ME	
AZ	REVISED PER TDRR 34197	21-JUL 67		
BA	REVISED PER TDRR 34720	2-OCT 67	J.S.	
BB	REVISED PER TDRR 34903	7-NOV 67	EWS	
BC	REVISED PER TDRR 34906	13-NOV 67	JRK	

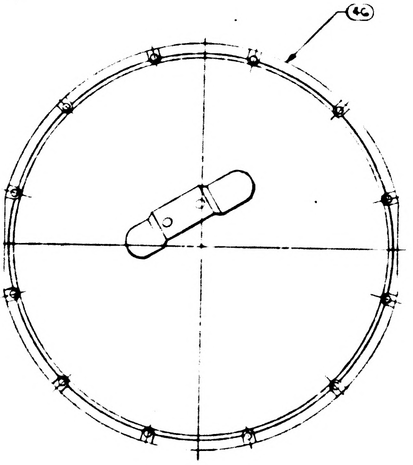




VIEW C-C



VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111 CONFIGURATIONS

												QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	LIST OF MATERIALS		
-	-	3	3	-	-	-	-	-	-	-	-	-	2021500-071 SEE NOTE 15	IRIG PREALIGNED ASSY	61
-	-	1	1	-	-	-	-	-	-	-	-	-	2018602-041	OUTER AXIS ASSEMBLY	60
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	59
-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1006277	SILICA, PULVERIZED, PYROGENIC	58
-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1008822-1	COLORANT	57
-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1008821-2	CURING AGENT	56
-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1008821-1	EPOXY RESIN	55
-	-	-	-	1	1	1	-	-	-	-	-	-	2018602-031	OUTER AXIS ASSEMBLY	54
A/R	A/R	A R	A/R	A/R	AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE "ACT	TAPE, ADH. ELEC. PRESS SENSITIVE	53
A/R	A/R	A R	A/R	A/R	AR	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
-	3	-	-	-	-	-	-	-	-	3	-	3	2021500 SEE NOTE 15 & 16	IRIG PREALIGNED ASSY	51
-	-	-	-	-	3	3	3	3	3	-	-	-	2021500 (SEE NOTE 15 & 19)	IRIG PREALIGNED ASS'Y	50
3	-	-	-	3	-	-	-	-	-	-	3	-	20 500 (SEE NOTE 15 & 23)	IRIG PREALIGNED ASSY	49
-	3	-	3	-	-	3	-	3	3	3	-	-	2018844-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	-	3	-	3	3	-	3	-	-	-	3	3	2018844-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
-	1	-	1	-	-	1	-	1	-	1	-	-	2018839	CASE COVER ASSEMBLY	46
1	-	1	1	1	1	1	1	1	1	-	1	-	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	2	2	2	2	2	2	2	1011625-11 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018834 - SEE NOTE 5	WEIGHT, BALANCE S/M	43
1	-	1	1	1	1	1	1	1	1	-	1	-	2018612-021	IGSA RESOLVER OUTER AXIS	42
1	-	-	-	-	-	-	1	1	1	-	1	-	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018833-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
									~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1000260-SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	39
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018832-SEE NOTES 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTES 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000263-SEE NOTE 5	WEIGHT BALANCE OUT AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000261-SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
									~~A/R~~	~~A/R~~	~~A/R~~	~~A/R~~	~~1001489-SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1001488 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	4	4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	6	6	6	6	6	6	6	1000220-SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1	1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	1	1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	4	4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX SOC	26
4	4	4	4	4	4	4	4	4	4	4	4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	2	2	2	2	2	2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	6	6	6	6	6	6	6	6	6	6	6	1001488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	36	36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	2	2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1	1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	2	2	2	2	2	2	2	1000159-8	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1	1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1	1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	AR	A/R	A/R	1010838	ADHESIVE	14
-	-	-	-	1	1	1	1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L H)	13
-	-	-	-	1	1	1	1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R H)	12
1	1	1	1	1	1	1	1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	2	2	2	2	2	2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	1	1	1	1	1	1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2	2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	1	1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR OUTER AXIS	7
1	1	1	1	1	1	1	1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
-	1	-	-	-	-	-	-	-	-	1	-	1	2018609-011	IGSA, TORQUE MOTOR, OUTER AXIS	5
-	1	-	-	-	-	-	-	-	-	1	-	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	-	1	-	1	1	-	1	-	1	-	1	1	2018710	CASE COVER	3
-	1	-	-	-	-	-	-	-	-	1	-	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	1	1	1	1	1	1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

REPLACE REV T
WITH CHANGES

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN DTB DATE 3/5/65
CHECKED G QUINN
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

INERTIAL MEASURING UNIT ASSEMBLY

CODE IDENT NO 80230
SIZE J3
NASA DRAWING NO. 2018601
SCALE 1/1
SHEET 1 OF 1

2018601 BC

3A

2018601 BC 1

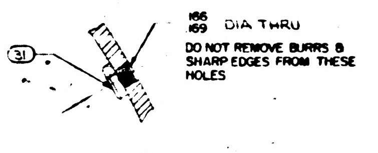
3/2018601

TABLE II

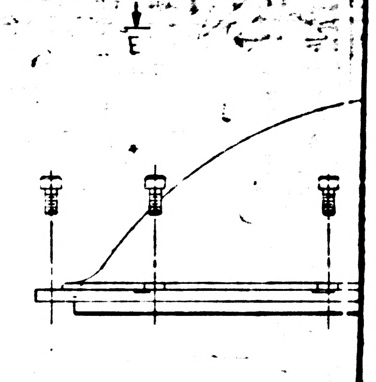
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
[illegible] 5-11	

TABLE I

CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
7	3/8

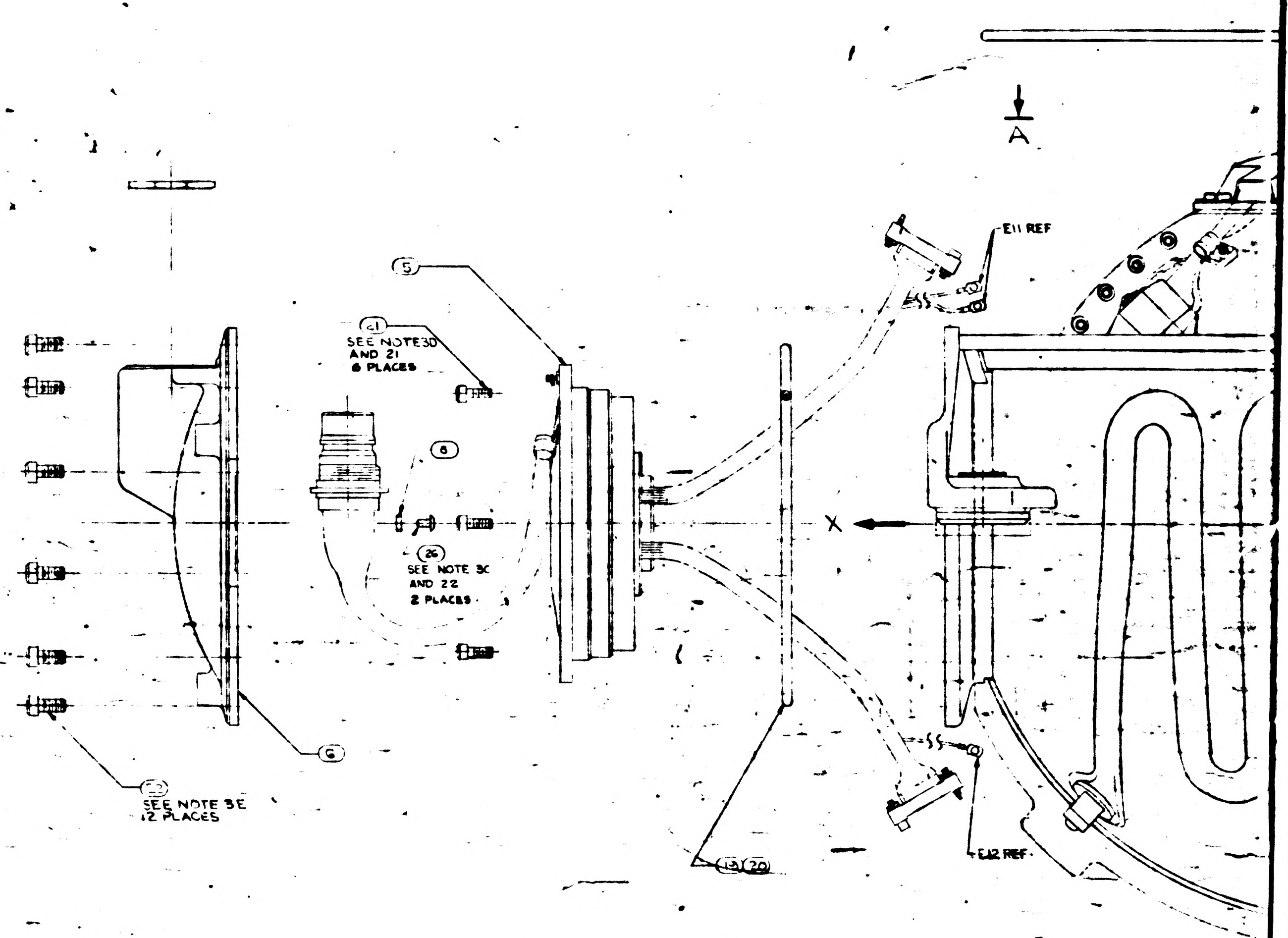


DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



DOCUMENT CHART

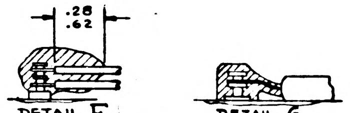
ASSEMBLY NO.	SCHEMATIC (REF	PROC. SPEC
2018601-011	2018615	PS2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS2018601
2018601-041	2018618	PS2016152
2018601-051	2018618	PS2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154
2018601-131	2018615	PS2018601
2018601-141	2018618	PS2016154
2018601-151	2021398	PS2016152
2018601-161	2021398	PS2016154
2018601-171	2021402	PS2018601
2018601-181	2021398	PS2016154


A
E11 REF
(5)
(21) SEE NOTE 3D AND 21 6 PLACES
(8)
(26) SEE NOTE 3C AND 22 2 PLACES
X
(6)
(22) SEE NOTE 3E 12 PLACES
E12 REF
(19)(20)

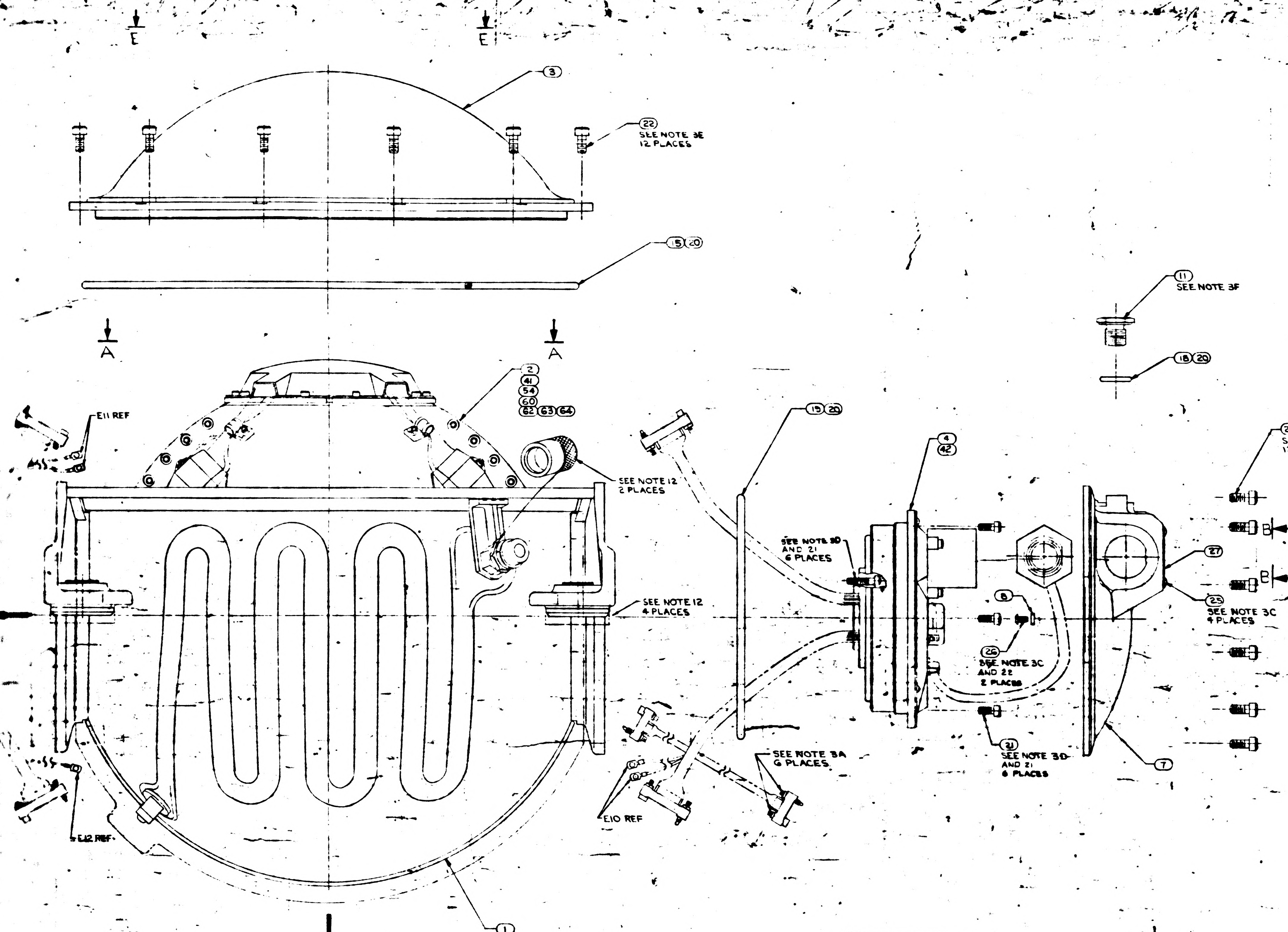
NOTES

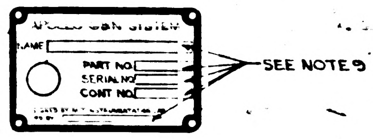
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY ~~CLAMP~~ TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED ~~ITEM (33) NASA DWG NO 1000260 USE 1000260-1 THRU 1000260-42 ONLY.~~ SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). ADJOINING SURFACES OF ITEMS (12) + (13) TO BE BONDED TO EACH OTHER
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE
15. SEE NASA DRAWING NO 2018605 FOR INSTALLATION INFORMATION
16. IRIG PREALIGNED ASS'Y NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USED IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (83) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-061 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "a" AND "b" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - a. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
    - b. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "a" ABOVE.

    CURE APPLIED COATINGS AT 130°±10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-031, -051, -071 MAY BE USED INTERCHANGEABLY.

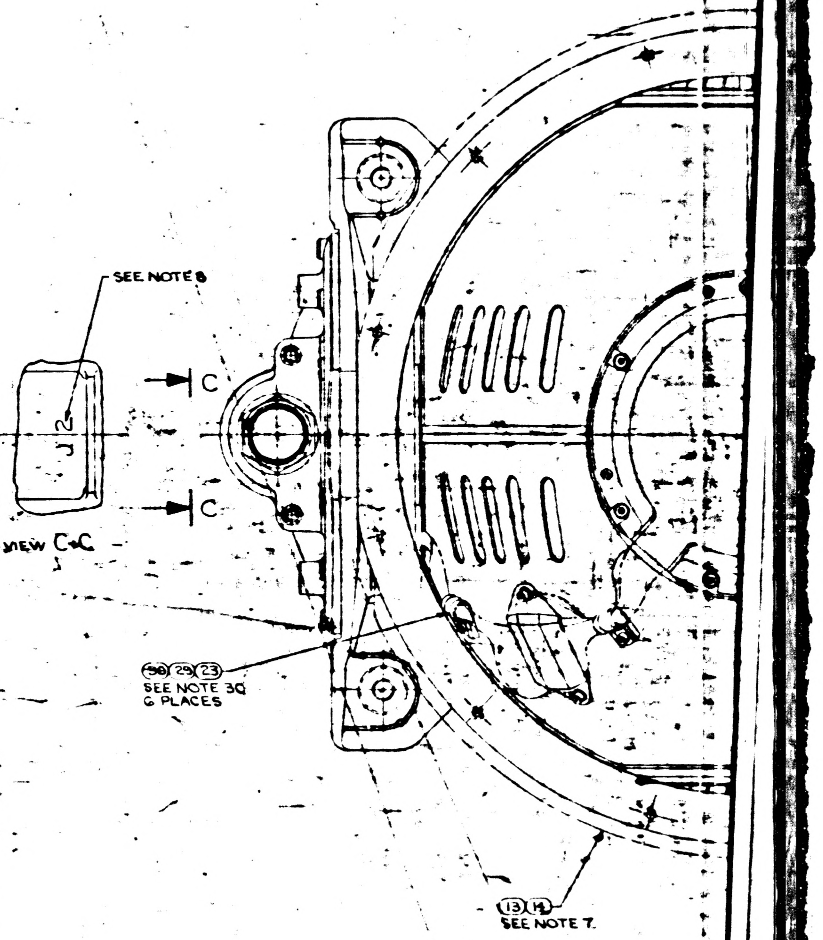


DETAIL F
DETAIL G
(-071 AND ON CONFIGURATION)

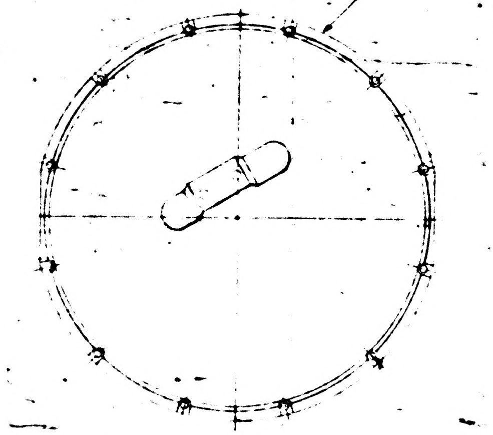

E
E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
A
2
41
54
60
62 63 64
E11 REF
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
E12 REF
1
Z
19 20
SEE NOTE 3D
AND 21
6 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
4
42
8
26
SEE NOTE 3C
AND 22
2 PLACES
31
SEE NOTE 3D
AND 21
6 PLACES
7
27
25
SEE NOTE 3C
4 PLACES
11
SEE NOTE 3F
18 20
22
SEE NOTE 3E
12 PLACES
B
B


NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9

VIEW B-B


SEE NOTE 3G
2 PLACES
SEE NOTE 8
C
C
J2
30 29 23
SEE NOTE 3G
6 PLACES
13 14
SEE NOTE 7
Y

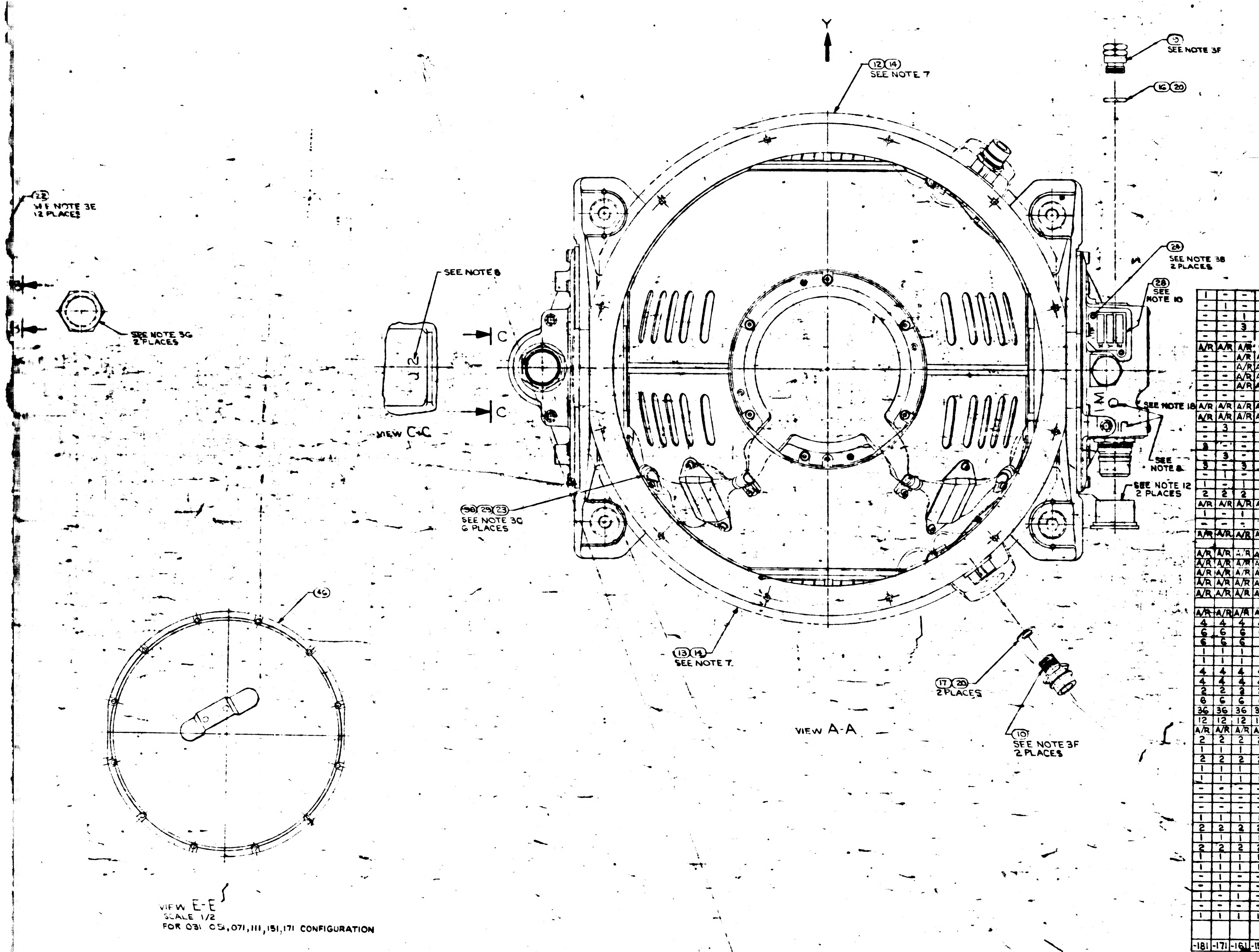
VIEW C-C



VIEW E-E
SCALE 1/2
FOR 031 051,071,111,151,171 CONFIGURATION

2018601 BD

SYM	DESCRIPTION	DATE		APPR
U	REPLACED REV T WITH CHANGES PER TDRR 17742	[illegible]	[illegible]	[illegible]
V	REVISED TDRR 19275	[illegible]	[illegible]	[illegible]
W	REVISED TDRR 21107	[illegible]	[illegible]	[illegible]
Y	REVISED PER TDRR 21814	[illegible]	[illegible]	[illegible]
Z	REVISED TDRR 22894	[illegible]	[illegible]	[illegible]
AA	REVISED TDRR 23700	[illegible]	[illegible]	[illegible]
AB	REVISED TDRR 24 [illegible]	[illegible]	[illegible]	[illegible]
AC	REVISED TDRR 25485	[illegible]	[illegible]	[illegible]
AD	REVISED TDRR 26296	[illegible]	[illegible]	[illegible]
AE	REVISED TDRR 25297	[illegible]	[illegible]	[illegible]
AF	REVISED TDRR 26258	[illegible]	[illegible]	[illegible]
AG	REVISED TDRR 26260	[illegible]	[illegible]	[illegible]
AH	REVISED TDRR 26579	[illegible]	[illegible]	[illegible]
AJ	REVISED TDRR 27347	[illegible]	[illegible]	[illegible]
AK	REVISED TDRR 27776	[illegible]	[illegible]	[illegible]
AL	REVISED TDRR 28426	[illegible]	[illegible]	[illegible]
AM	REVISED TDRR 29026	[illegible]	[illegible]	[illegible]
AN	REVISED PER TDRR 29871	21 JUN	[illegible]	
AP	REVISED PER TDRR 31076	SEP 66	[illegible]	
AR	REVISED PER TDRR 32108	7 DEC 66	ME	[illegible]
AS	REVISED PER TDRR 33113	[illegible]	[illegible]	RCD
AT	REVISED PER TDRR 33316	6 APR 67	ME	RCD
AU	REVISED PER TDRR 33352	6 APR 67	ME	[illegible]
AV	REVISED PER TDRR 33383	6 APR 67	ME	RCB
AW	REVISED PER TDRR 33397	5 APR 67	ME	[illegible]
AY	REVISED PER TDRR 33388	5 APR 67	ME	[illegible]
AZ	REVISED PER TDRR 34197	23 JUL 67	[illegible]	[illegible]
BA	REVISED PER TDRR 34720	2 OCT 67	J.S.	[illegible]
BB	REVISED PER TDRR 34903	7 NOV 67	[illegible]	[illegible]
BC	REVISED PER TDRR 34906	13 NOV 67	[illegible]	RWH
BD	REVISED PER TDRR 35728	FEB 68	J	[illegible]



LIST OF MATERIALS

-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2018602-061	OUTER AXIS ASSEMBLY	64
-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2018602-071	OUTER AXIS ASSEMBLY	63
-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2018602-051	OUTER AXIS ASSEMBLY	62
-	-	3	3	-	-	3	3	-	-	-	-	-	-	-	-	-	2021500-071 SEE NOTE 15	IRIG PREALIGNED ASSY	61
-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	2018602-041	OUTER AXIS ASSEMBLY	60
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	59
-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1006277	SILICA, PULVERIZED, PYROGENIC	58
-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1008822-1	COLORANT	57
-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1008821-2	CURING AGENT	56
-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	1008821-1	EPOXY RESIN	55
-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	2018602-031	OUTER AXIS ASSEMBLY	54
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-I-15125 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	53
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1006338-000 SEE NOTE 17	SEALING COMPOUND SILICONE RUBBER	52
-	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	3	2021500 SEE NOTE 14 & 16	IRIG PREALIGNED ASSY	51
-	-	-	-	-	-	-	-	-	3	3	3	3	3	-	-	-	2021500 (SEE NOTE 18 & 19)	IRIG PREALIGNED ASSY	50
3	-	-	-	3	-	-	-	3	-	-	-	-	-	-	3	-	20[illegible]00 (SEE NOTE 18 & 23)	IRIG PREALIGNED ASSY	49
-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	2018644-021 SEE NOTE 15	CALIBRATED PIP ASSY	48
3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	2018644-011 SEE NOTE 15	CALIBRATED PIP ASSY	47
-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	2018835	CASE COVER ASSEMBLY	46
1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	45
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	-	[illegible]625-1 - SEE NOTE 6	SCREW, HEX, SOC HD SELF-LKG	44
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	~~2018834 - SEE NOTE 5~~	WEIGHT, BALANCE S/M	43
1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	2018612-021	IGSA RESOLVER OUTER AXIS	42
-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018833 - SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	40
													A/R	A/R	A/R	A/R	~~1000280 - SEE NOTE 5~~	~~WEIGHT, BALANCE S/M~~	39
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018832 - SEE NOTE 5	WEIGHT, BALANCE S/M	38
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	2018831 - SEE NOTE 5	WEIGHT, BALANCE S/M	37
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000263 - SEE NOTE 5	WEIGHT BALANCE OUT AND MID GIMBAL	36
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000262 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1000261 - SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	34
													A/R	A/R	A/R	A/R	~~1001468 - SEE NOTE 6~~	~~SCREW, HEX, SOC HEAD~~	33
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1001468 - SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1010861-6 SEE NOTE 6	NUT, PLAIN CLINCH	31
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	30
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	1000220 - SEE NOTE 4	CLAMP, CABLE	29
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1000022	PLATE, INFORMATION	28
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2018795	PLATE, IDENTIFICATION	27
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1006783-18	SCREW, BUTTON HD, HEX SOC	26
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1010859-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1010851-7	SCREW, BUTTON HD, SELF-LKG, SOC, SP. INC	24
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	[illegible]C 488-1	SCREW, HEX SOC HEAD	23
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1000159-8	PACKING, PREFORMED "O" RING	17
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1000159-15	PACKING, PREFORMED "O" RING	15
-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	1010838	ADHESIVE	14
-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	2018806	INSULATION CASE HEAT EXCH (L.H)	13
-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	2018805	INSULATION CASE HEAT EXCH (R.H)	12
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1000135	COUPLING, HALF QUICK DISCONNECT	10
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2018769	MOUNT, CONN, RSVR. OUTER AXIS	7
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2018774	MOUNT, CONN, T.M. OUTER AXIS	6
-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2018609-011	IGSA TORQUE MOTOR, OUTER AXIS	5
-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2018612-011	IGSA, RESOLVER OUTER AXIS	4
1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	2018710	CASE COVER	3
-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2018738-0[illegible]	CASE CENTER, MACHINING ASS'Y	1

QTY REQD

REPLACE REV T
WITH CHANGES

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

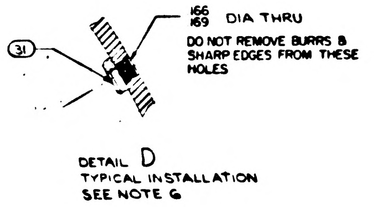
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN UTB DATE [illegible]
CHECKED GQ VN 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

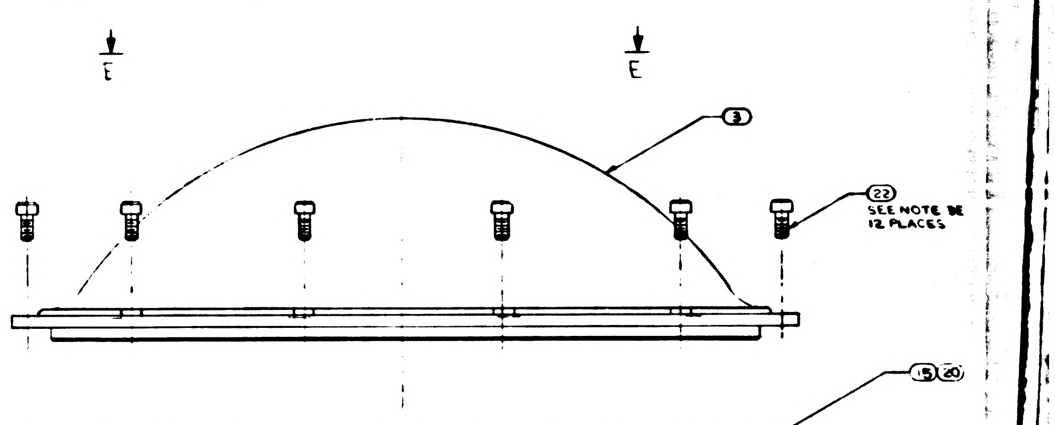
INERTIAL
MEASURING UNIT
ASSEMBLY

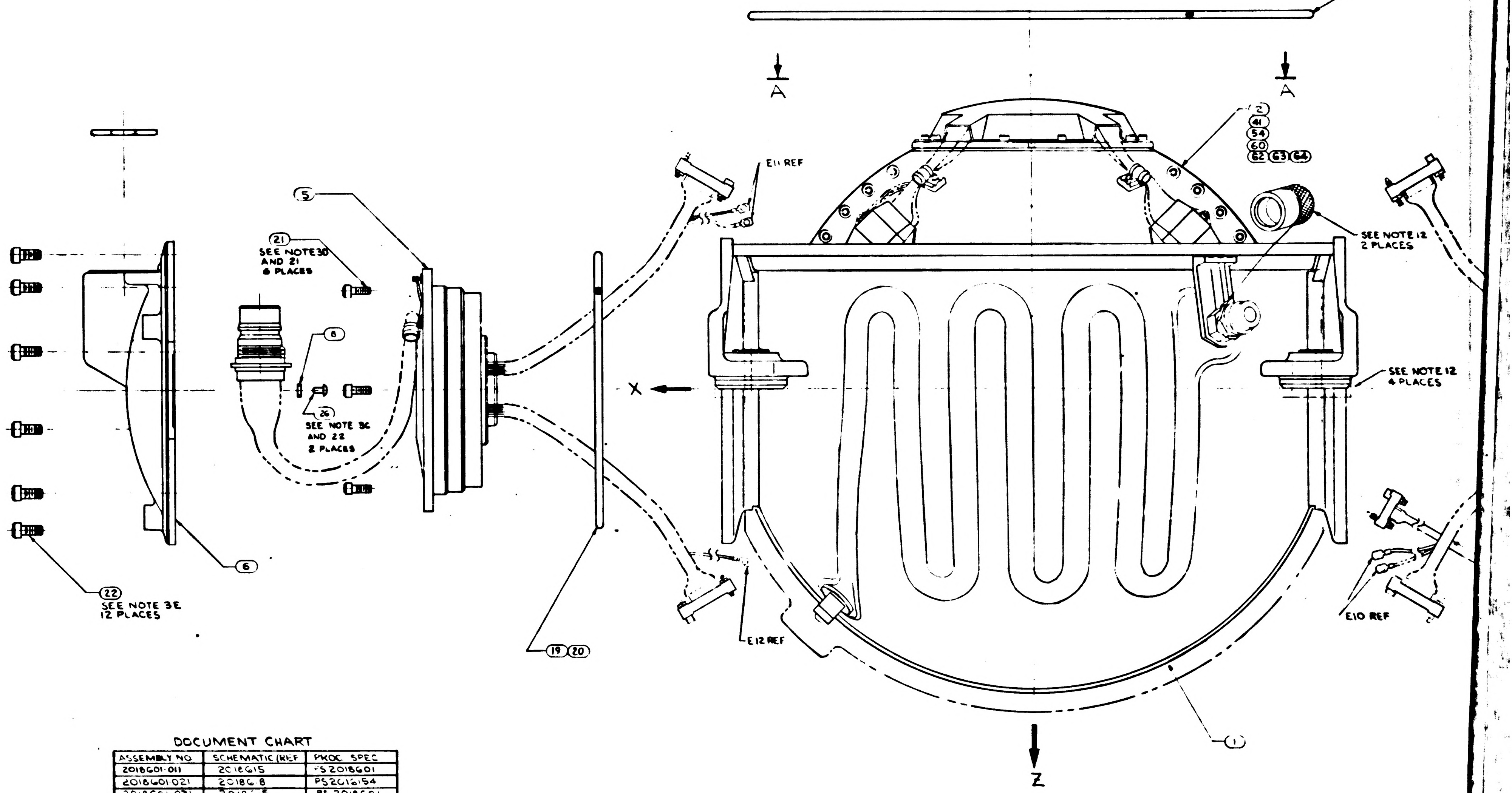
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
SHEET OF

BD



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6





NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED
      1.0 IN.-LB WHILE ENGAGING PINS
   B. 3.5 IN.-LB
   C. 5.0 IN.-LB
   D. 10.0 IN.-LB
   E. 30.0 IN.-LB
   F. 70.0 IN.-LB
   G. 80.0 IN.-LB
4. ITEM 29 TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16. IRIG PREALIGNED ASSY NASA DRAWING NO. 2021500-031, 041, 051, 061, 071 MAY BE USE IN -011 AND -031 CONFIGURATION OF THIS ASSEMBLY.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-051 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
   A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
   B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE.
   CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-031, -051, -071 MAY BE USED INTERCHANGEABLY.
24. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-081 AND -101 MAY BE USED INTERCHANGEABLY.

DOCUMENT CHART

ASSEMBLY NO	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154
2018601-131	2018615	PS2018601
2018601-141	2018618	PS2016154
2018601-151	2021398	PS2016152
2018601-161	2021398	PS2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152

TABLE I

CABLE CLAMP (29)

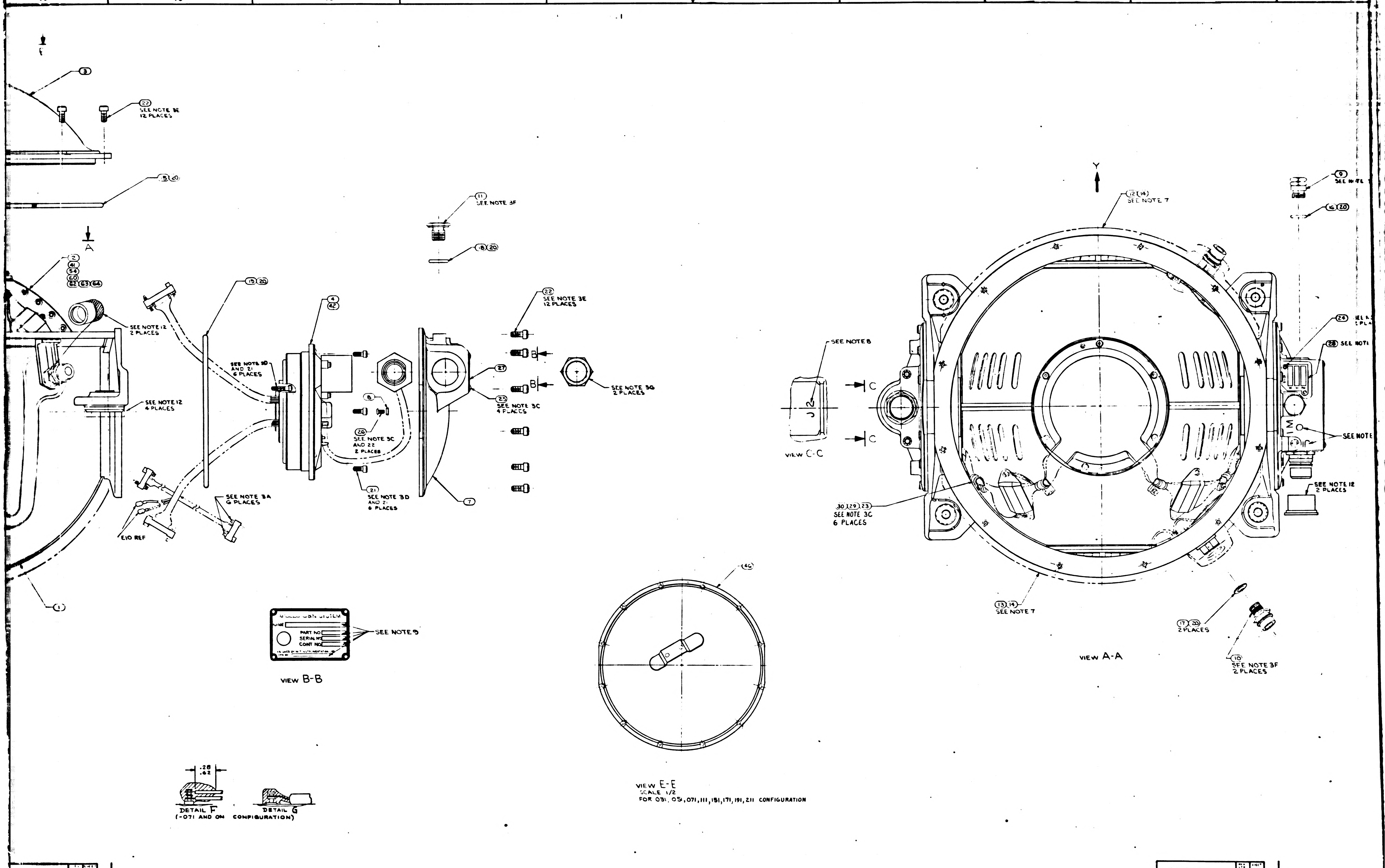
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

TABLE II

SCREW SELECTION CHART (32)

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

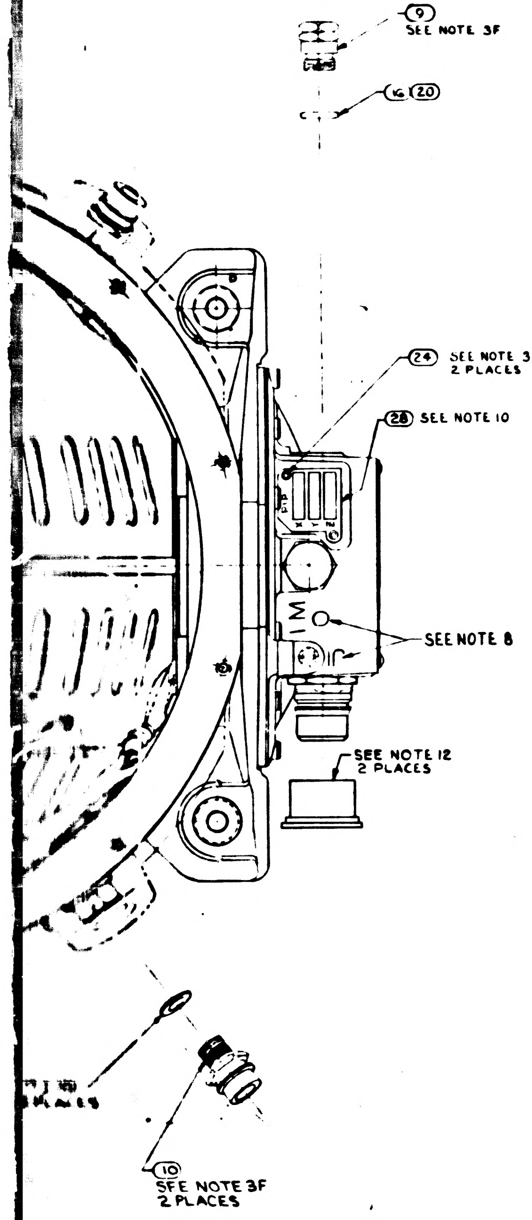
2018601 BE 1 OF 1


③
22 SEE NOTE 3E 12 PLACES
5 20
A
2 41 54 60 62 63 64
SEE NOTE 12 2 PLACES
SEE NOTE 12 4 PLACES
15 20
SEE NOTE 3D AND 21 6 PLACES
SEE NOTE 3A 6 PLACES
E10 REF
1
4 42
11 SEE NOTE 3F
18 20
6
26 SEE NOTE 3C AND 22 2 PLACES
21 SEE NOTE 3D AND 21 6 PLACES
22 SEE NOTE 3E 12 PLACES
B
B
27
25 SEE NOTE 3C 4 PLACES
7
SEE NOTE 3G 2 PLACES
SEE NOTE 8
J12
C
C
VIEW C-C
30 29 23 SEE NOTE 3C 6 PLACES
Y
12 14 SEE NOTE 7
13 14 SEE NOTE 7
9 SEE NOTE
16 20
24 SEE NOTE 3 2 PLA
28 SEE NOTE
SEE NOTE
SEE NOTE 12 2 PLACES
17 20 2 PLACES
10 SEE NOTE 3F 2 PLACES
VIEW A-A
NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9
VIEW B-B
46
VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211 CONFIGURATION
.28
.62
DETAIL F
DETAIL G
(-071 AND ON CONFIGURATION)
16
15
14
13
12
11
10
9
8

2018601 BE 1 OF 1

272018601

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	T/C



-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65		2021500	IRIG PREALIGNED ASSY	15,24
-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
-	-	-	-	-	3	3	-	-	3	3	-	-	-	-	-	-	-	-	-	61		2021500-071	IRIG PREALIGNED ASSY	15
1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM,DISULFIDE	
A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	57		1008822-1	COLORANT	
A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
-	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	3	51		2021500	IRIG PREALIGNED ASSY	15,16
-	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3	3	-	-	-	50		2021500	IRIG PREALIGNED ASSY	15,19
-	-	-	3	-	-	-	3	-	-	-	3	-	-	-	-	-	-	3	-	49		2021500	IRIG PREALIGNED ASSY	15,23
3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																				39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT. AND MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT,BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																				33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN. T.M. OUTER AXIS	
-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED

LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
DRAWN DTB DATE 3/5/65
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

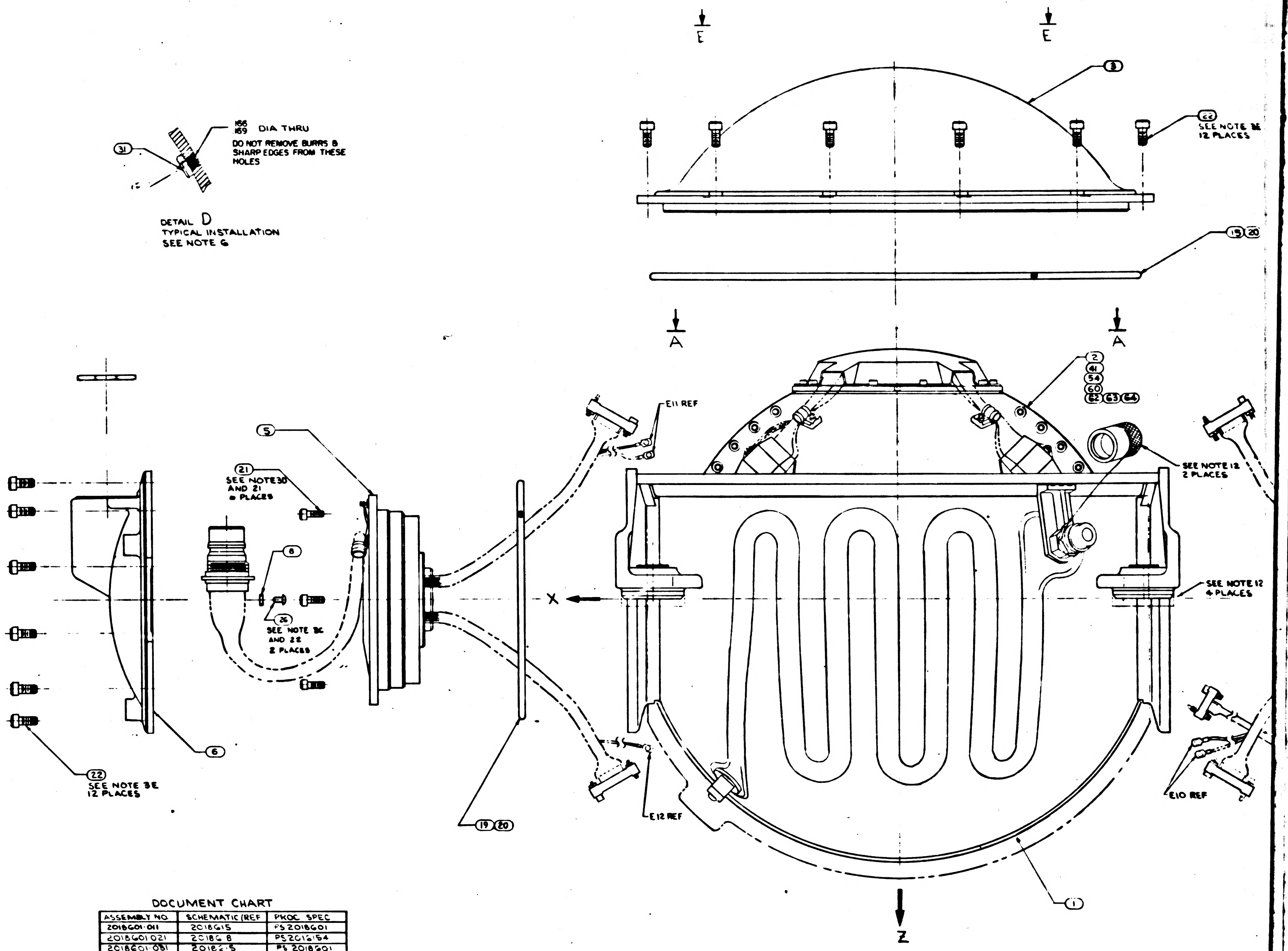
INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO 80230
SIZE J3
NASA DRAWING NO 2018601
SCALE 1/1
SHEET 1 OF 1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 5.0 IN.-LB
   - D. 10.0 IN.-LB
   - E. 30.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16. IRIG PREALIGNED ASSY NASA DRAWING NO. 2021500-031, 041, 051, 061, 071, 111 MAY BE USED INTERCHANGEABLY.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-051 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
   - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
   - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE.

   CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-031, -051, -071, -111 MAY BE USED INTERCHANGEABLY.
24. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-081 AND -101 MAY BE USED INTERCHANGEABLY.


E
E
(3)
(22) SEE NOTE 22 12 PLACES
(15) (20)
A
A
(31)
.166
.169 DIA THRU
DO NOT REMOVE BURRS & SHARP EDGES FROM THESE HOLES
(2)
(41)
(54)
(60)
(62) (63) (64)
E11 REF
SEE NOTE 12 2 PLACES
(5)
(21) SEE NOTE 30 AND 21 8 PLACES
(8)
(26) SEE NOTE 30 AND 22 2 PLACES
X
SEE NOTE 12 4 PLACES
(6)
(22) SEE NOTE 22 12 PLACES
(19) (20)
E12 REF
E10 REF
(1)
Z

DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154
2018601-131	2018615	PS2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS2016152
2018601-161	2021398	PS2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

CABLE CLAMP (29)

PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

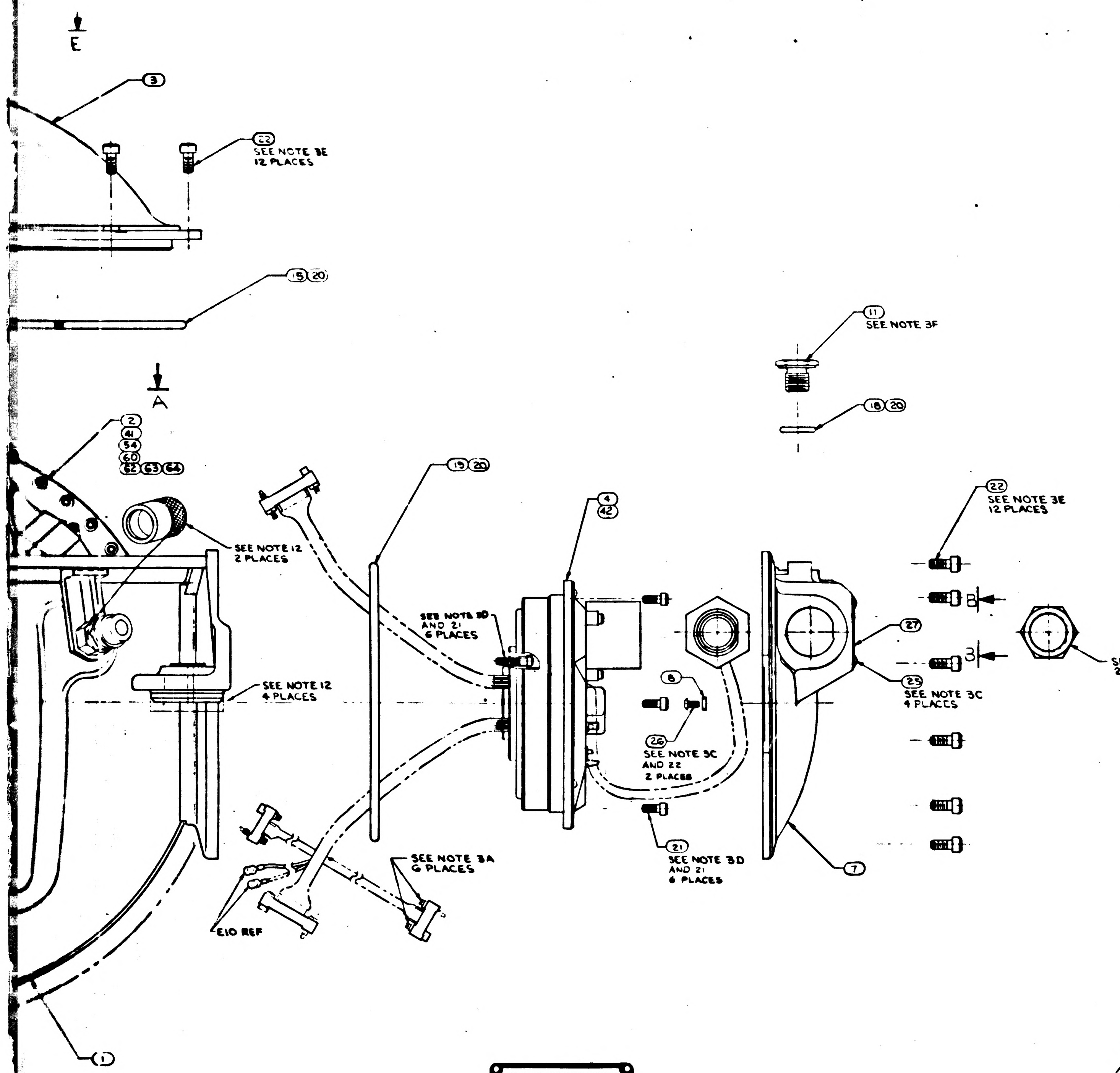
TABLE II

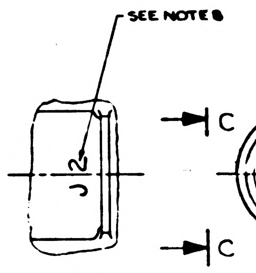
SCREW SELECTION CHART (32)

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

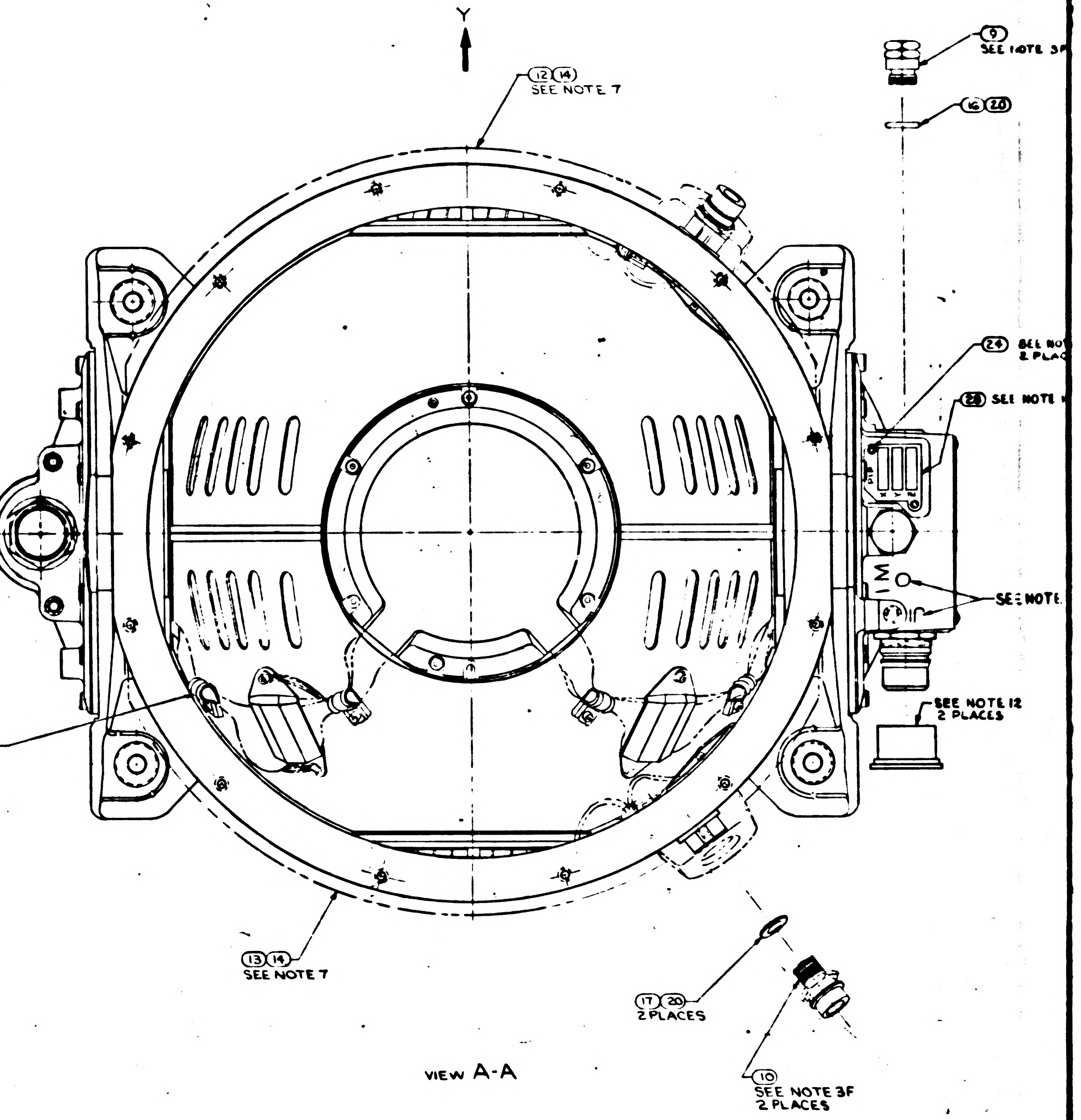
2018601 BF 1 OF 1

1/2018601

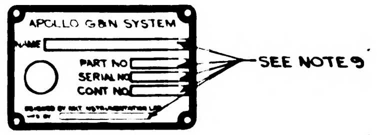

E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
2
41
54
60
62 63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
SEE NOTE 3D
AND 21
6 PLACES
4
42
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
1
11
SEE NOTE 3F
18 20
22
SEE NOTE 3E
12 PLACES
B
B
27
25
SEE NOTE 3C
4 PLACES
7
SEE NOTE 3G
2 PLACES


SEE NOTE 8
J2
C
C

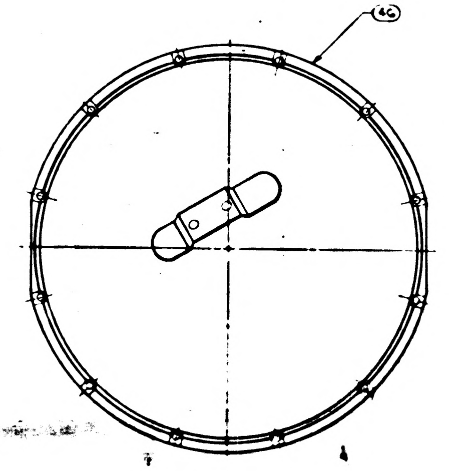
VIEW C-C


Y
12 14
SEE NOTE 7
9
SEE NOTE 3F
16 20
24 SEE NOTE
2 PLACES
28 SEE NOTE
SEE NOTE
SEE NOTE 12
2 PLACES
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES

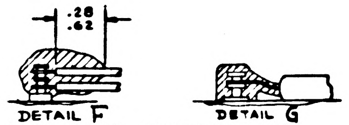
VIEW A-A


APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9

VIEW B-B

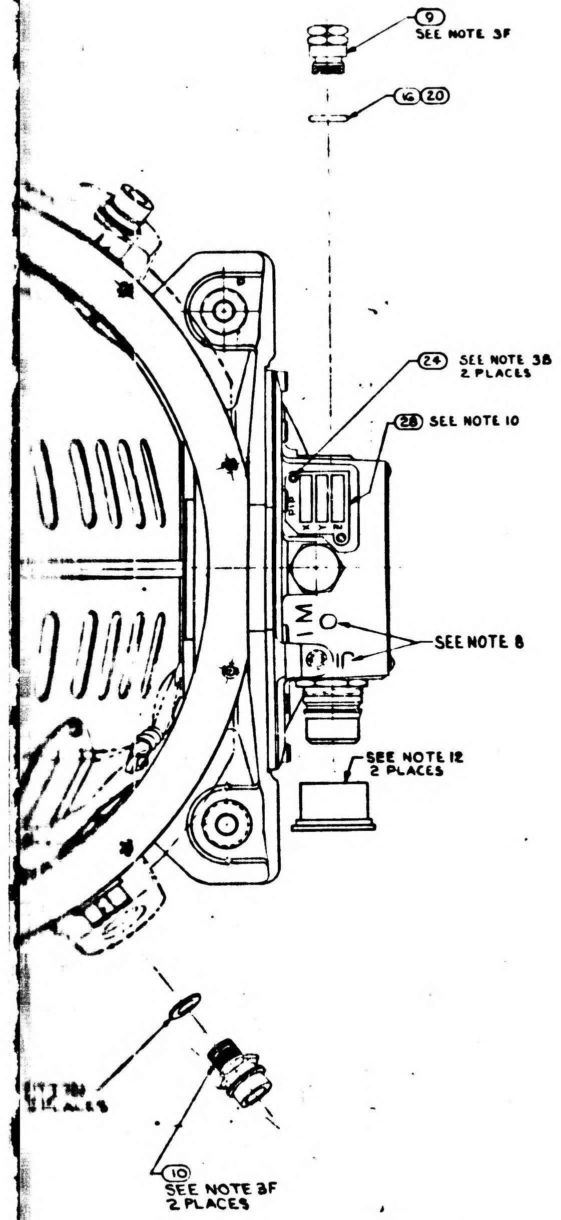


VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211, 231, 251 CONFIGURATION



DETAIL F DETAIL G
(-071 AND ON CONFIGURATION)

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	
	BF	REVISED PER TDRR 35745			



-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO	CODE IDENT NO	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66		2021500-111	IRIG PREALIGNED ASSY	
-	-	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65		2021500	IRIG PREALIGNED ASSY	15,24
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
-	-	-	-	-	-	-	3	3	-	-	3	3	-	-	-	-	-	-	-	-	-	61		2021500-071	IRIG PREALIGNED ASSY	15
-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	57		1008822-1	COLORANT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
-	-	-	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	3	51		2021500	IRIG PREALIGNED ASSY	15,16
-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3	3	-	-	-	50		2021500	IRIG PREALIGNED ASSY	15,19
-	-	-	-	-	3	-	-	-	3	-	-	-	3	-	-	-	-	-	-	3	-	49		2021500	IRIG PREALIGNED ASSY	15,23
-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	-	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT, AND MID, GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT, BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
-	-	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN, T.M. OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED

LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

G007001	G015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN DTB DATE 3/5/65
CHECKED G QUINN 3/1/65
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

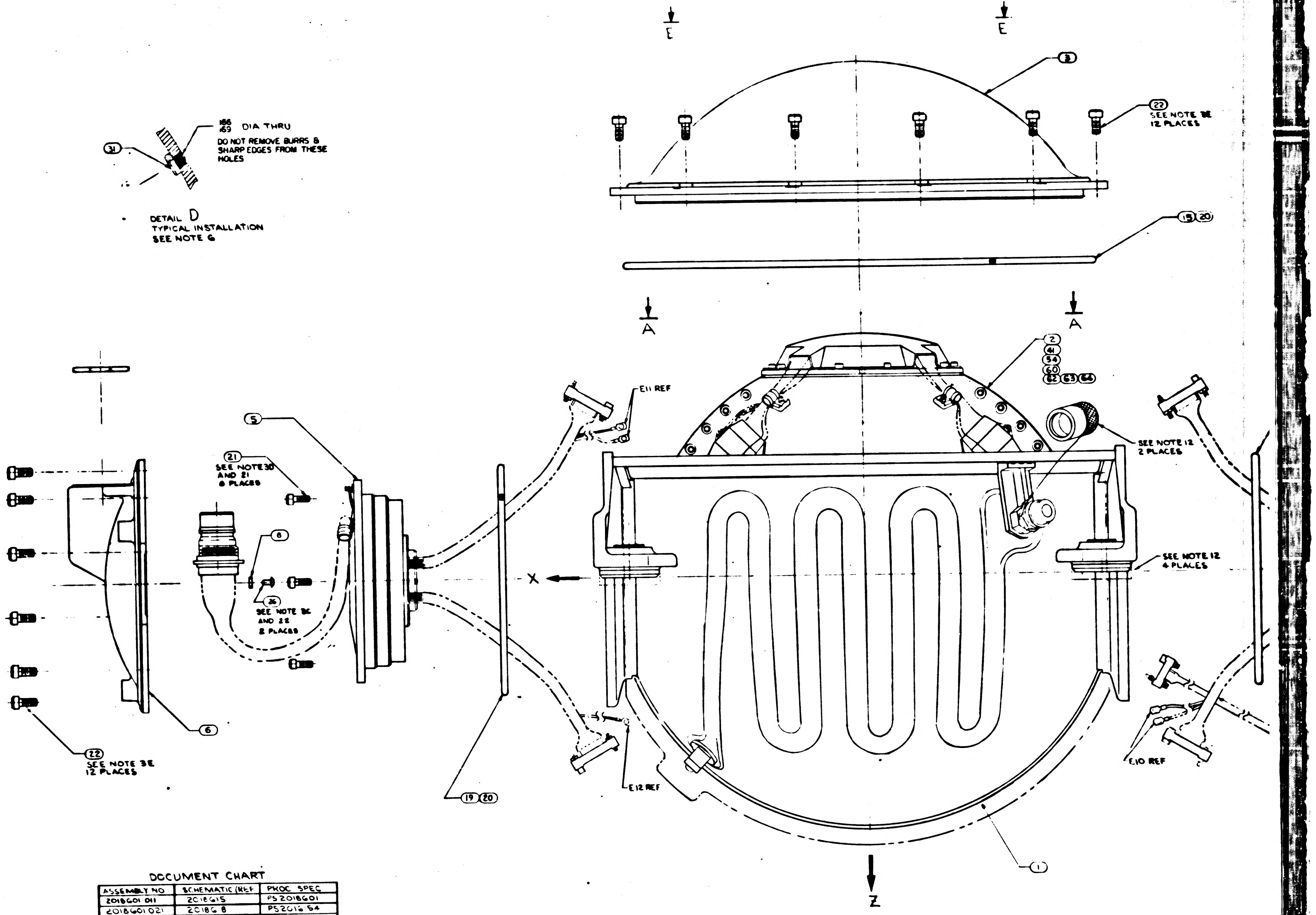
INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO 80230
SIZE J3
NASA DRAWING NO 2018601
SCALE 1/1
WT
SHEET 1 OF 1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 5.0 IN.-LB
   - D. 10.0 IN.-LB
   - E. 30.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16. IRIG PREALIGNED ASSY NASA DRAWING NO. 2021500-031, 041, 051, 061, 071, 111 MAY BE USED INTERCHANGEABLY.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-051 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
    - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE.

    CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-031, -051, -071, -111 MAY BE USED INTERCHANGEABLY.
24. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-081 AND -101 MAY BE USED INTERCHANGEABLY.



DOCUMENT CHART

ASSEMBLY NO	SCHEMATIC (REF	PROC SPEC
2018601 011	2018615	PS 2018601
2018601 021	2018618	PS 2016154
2018601 031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601 051	2018618	PS 2016152
2018601-061	2018618	PS 2016154
2018601-071	2018618	PS 2016152
2018601-081	2018618	PS 2016154
2018601-111	2018618	PS 2016152
2018601-121	2018618	PS 2016154
2018601-131	2018615	PS 2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS 2016152
2018601-161	2021398	PS 2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

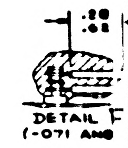
CABLE CLAMP (29)

PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

TABLE II

SCREW SELECTION CHART (32)

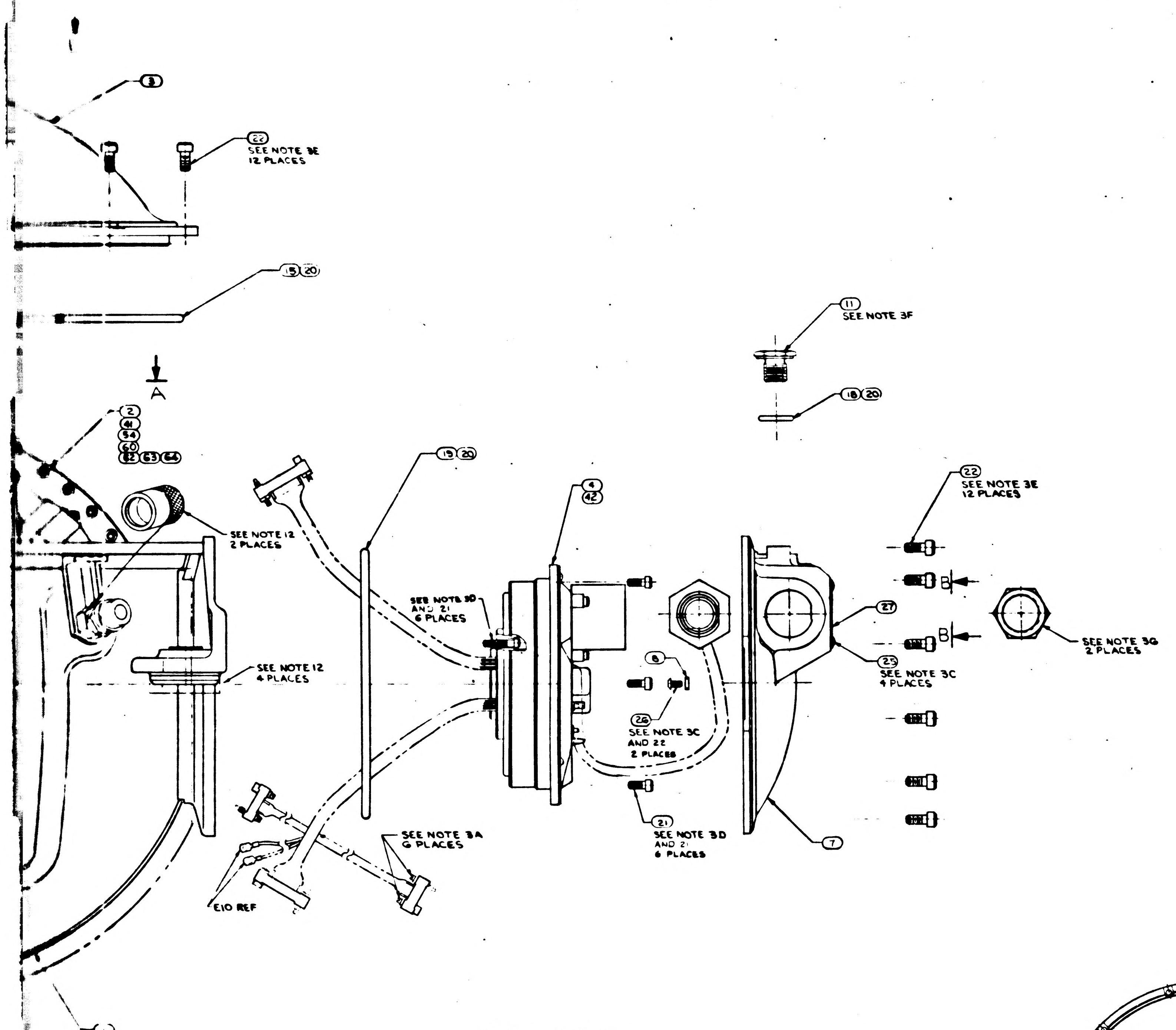
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

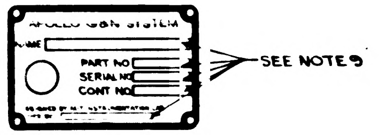


DETAIL F
(-071 AND

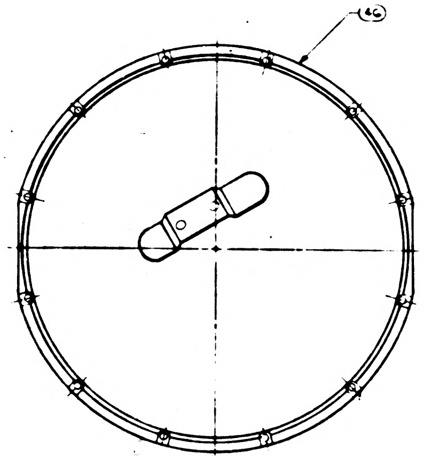
2018601 | B G | 1 OF 1

172018601

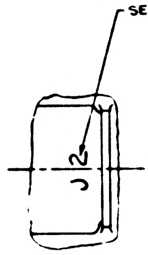

8
22
SEE NOTE 3E
12 PLACES
15 20
A
2
41
54
60
62 63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
SEE NOTE 3D
AND 21
6 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
4
42
11
SEE NOTE 3F
18 20
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
27
25
SEE NOTE 3C
4 PLACES
7
22
SEE NOTE 3E
12 PLACES
B
B
SEE NOTE 3G
2 PLACES


APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9

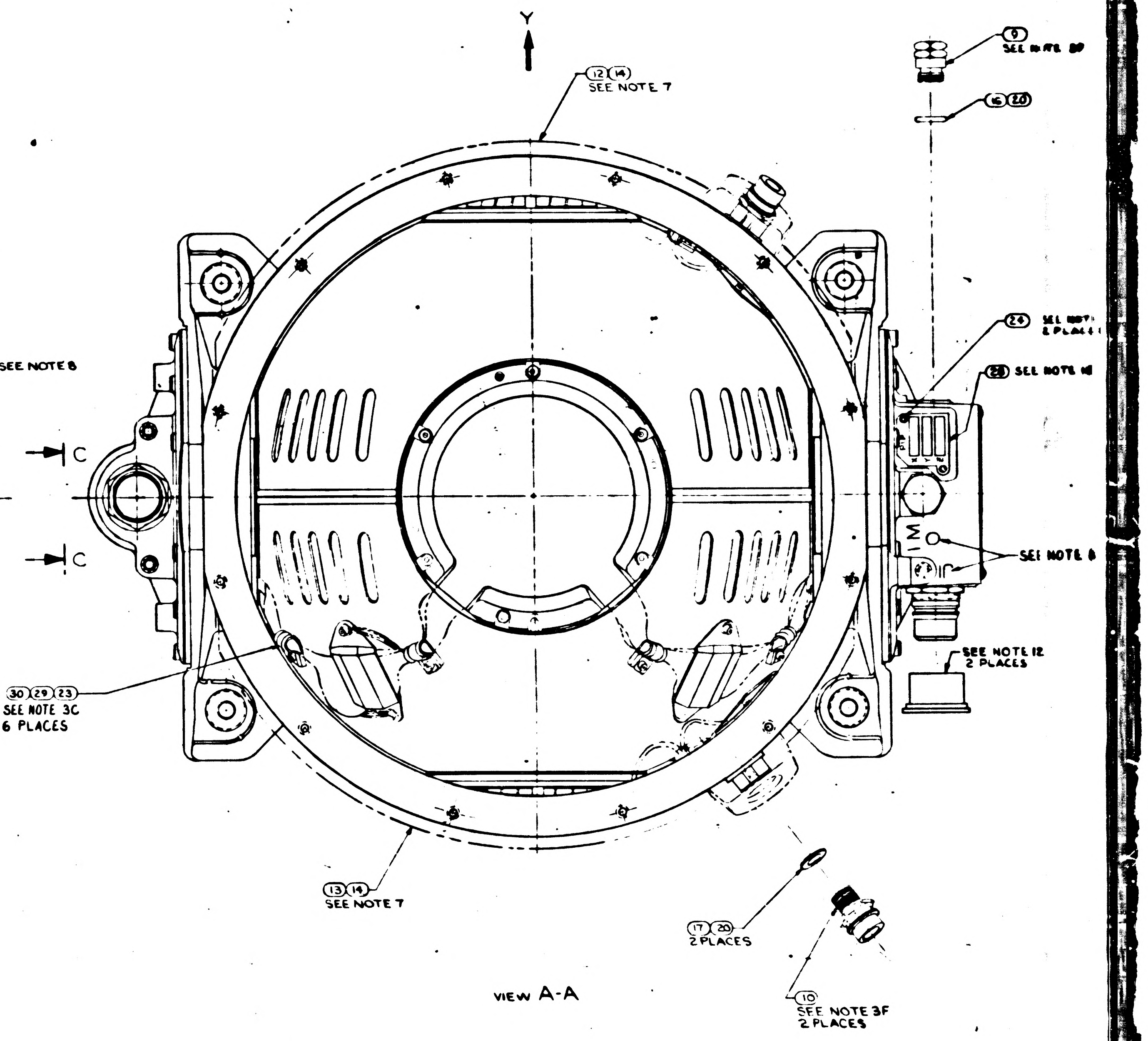
VIEW B-B



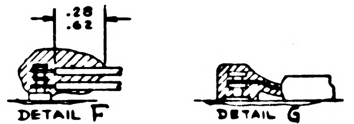
VIEW E-E
SCALE 1/2
FOR 031, 05, 071, 111, 151, 171, 191, 211, 221, 231 CONFIGURATION


SEE NOTE 8
J2

VIEW C-C

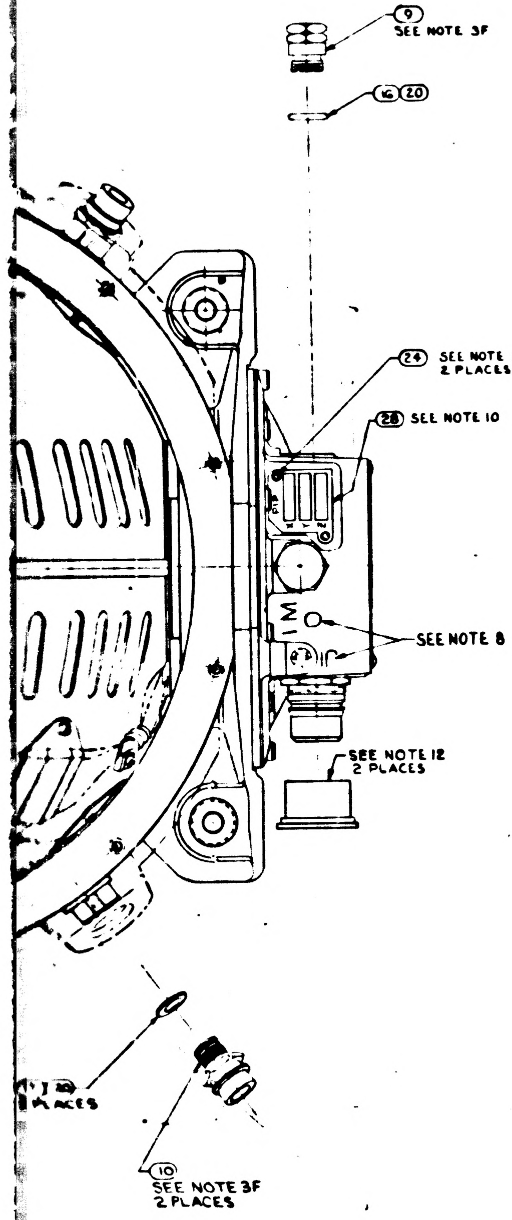

Y
12 14
SEE NOTE 7
9
SEE NOTE 3F
16 20
24
SEE NOTE
2 PLACES
28
SEE NOTE 12
C
C
I M
SEE NOTE 8
SEE NOTE 12
2 PLACES
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES

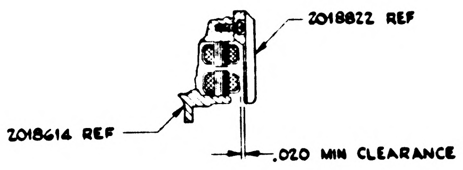
VIEW A-A



DETAIL F DETAIL G
(-071 AND ON CONFIGURATION)

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
REVISIONS					
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	
	BF	REVISED PER TDRR 35745			
	BG	REVISED PER TDRR 35750			





DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO	CODE IDENT NO	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66		2021500-111	IRIG PREALIGNED ASSY	
-	-	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65		2021500	IRIG PREALIGNED ASSY	15,24
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
-	-	-	-	-	-	-	3	3	-	-	3	3	-	-	-	-	-	-	-	-	-	61		2021500-071	IRIG PREALIGNED ASSY	15
-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	57		1008822-1	COLORANT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
-	-	-	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	3	51		2021500	IRIG PREALIGNED ASSY	15,16
-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3	3	-	-	-	50		2021500	IRIG PREALIGNED ASSY	15,19
-	-	-	-	-	3	-	-	-	3	-	-	-	3	-	-	-	-	-	-	3	-	49		2021500	IRIG PREALIGNED ASSY	15,23
-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	-	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT, AND MID, GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT, BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
-	-	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN, T.M. OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		2018738-011	CASE CENTER, MACHINING ASSY	
QUANTITY REQUIRED																						LIST OF PARTS AND MATERIALS				

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN DTB DATE 3/5/65
CHECKED G QUINN /65
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

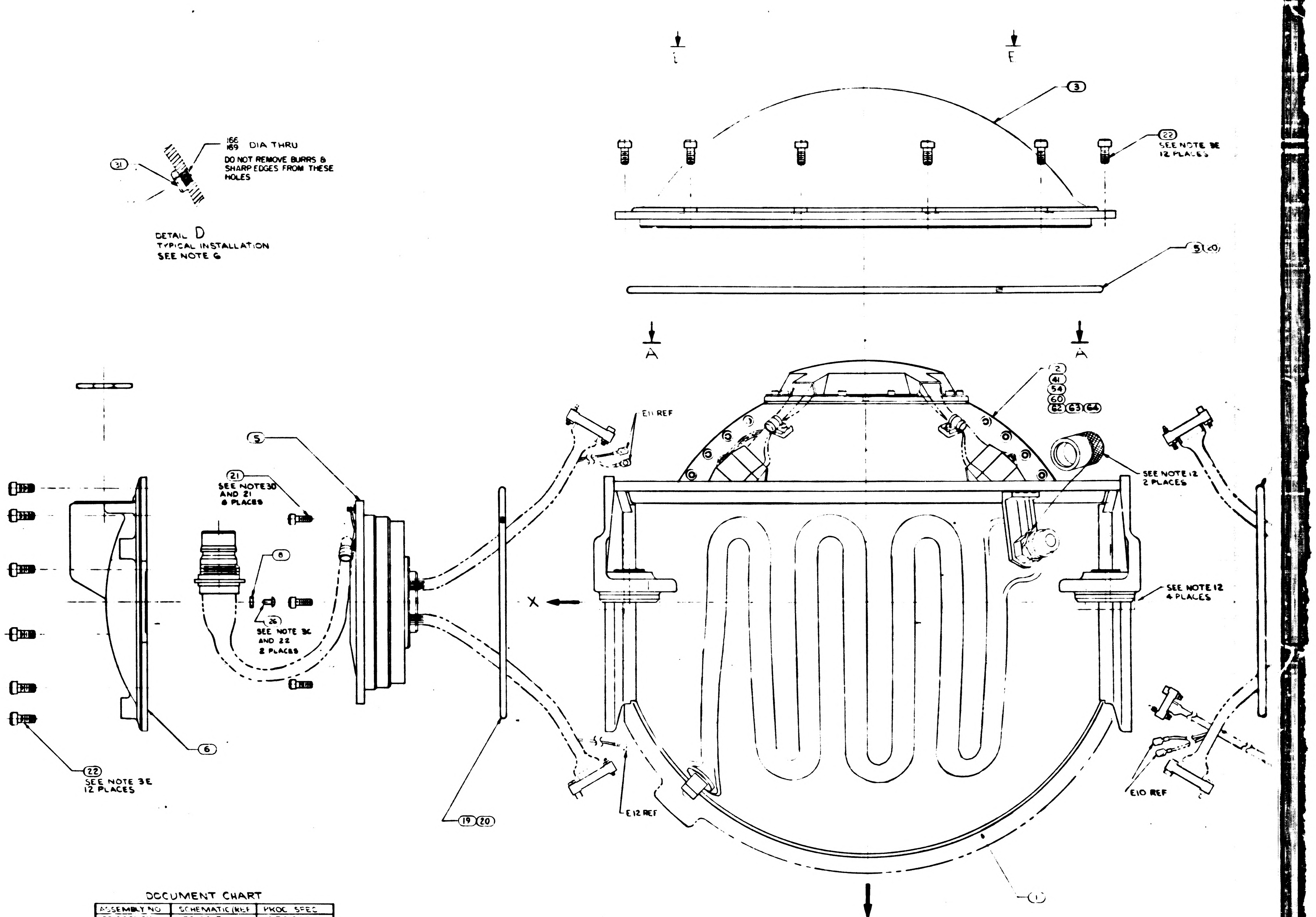
CODE IDENT NO 80230
SIZE J3
NASA DRAWING NO 2018601
SCALE 1/1
SHEET 1 OF 1

2018601 BG

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 5.0 IN.-LB
   - D. 10.0 IN.-LB
   - E. 30.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM 29 TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16. IRIG PREALIGNED ASSY NASA DRAWING NO. 2021500-031, 041, 051, 061, 071, 111 MAY BE USED INTERCHANGEABLY.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-051 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
   - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
   - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE.

   CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-031, -051, -071, -111 MAY BE USED INTERCHANGEABLY.
24. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-081 AND -101 MAY BE USED INTERCHANGEABLY. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-111 MAY BE USED IN PLACE OF 2021500-081 AND 2021500-101. WHEN ALL THREE IRIGS ARE 2021500-111, THE IMU PART NUMBER WILL BE CHANGED AS APPLICABLE.


(31)
.166/.169 DIA THRU
DO NOT REMOVE BURRS & SHARP EDGES FROM THESE HOLES
E
E
(3)
(22) SEE NOTE 3E 12 PLACES
(5) (20)
A
A
(2) (41) (54) (60) (62) (63) (64)
E11 REF
SEE NOTE 12 2 PLACES
SEE NOTE 12 4 PLACES
(5)
(21) SEE NOTE 3D AND 21 6 PLACES
(8)
(26) SEE NOTE 3C AND 22 2 PLACES
X
(6)
(22) SEE NOTE 3E 12 PLACES
(19) (20)
E12 REF
E10 REF
(1)
Z

DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

DOCUMENT CHART

ASSEMBLY NO	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS2018601
2018601-041	2018618	PS2016152
2018601-051	2018618	PS2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154
2018601-131	2018615	PS2018601
2018601-141	2018618	PS2016154
2018601-151	2021398	PS2016152
2018601-161	2021398	PS2016154
2018601-171	2021402	PS2018601
2018601-181	2021398	PS2016154
2018601-191	2021398	PS2016152
2018601-201	2021398	PS2016154
2018601-211	2018618	PS2016152
2018601-221	2021398	PS2016152
2018601-231	2021398	PS2016154

TABLE I

CABLE CLAMP (29)

PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

TABLE II

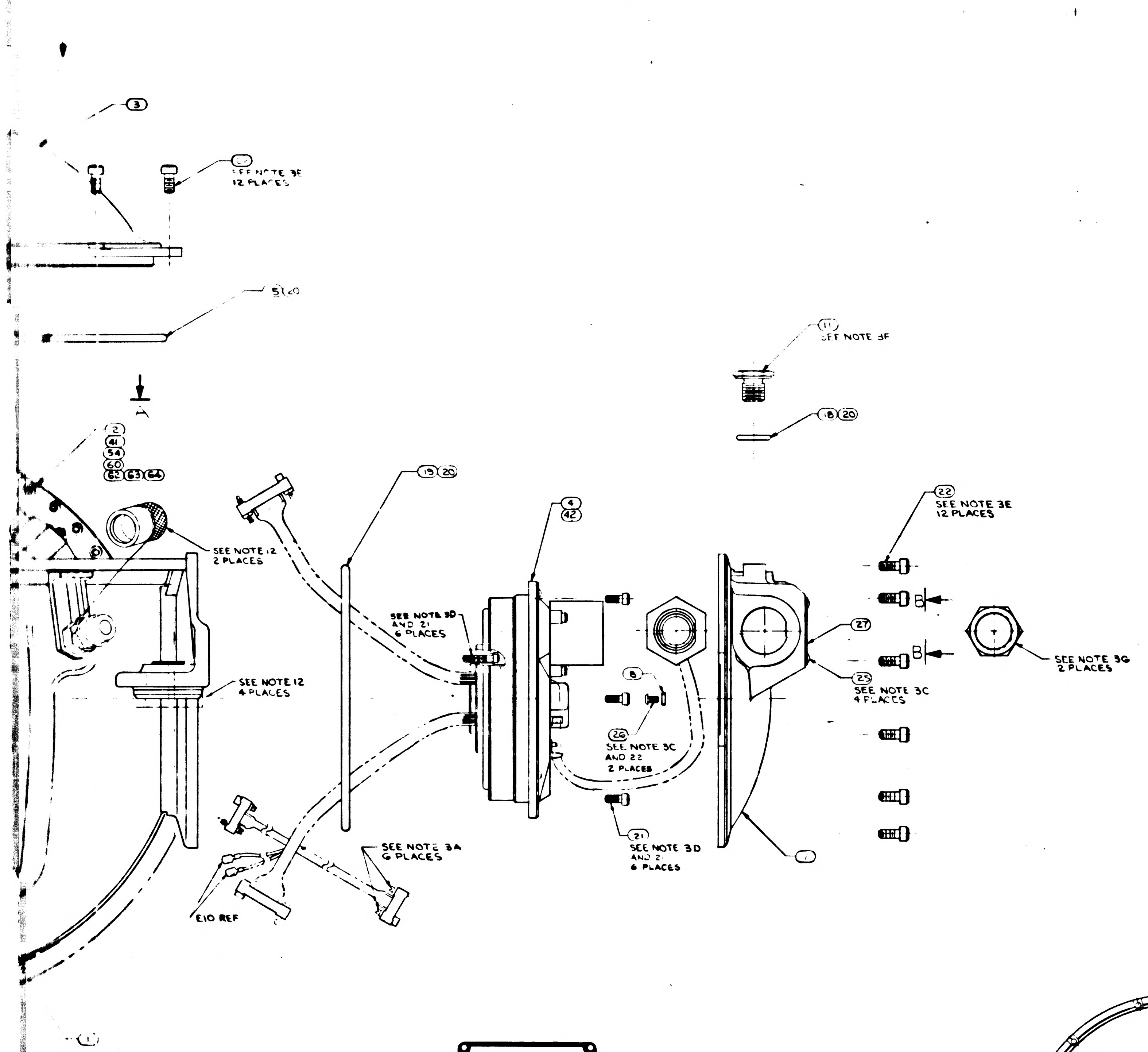
SCREW SELECTION CHART (32)

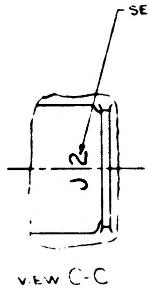
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

DETAIL
(-071 AND

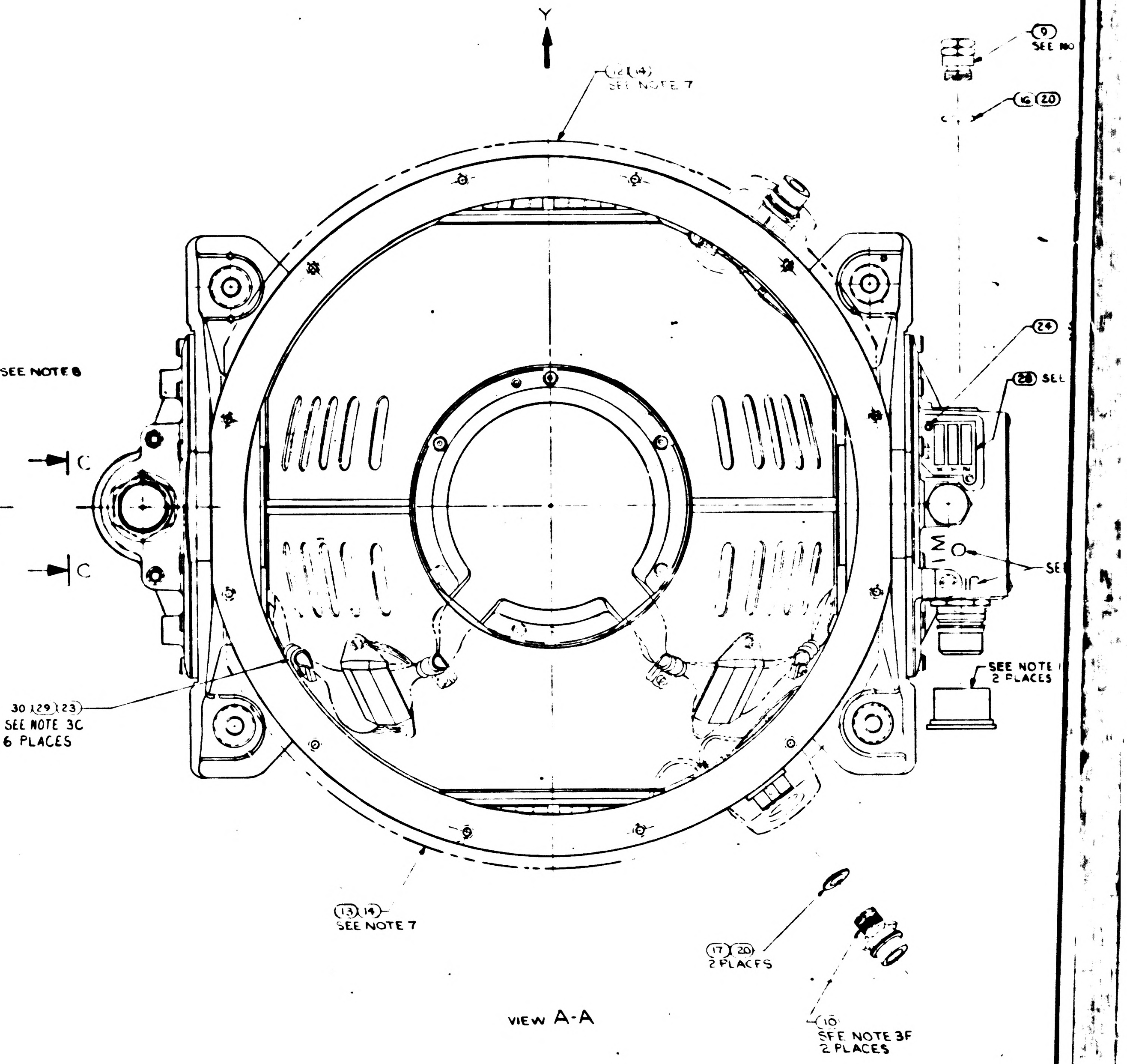
2018601 | B4 | 1 OF 1

1/2018601

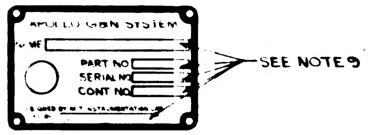

3
SEE NOTE 3E
12 PLACES
51(20)
A
2
41
54
60
62 63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
4
42
SEE NOTE 3D
AND 21
6 PLACES
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 2
6 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
11
SEE NOTE 3F
18 20
22
SEE NOTE 3E
12 PLACES
27
25
SEE NOTE 3C
4 PLACES
B
B
SEE NOTE 3G
2 PLACES
1
1


SEE NOTE 8
J2

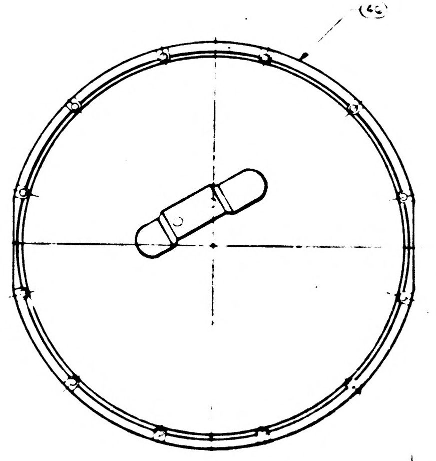
VIEW C-C


Y
12 14
SEE NOTE 7
9
SEE NO
16 20
24
28
SEE
J1
M
SEE
SEE NOTE 1
2 PLACES
C
C
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES

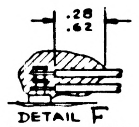
VIEW A-A


APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9

VIEW B-B



VIEW E-E
SCALE 1/2
FOR 031 05, 071, 111, 151, 171 191, 211 231, 251 CONFIGURATION



DETAIL F

DETAIL G

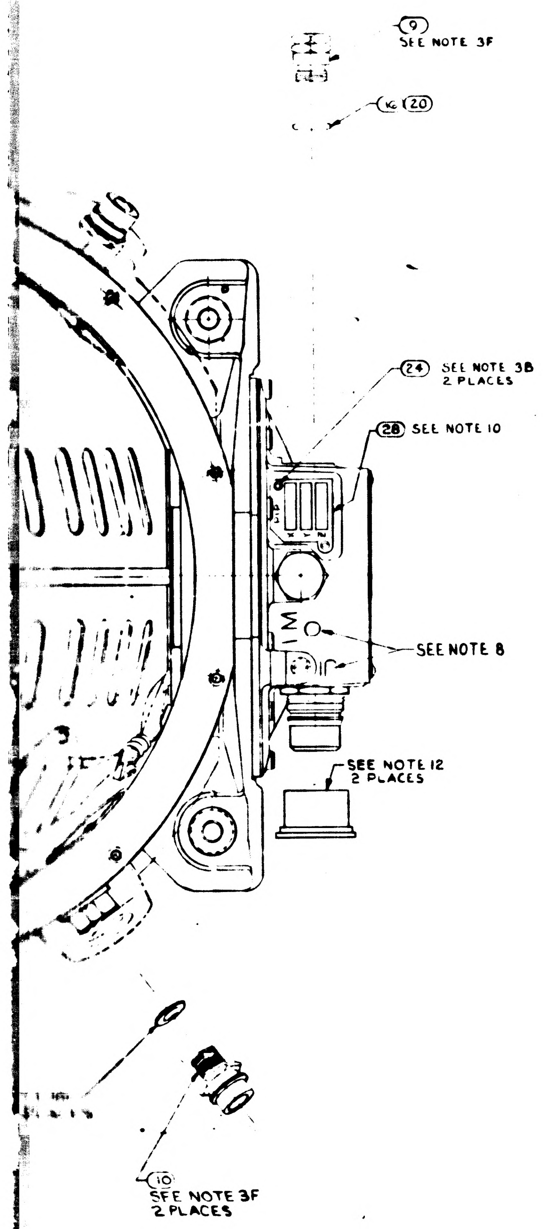
(-071 AND ON CONFIGURATION)

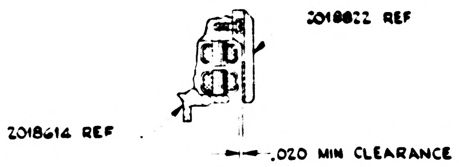
BH

2018601 BH

2/2018601

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG NO	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	TJC
	BF	REVISED PER TDRR 35745		25 MAR 68	
	BG	REVISED PER TDRR 35750			
	BH	REVISED PER TDRR 35751		16 APR 68	JJJ ESP





DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO	CODE IDENT NO	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
3	3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66		2021500-111	IRIG PREALIGNED ASSY	
		3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65		2021500	IRIG PREALIGNED ASSY	15,24
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
-	-	-	-	-	-	-	3	3	-	-	3	3	-	-	-	-	-	-	-	-	-	61		2021500-071	IRIG PREALIGNED ASSY	15
-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	57		1008822-1	COLORANT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
-	-	-	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	3	51		2021500	IRIG PREALIGNED ASSY	15,16
-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3	3	-	-	-	50		2021500	IRIG PREALIGNED ASSY	15,19
-	-	-	-	-	3	-	-	-	3	-	-	-	3	-	-	-	-	-	-	3	-	49		2021500	IRIG PREALIGNED ASSY	15,23
-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	-	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT. AND MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT, BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
-	-	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN, T.M. OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED — LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN DTB DATE 3/5/65
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO 80230
SIZE J3
NASA DRAWING NO 2018601
SCALE 1/1
WT
SHEET 1 OF 1

2018601

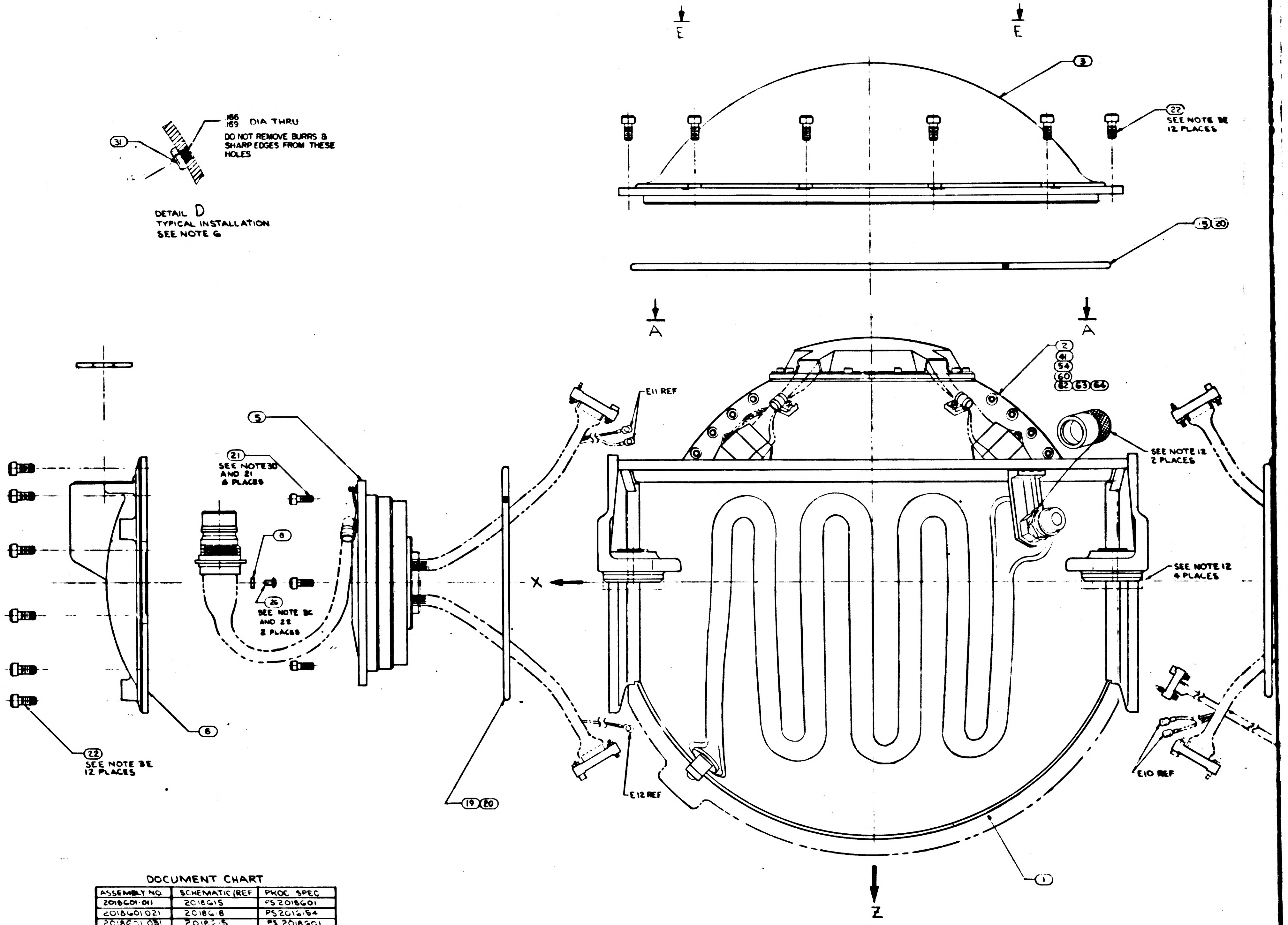
BH

3/2018601

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 6.5 IN.-LB
   - D. 13.0 IN.-LB
   - E. 35.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭ ADJOINING SURFACES OF ITEMS ⑫ AND ⑬ TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS ⑩ , ⑰ AND ⑳ ARE ASSEMBLIED TO CASE, ITEM ①
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16. IRIG PREALIGNED ASSY NASA DRAWING NO. 2021500-031. 041, 051, 061, 071, 111 MAY BE USED INTERCHANGEABLY.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-051 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55) , (56) , (57) , (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
   - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
   - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE.

   CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-031, -051, -071, -111 MAY BE USED INTERCHANGEABLY.
24. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-081 AND -101 MAY BE USED INTERCHANGEABLY. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-111 MAY BE USED IN PLACE OF 2021500-081 AND 2021500-101. WHEN ALL THREE IRIGS ARE 2021500-111, THE IMU PART NUMBER WILL BE CHANGED AS APPLICABLE.



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154
2018601-071	2018618	PS 2016152
2018601-081	2018618	PS 2016154
2018601-111	2018618	PS 2016152
2018601-121	2018618	PS 2016154
2018601-131	2018615	PS 2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS 2016152
2018601-161	2021398	PS 2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

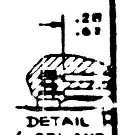
CABLE CLAMP ㉙

PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

TABLE II

SCREW SELECTION CHART ㉜

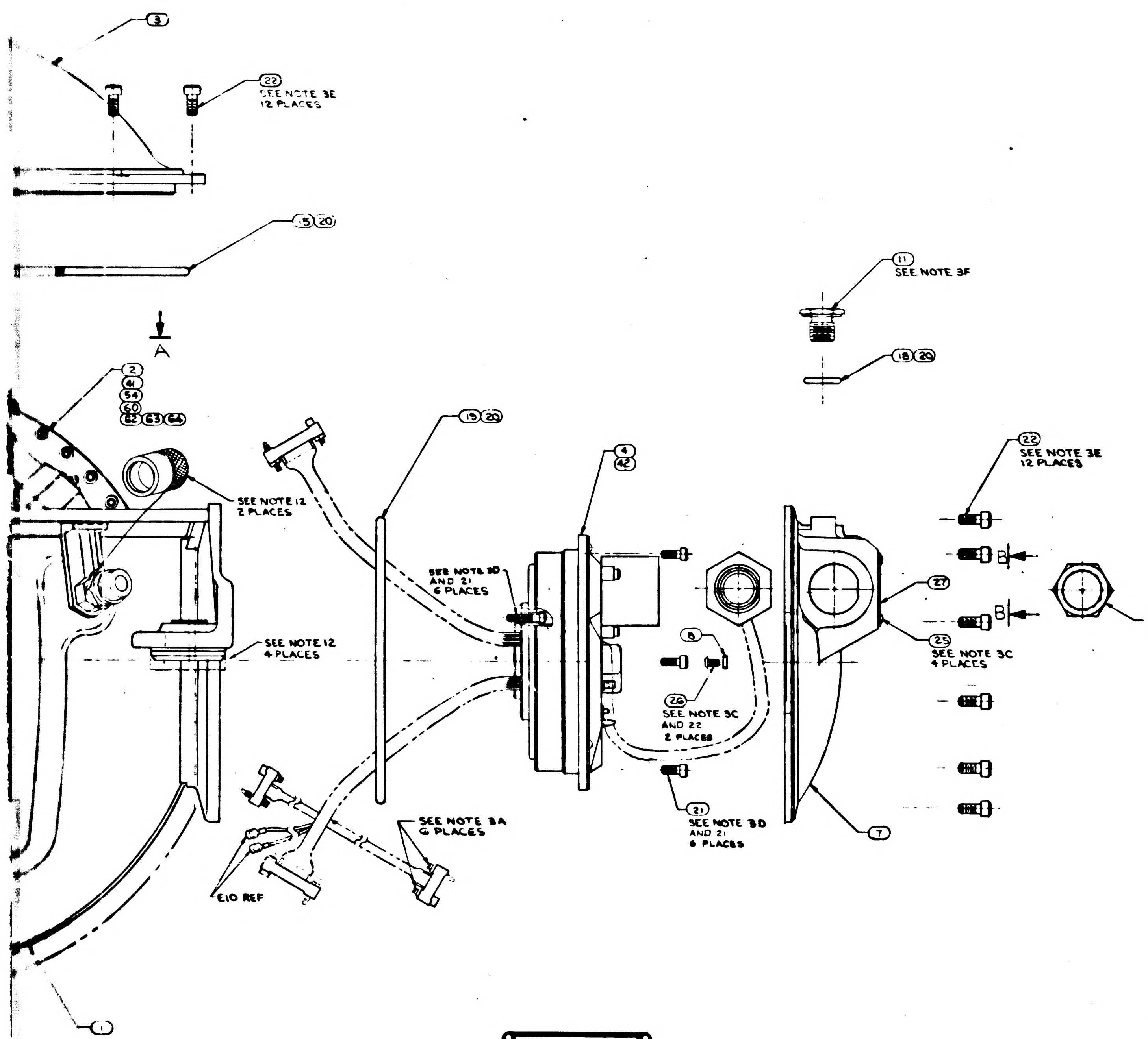
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011623-11	

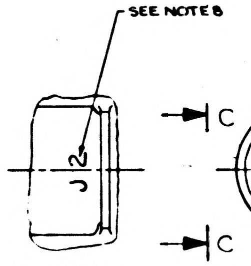


DETAIL
(-071 AND

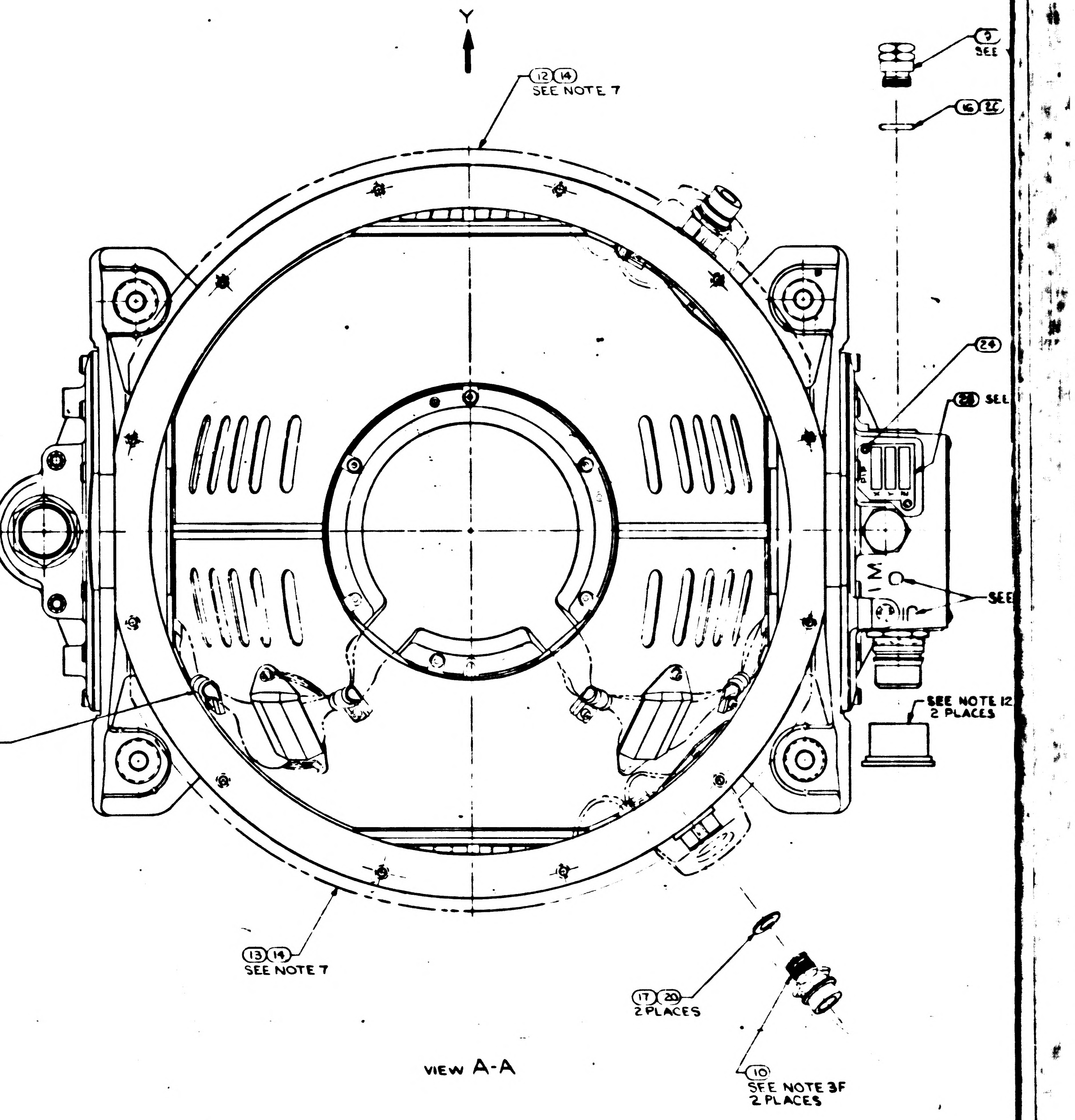
2018601 B

1/2018601

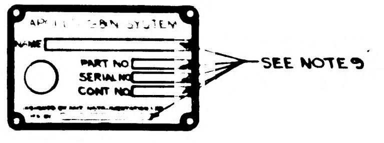

3
22
SEE NOTE 3E
12 PLACES
15 20
A
2
41
54
60
62 63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
SEE NOTE 3D
AND 21
6 PLACES
4
42
11
SEE NOTE 3F
18 20
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
27
25
SEE NOTE 3C
4 PLACES
7
22
SEE NOTE 3E
12 PLACES
B
B
SEE NOTE 3G
2 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
1


SEE NOTE 8
J2
C
C

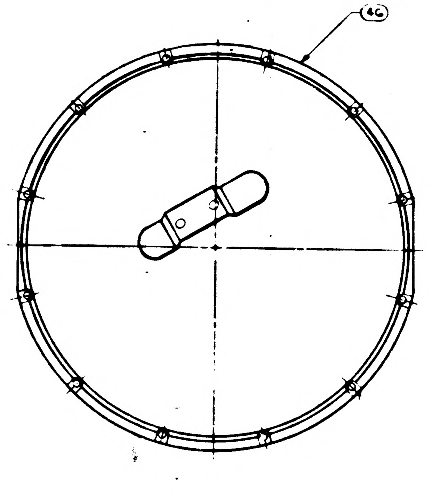
VIEW C-C


Y
12 14
SEE NOTE 7
9
SEE
16 20
24
28 SEE
J1
SEE
SEE NOTE 12
2 PLACES
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES

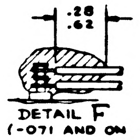
VIEW A-A


APOLLO ... SYSTEM
PART NO
SERIAL NO
CONT NO
SEE NOTE 9

VIEW B-B



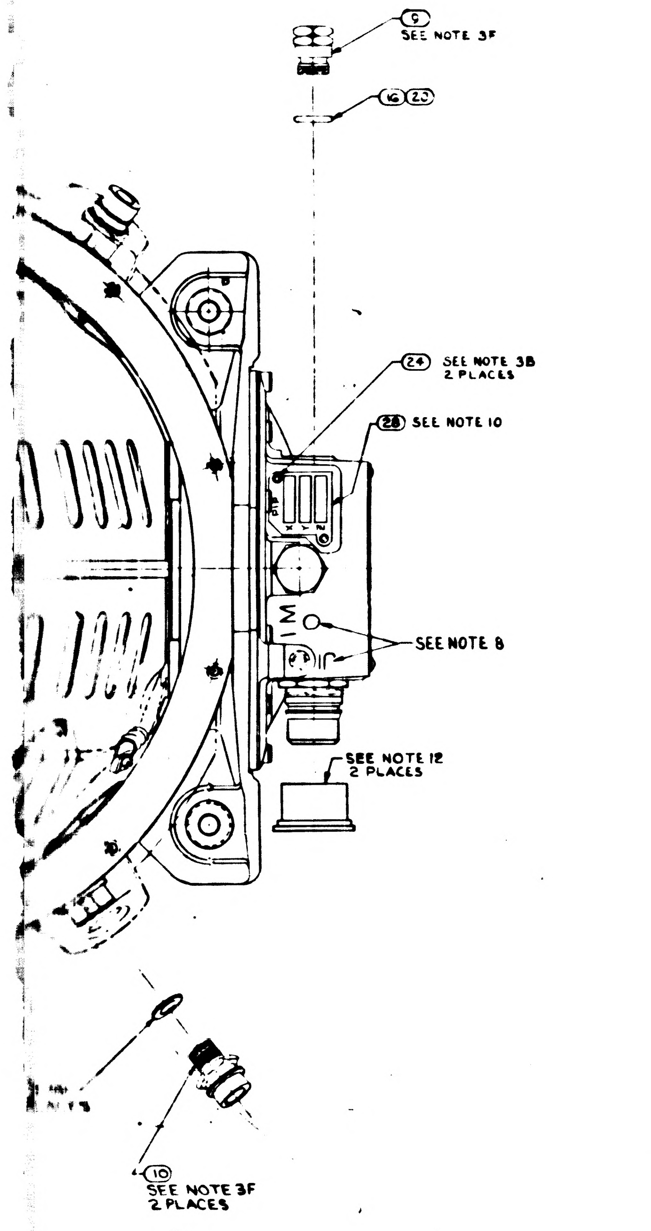
VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 131, 171, 191, 211, 221, 231 CONFIGURATION

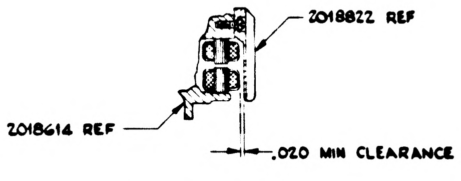


DETAIL F
(-071 AND ON CONFIGURATION)

DETAIL G

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	TJC
	BF	REVISED PER TDRR 35745			
	BG	REVISED PER TDRR 35750			
	BH	REVISED PER TDRR 35751		15 APR 68	
	BJ	REVISED PER TDRR36003		15 APR 68	





DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66		2021500-111	IRIG PREALIGNED ASSY	
	-	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65		2021500	IRIG PREALIGNED ASSY	15,24
-	-	-	-	-	1	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
-	-	-	-	-	-	-	3	3	-	-	3	3	-	-	-	-	-	-	-	-	-	61		2021500-071	IRIG PREALIGNED ASSY	15
-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM,DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	57		1008822-1	COLORANT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
-	-	-	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-	3	51		2021500	IRIG PREALIGNED ASSY	15,16
-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3	3	-	-	-	50		2021500	IRIG PREALIGNED ASSY	15,19
-	-	-	-	-	3	-	-	-	3	-	-	-	3	-	-	-	-	-	-	3	-	49		2021500	IRIG PREALIGNED ASSY	15,23
-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	-	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT, AND MID, GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT,BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
-	-	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN, T.M, OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED

LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN DTB DATE 3/5/65
CHECKED G. D. [illegible] 65
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

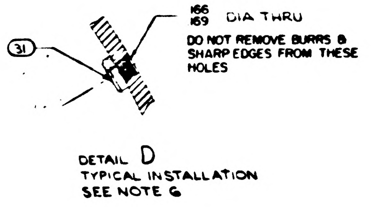
CODE IDENT NO 80230
SIZE J3
NASA DRAWING NO 2018601
SCALE 1/1
WT
SHEET 1 OF 1

372018601

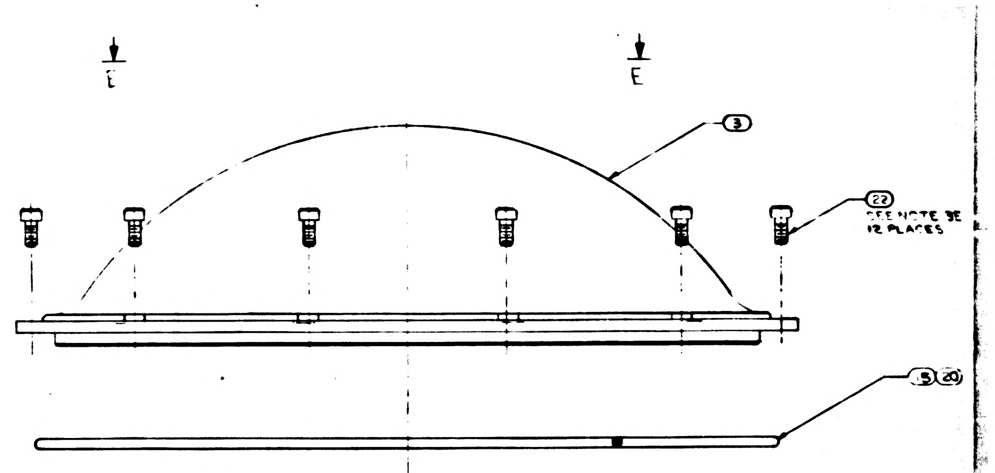
NOTES:

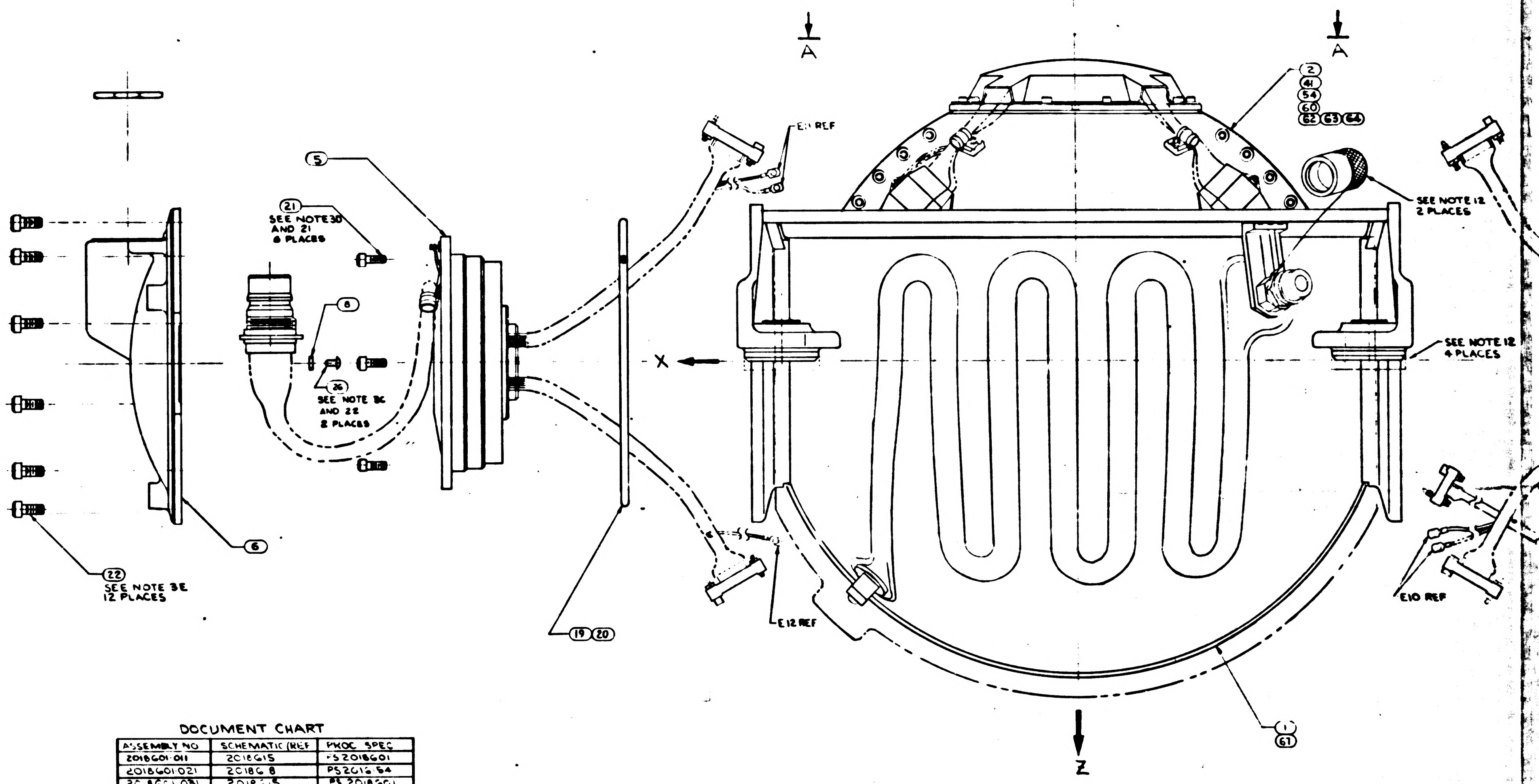
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 6.5 IN.-LB
   - D. 13.0 IN.-LB
   - E. 35.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM (1) OR (67)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16. IRIG PREALIGNED ASSY NASA DRAWING NO. 2021500-031. 041, 051, 061, 071, 111 MAY BE USED INTERCHANGEABLY.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19. IRIG PRE-ALIGNED ASSEMBLY NASA DRAWING NO. 2021500-051 OR 071 MAY BE USED INTERCHANGEABLY.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
   - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
   - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE.

   CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-031, -051, -071, -111 MAY BE USED INTERCHANGEABLY.
24. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-081 AND -101 MAY BE USED INTERCHANGEABLY. IRIG PREALIGNED ASSEMBLY NASA DRAWING NO. 2021500-111 MAY BE USED IN PLACE OF 2021500-081 AND 2021500-101. WHEN ALL THREE IRIGS ARE 2021500-111, THE IMU PART NUMBER WILL BE CHANGED AS APPLICABLE.



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6





DOCUMENT CHART

ASSEMBLY NO	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154
2018601-131	2018615	PS2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS2016152
2018601-161	2021398	PS2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

CABLE CLAMP (29)

PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

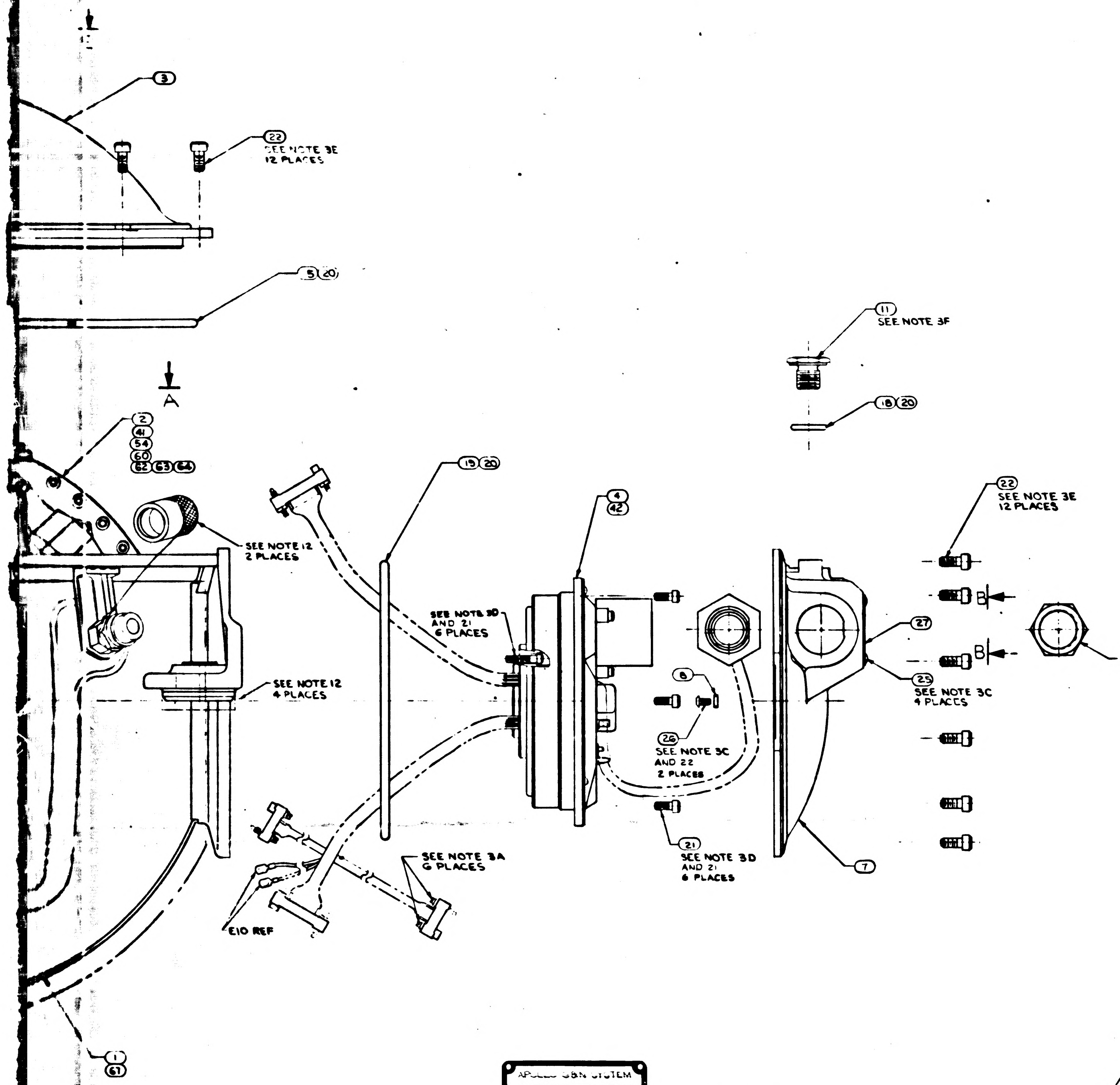
TABLE II

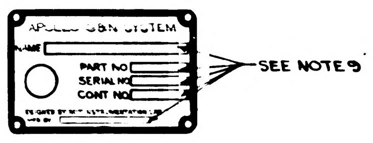
SCREW SELECTION CHART (32)

PART NO	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

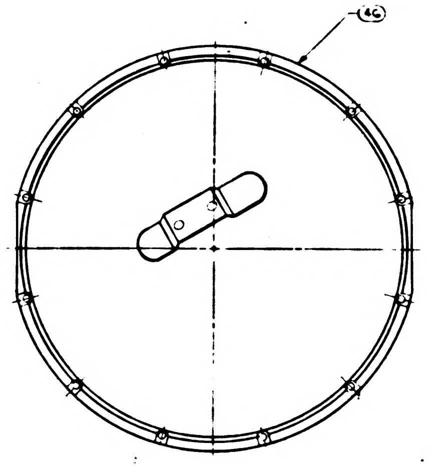
2018601 | BK | 1 OF 1

1 of 1/2018601

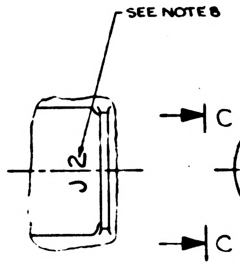

A
3
22
SEE NOTE 3E
12 PLACES
5 (20)
A
2
41
54
60
62 63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 (20)
SEE NOTE 3D
AND 21
6 PLACES
4
42
11
SEE NOTE 3F
18 (20)
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
27
25
SEE NOTE 3C
4 PLACES
7
22
SEE NOTE 3E
12 PLACES
B
B
SEE NOTE 3G
2 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
1
61


APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9

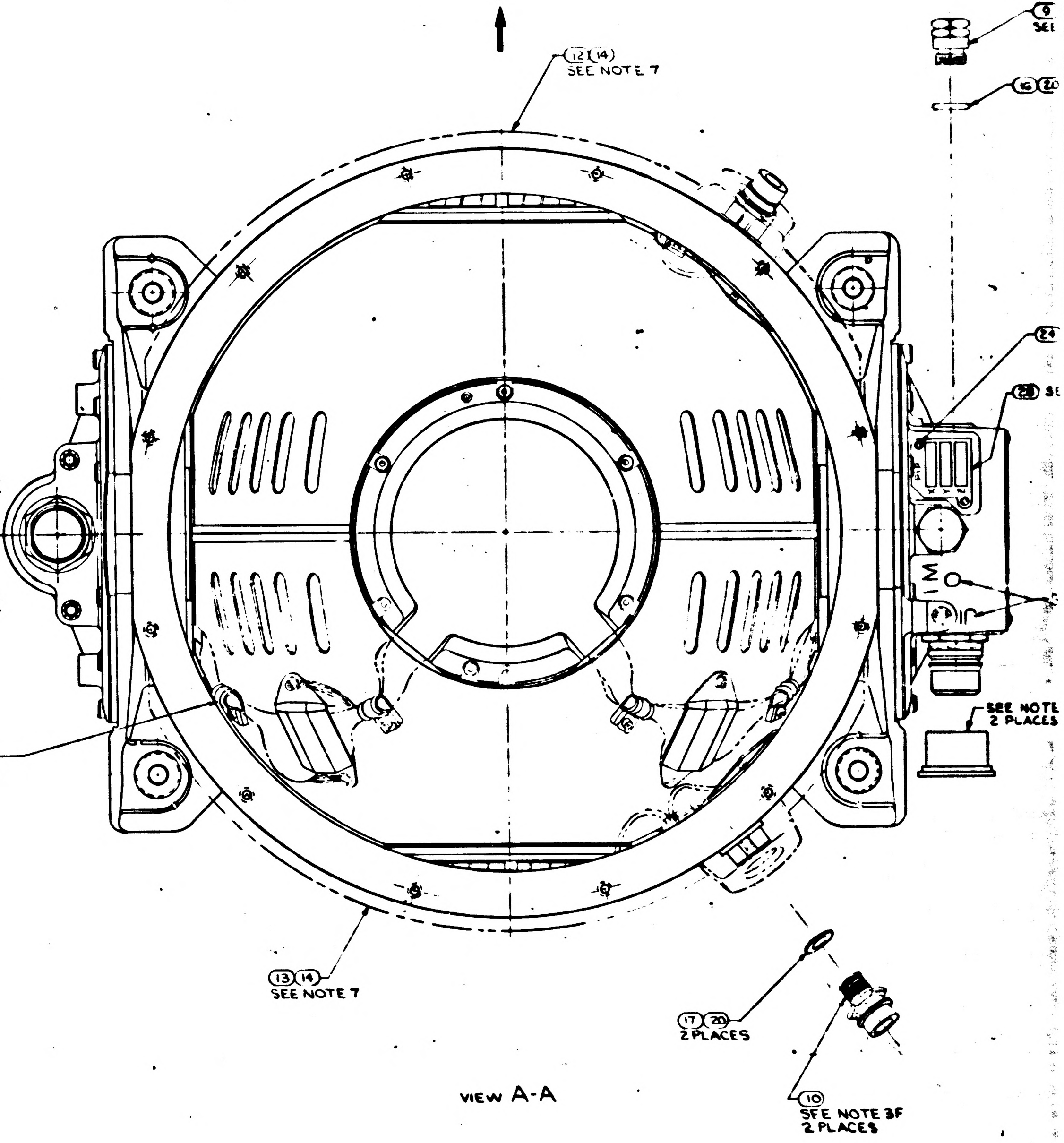
VIEW B-B



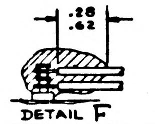
VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211, 221, CONFIGURATION


SEE NOTE 8
J2
C
C

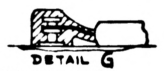
VIEW C-C


Y
12 (14)
SEE NOTE 7
9
16 (20)
24
28
M
SEE NOTE
2 PLACES
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 (20)
2 PLACES
10
SEE NOTE 3F
2 PLACES

VIEW A-A



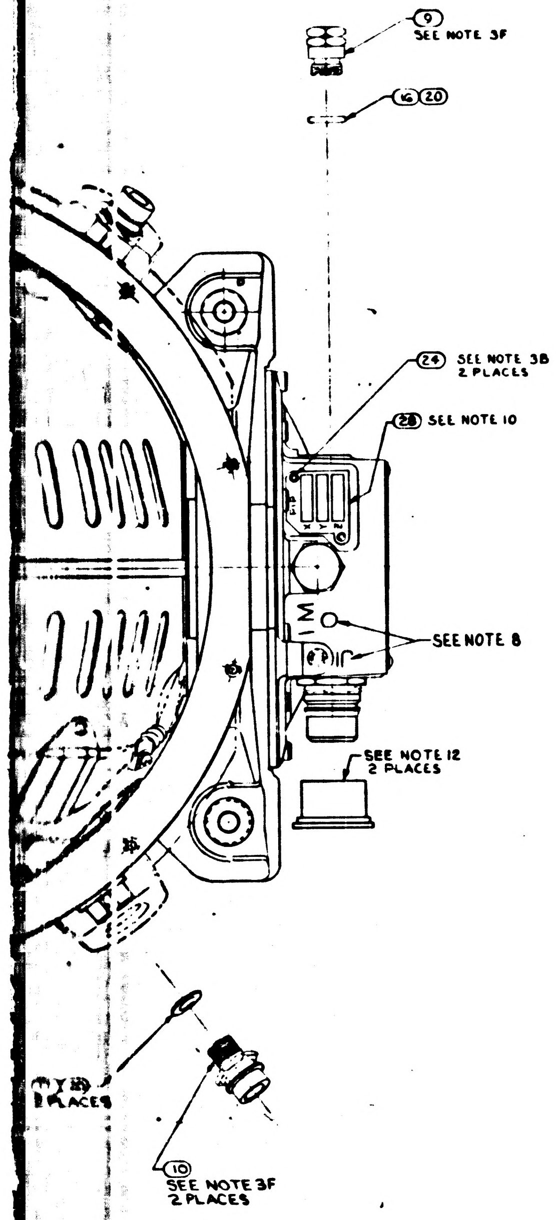
DETAIL F
(-071 AND ON CONFIGURATION)

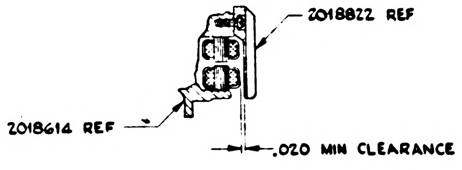


DETAIL G

REVISIONS

ZONE	LTR	DESCRIPTION	CHG NO	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	TJC
	BF	REVISED PER TDRR 35745		25 MAR	
	BG	REVISED PER TDRR 35750		[illegible]	
	BH	REVISED PER TDRR 35751		16 APR 68	JJJ
	BJ	REVISED PER TDRR 36003		18 APR 68	
	BK	REVISED PER TDRR 36472		25	





DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
1	–	–	1	–	1	–	1	–	1	–	1	–	1	1	–	1	–	–	–	1	–	67		2018738-021	CASE CENTER, MACHINING ASSY	
3	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	66		2021500-111	IRIG PREALIGNED ASSY	
	–	3	3	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	65		2021500	IRIG PREALIGNED ASSY	15,24
–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	64		2018602-061	OUTER AXIS ASSEMBLY	
	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	–	1	1	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	62		2018602-051	OUTER AXIS ASSEMBLY	
–	–	–	–	–	–	–	3	3	–	–	3	3	–	–	–	–	–	–	–	–	–	61		2021500-071	IRIG PREALIGNED ASSY	15
–	–	1	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	–	–	A/R	A/R	–	–	A/R	A/R	A/R	A/R	A/R	–	–	–	–	–	–	58		1006277	SILICA, PULVERIZED, PYROGENIC	
A/R	A/R	A/R	A/R	A/R	–	–	A/R	A/R	–	–	A/R	A/R	A/R	A/R	A/R	–	–	–	–	–	–	57		1008822-1	COLORANT	
A/R	A/R	A/R	A/R	A/R	–	–	A/R	A/R	–	–	A/R	A/R	A/R	A/R	A/R	–	–	–	–	–	–	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	–	–	A/R	A/R	–	–	A/R	A/R	A/R	A/R	A/R	–	–	–	–	–	–	55		1008821-1	EPOXY RESIN	
–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	–	–	–	–	–	–	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-006	SEALING COMPOUND SILICONE RUBBER	17
–	–	–	–	–	–	3	–	–	–	3	–	–	–	–	–	–	–	–	3	–	3	51		2021500	IRIG PREALIGNED ASSY	15,16
–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	3	3	3	3	–	–	–	50		2021500	IRIG PREALIGNED ASSY	15,19
–	–	–	–	–	3	–	–	–	3	–	–	–	3	–	–	–	–	–	–	3	–	49		2021500	IRIG PREALIGNED ASSY	15,23
–	3	3	–	3	–	3	–	3	–	3	–	3	–	–	3	–	3	3	3	–	–	48		2018844-021	CALIBRATED PIP ASSY	15
3	–	–	3	–	3	–	3	–	3	–	3	–	3	3	–	3	–	–	–	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
–	1	1	–	1	–	1	–	1	–	1	–	1	–	–	1	–	1	–	1	–	–	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	–	1	1	1	–	1	1	1	1	1	1	1	1	–	1	–	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2013834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	–	1	1	1	–	1	1	1	1	1	1	1	1	–	1	–	42		2018612-021	IGSA RESOLVER OUTER AXIS	
–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	1	1	–	1	–	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2013833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT, AND MID, GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT, BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
–	–	–	–	–	–	–	–	–	–	–	–	–	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE, PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN, T.M, OUTER AXIS	
–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	1	–	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	1	–	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	–	–	1	–	1	–	1	–	1	–	1	–	1	1	–	1	–	1	–	1	1	3		2018710	CASE COVER	
–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1	–	1	2		2018602-011	OUTER AXIS ASSEMBLY	
–	1	1	–	1	–	1	–	1	–	1	–	1	–	–	1	–	1	1	1	–	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED

LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN DTB DATE 3/5/65
CHECKED G QUINN 3/1/65
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

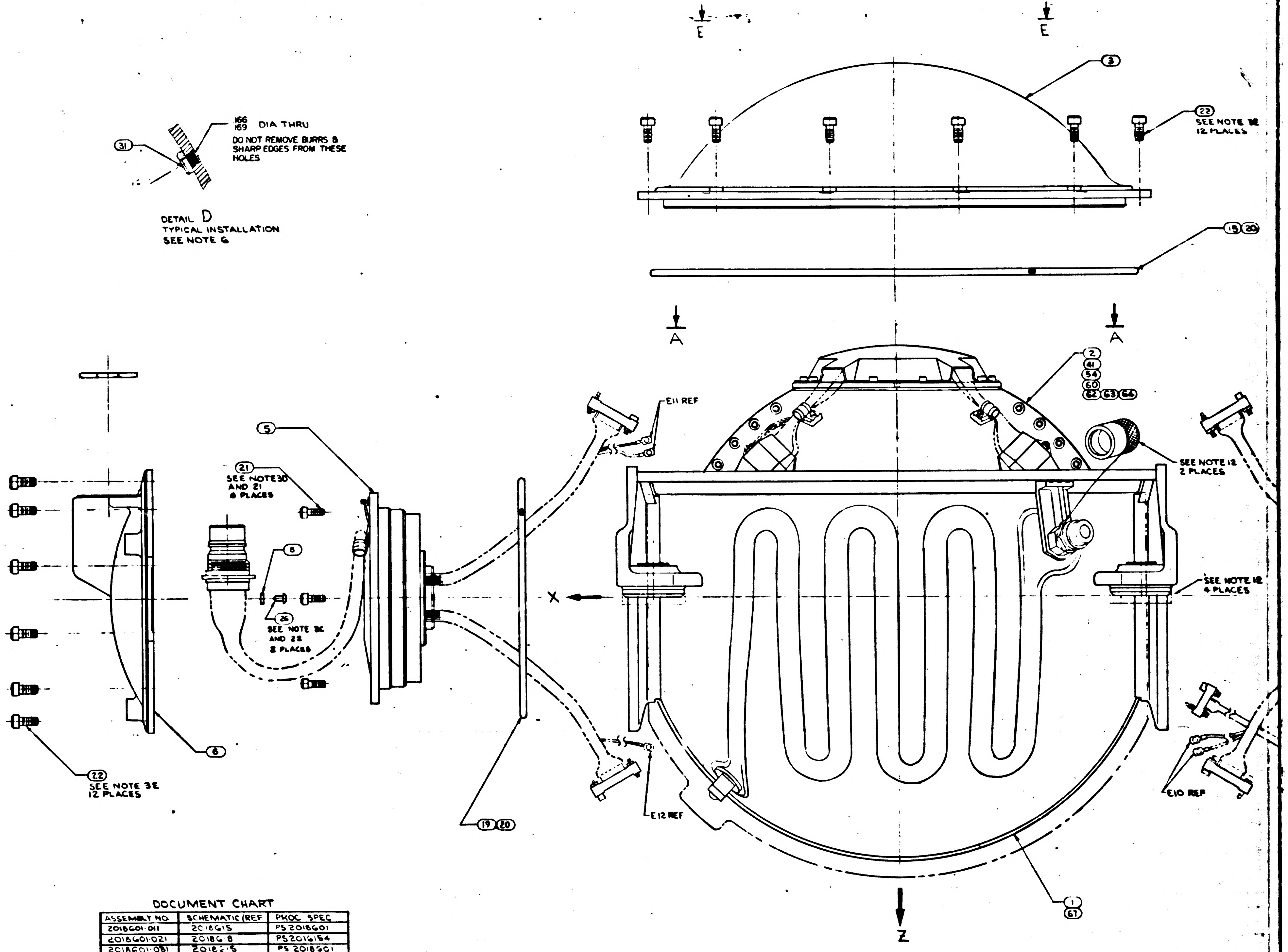
INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO 80230
SIZE J3
NASA DRAWING NO 2018601
SCALE 1/1
WT
SHEET 1 OF 1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 6.5 IN.-LB
   - D. 13.0 IN.-LB
   - E. 35.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM ① USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM ① OR (61)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (57), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
   - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE.
   - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE.

   CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.AND UNDERSIDE OF SCREW HEAD.
23.
24.



DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154
2018601-131	2018615	PS2018601
2018601-141	2018618	PS2016154
2018601-151	2021398	PS2016152
2018601-161	2021398	PS2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

CABLE CLAMP (29)

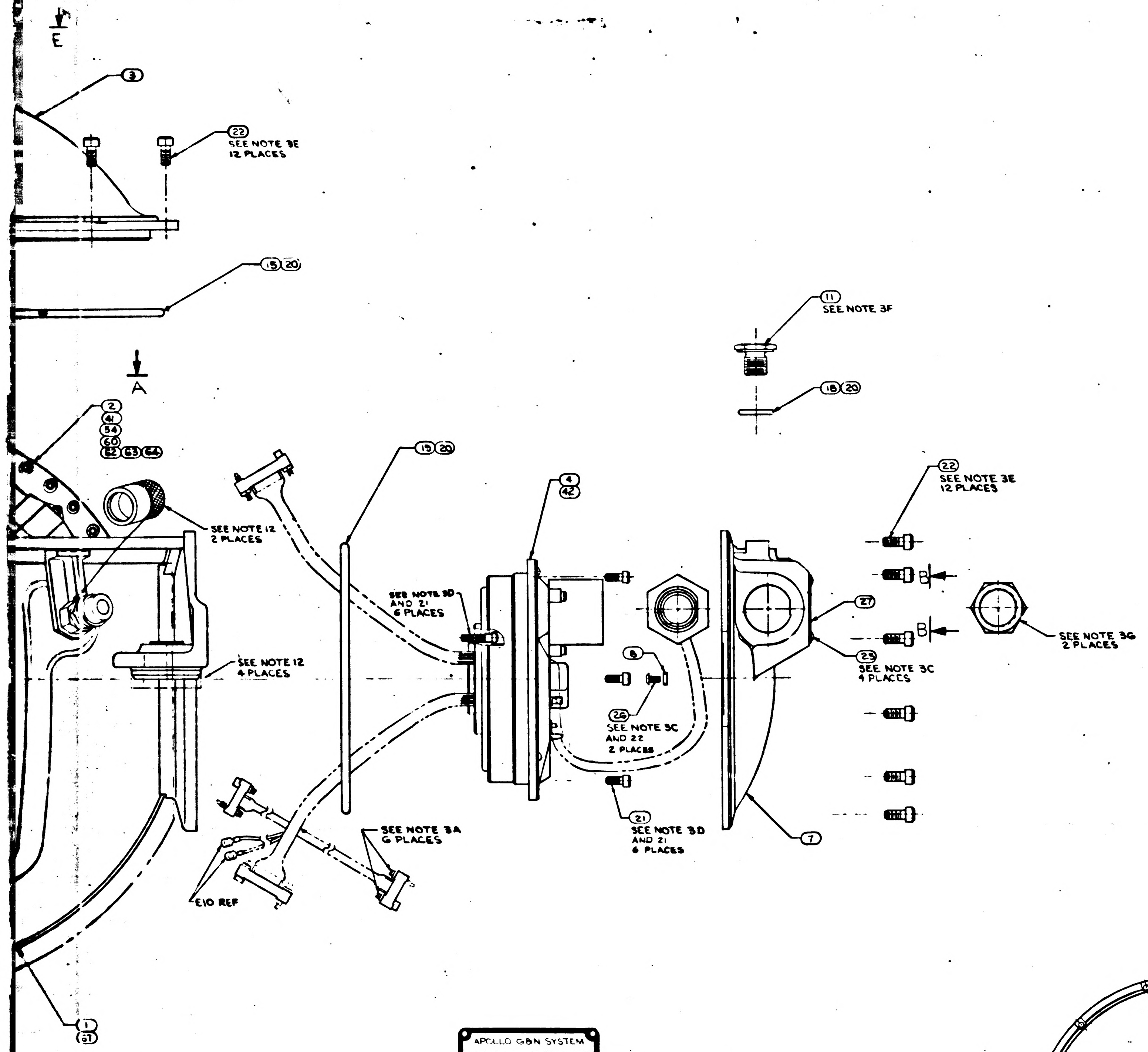
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

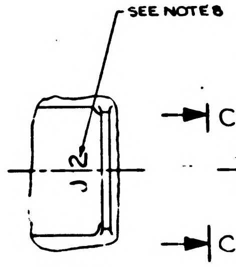
TABLE II

SCREW SELECTION CHART (32)

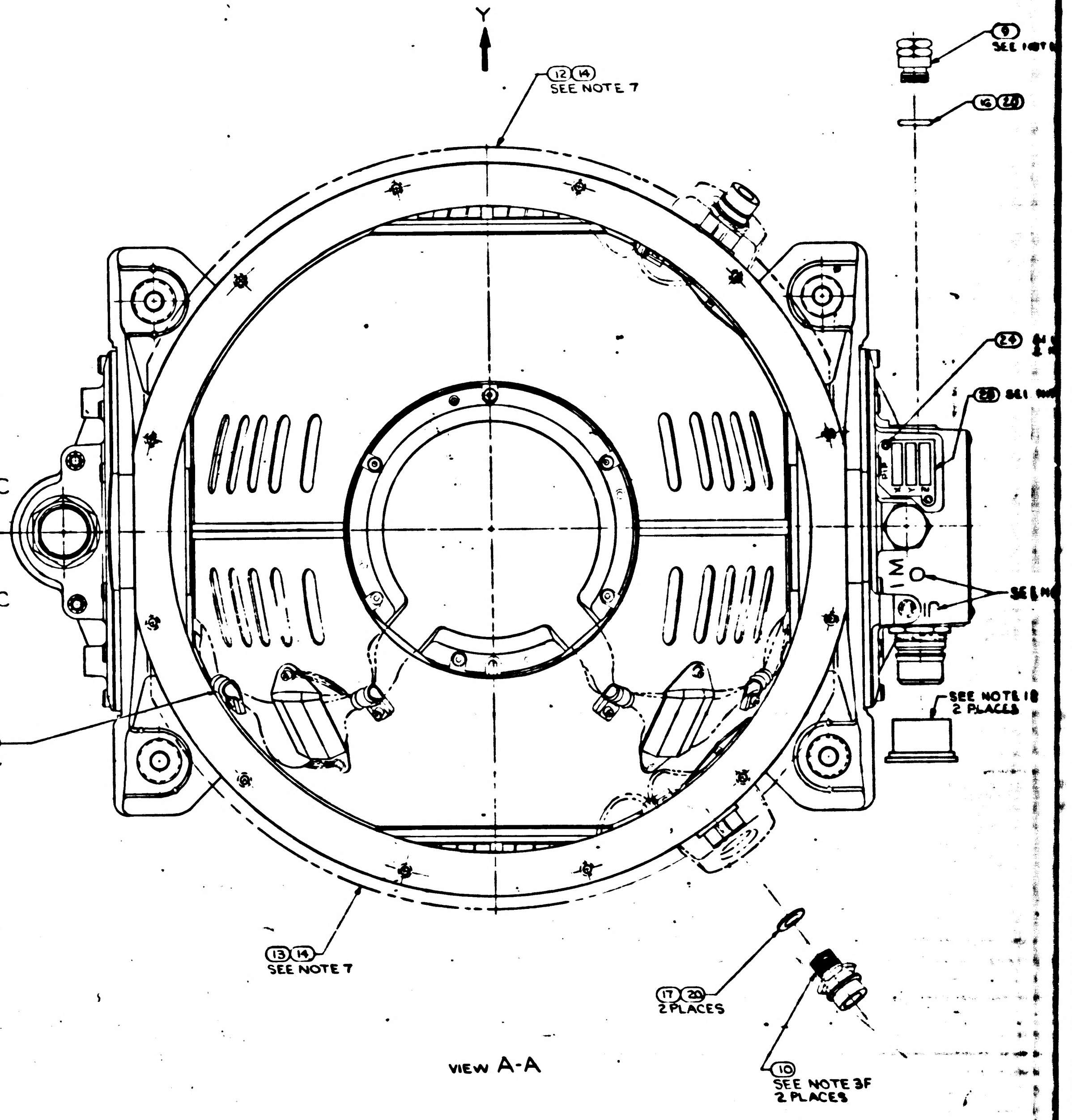
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

2018601 BK 1 OF 1

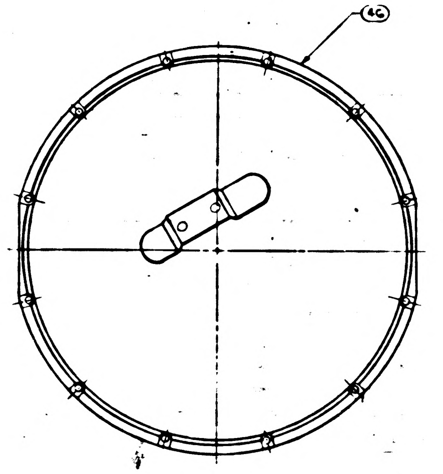

E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
2
41
54
60
62 63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
SEE NOTE 3D
AND 21
6 PLACES
4
42
11
SEE NOTE 3F
18 20
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
27
23
SEE NOTE 3C
4 PLACES
7
22
SEE NOTE 3E
12 PLACES
B
B
SEE NOTE 3G
2 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
1
61

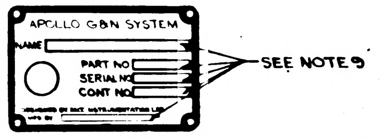

SEE NOTE 8
J 2
C
C

VIEW C-C


Y
12 14
SEE NOTE 7
9
SEE NOTE
16 20
24
28 SEE NOTE
M
SEE NOTE
SEE NOTE 18
2 PLACES
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES

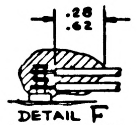
VIEW A-A



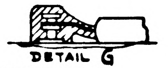

APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
MFG BY
SEE NOTE 9

VIEW B-B

VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211, 221, CONFIGURATION



DETAIL F



DETAIL G

(-071 AND ON CONFIGURATION)

ZONE	LTR	DESCRIPTION	CHG. NO	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		26 MAR 68	
	BF	REVISED PER TDRR 35745			
	BG	REVISED PER TDRR 35750			
	BH	REVISED PER TDRR 35751		16 APR 68	JJJ
	BJ	REVISED PER TDRR 36003		18 APR 68	JJJ
	BK	REVISED PER TDRR 36472			
	BL	REVISED PER TDRR 36560			

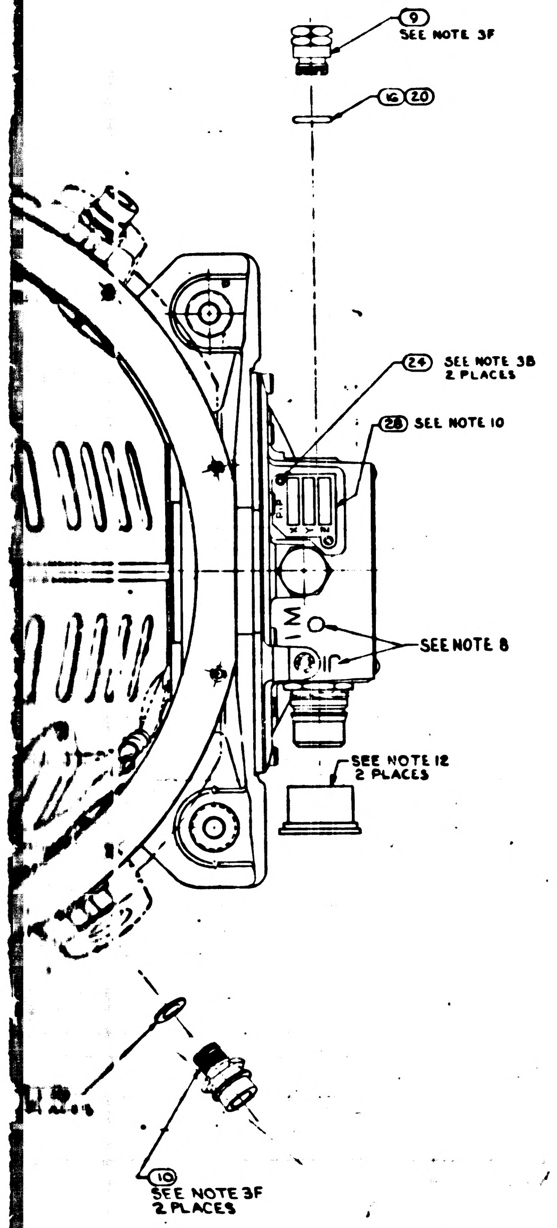
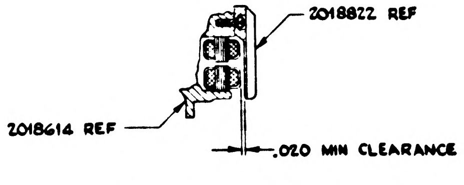


TABLE III

IMU CONFIGURATION 2018601	ALLOWABLE GYRO CONFIGURATIONS 2021500-											
	011	021	031	041	051	061	071	081	091	101	111	121
-011			X	X	X	X	X				X	X
-021			X		X		X				X	X
-031			X	X	X	X	X				X	X
-041					X		X					
-051					X		X					
-061					X		X					
-071					X		X					
-081					X		X					
-091			X				X				X	X
-111							X					
-121							X					
-131			X	X	X	X	X				X	X
-141			X		X		X				X	X
-151							X					
-161							X					
-171			X	X	X	X	X				X	X
-181			X		X		X				X	X
-191								X		X	⊗	⊗
-201								X		X	⊗	⊗
-211								X		X	X	
-221											X	X
-231											X	X

⊗ DENOTES IMU WILL CHANGE PART NUMBER IF THREE -111 OR HIGHER CONFIGURATION GYROS ARE USED.



DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	-	-	1	-	67		2018738-021	CASE CENTER, MACHINING ASSY	
																						66				
																						65				
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
																						61				
-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	57		1008822-1	COLORANT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
																						51				
																						50				
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	49		2021500	IRIG PREALIGNED ASSY	SEE TABLE III
-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	-	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT, AND MID, GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT,BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
-	-	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN, T.M. OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	1	1	-	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED — LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

NEXT ASSY	USED ON
G007001	G015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

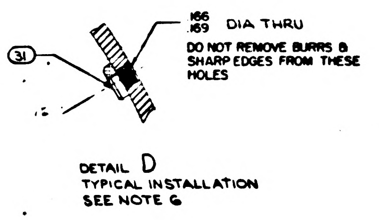
DRAWN DTB DATE 3/5/65
CHECKED G QUINN /65
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

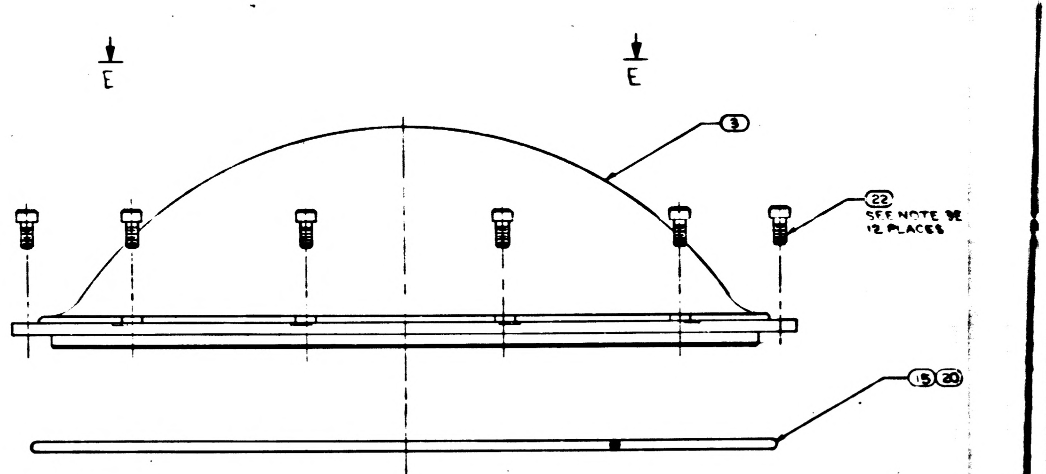
INERTIAL
MEASURING UNIT
ASSEMBLY

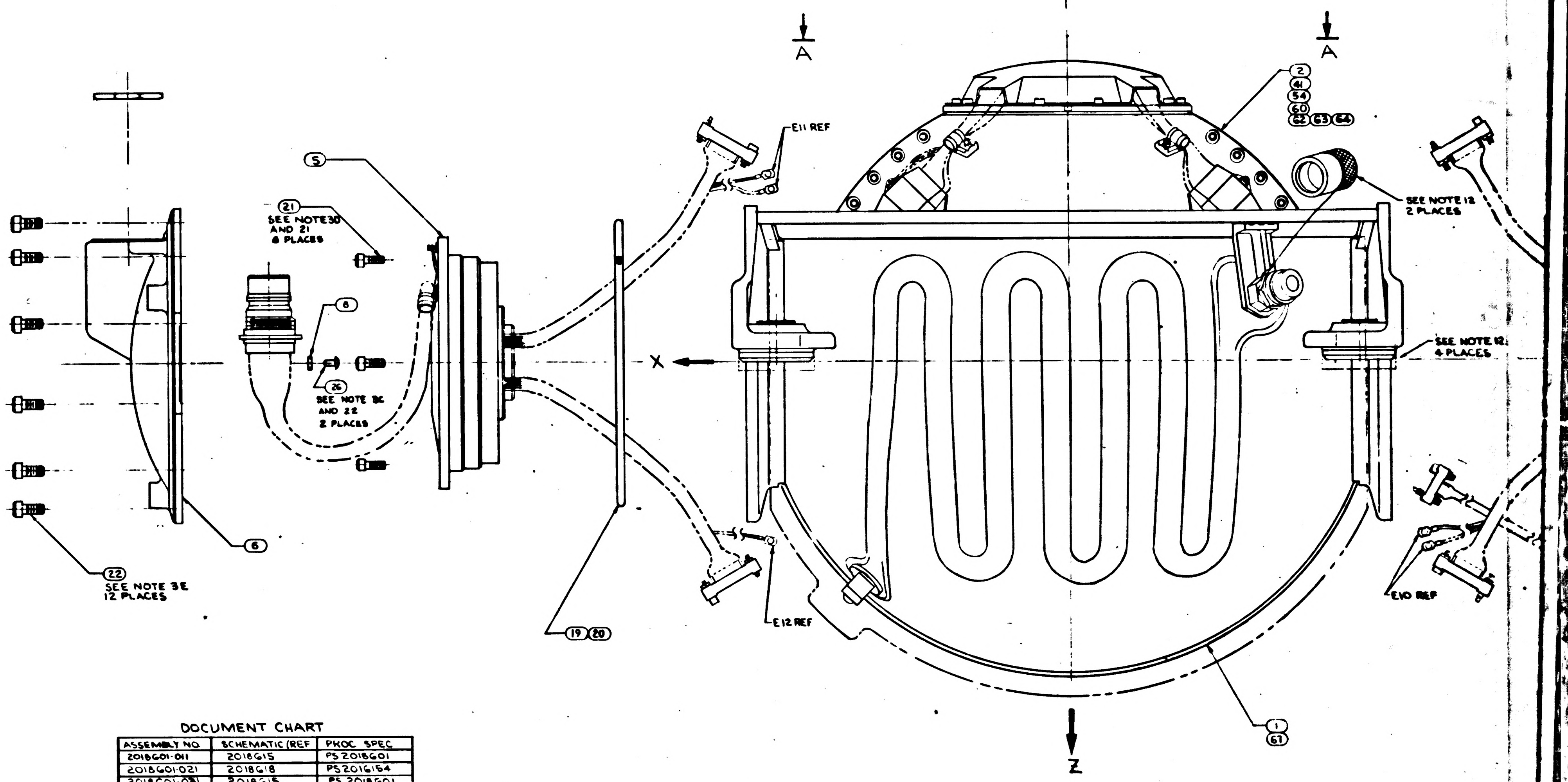
CODE IDENT NO. 80230
SIZE J3
NASA DRAWING NO. 2018601
SCALE 1/1
SHEET 1 OF

3/2018601



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6





NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   B. 3.5 IN.-LB
   C. 6.5 IN.-LB
   D. 13.0 IN.-LB
   E. 35.0 IN.-LB
   F. 70.0 IN.-LB
   G. 80.0 IN.-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭ ADJOINING SURFACES OF ITEMS ⑫ AND ⑬ TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS ⑩ , ⑰ AND ⑳ ARE ASSEMBLIED TO CASE, ITEM ① OR (67)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19.
20. APPLY CONFORMED COATING OF ITEMS (55) , (56) , (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
   A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
   B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
   CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23.
24.

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154
2018601-071	2018618	PS 2016152
2018601-081	2018618	PS 2016154
2018601-111	2018618	PS 2016152
2018601-121	2018618	PS 2016154
2018601-131	2018615	PS 2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS 2016152
2018601-161	2021398	PS 2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

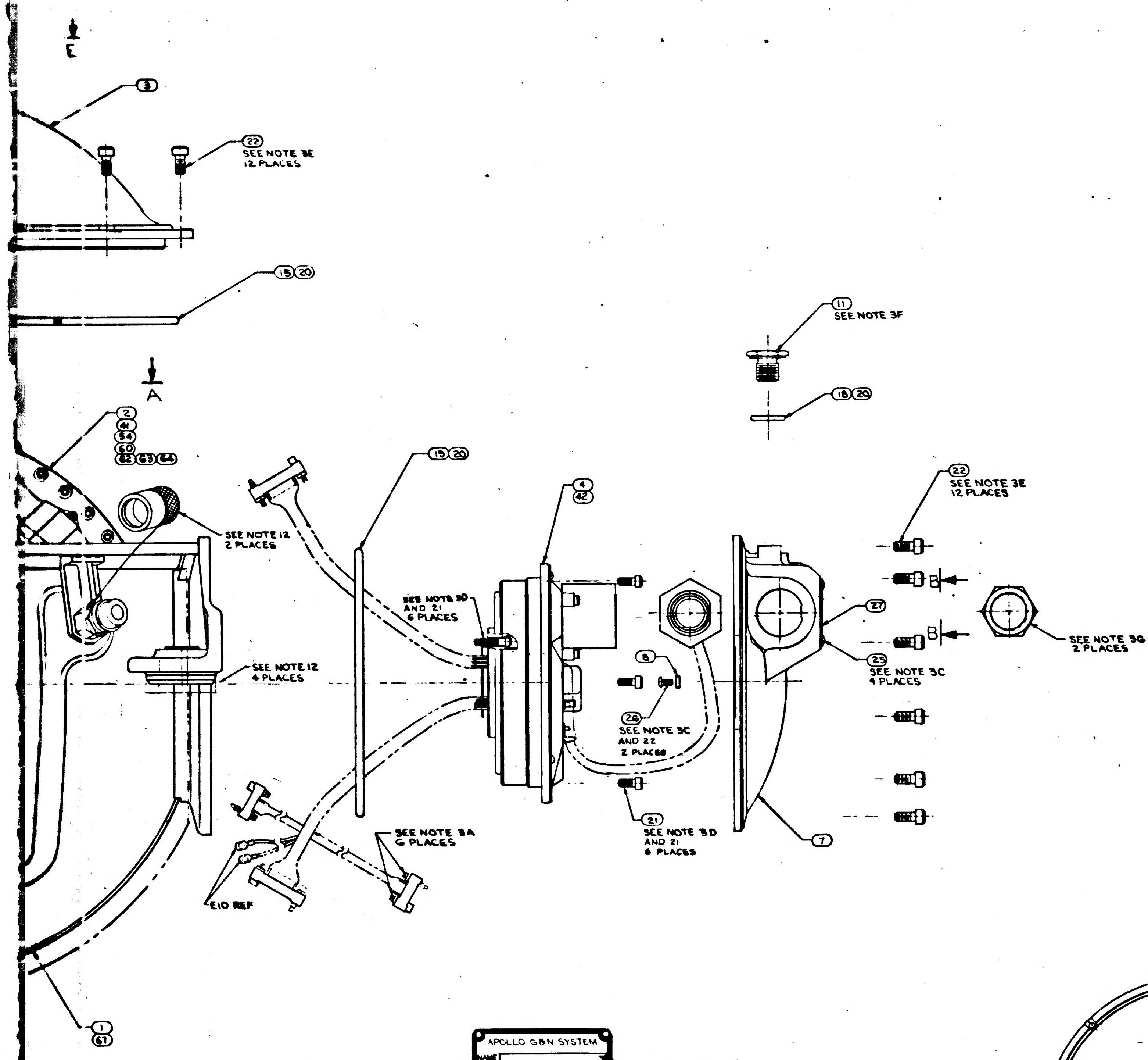
CABLE CLAMP ㉙

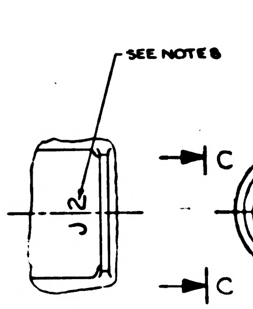
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

TABLE II

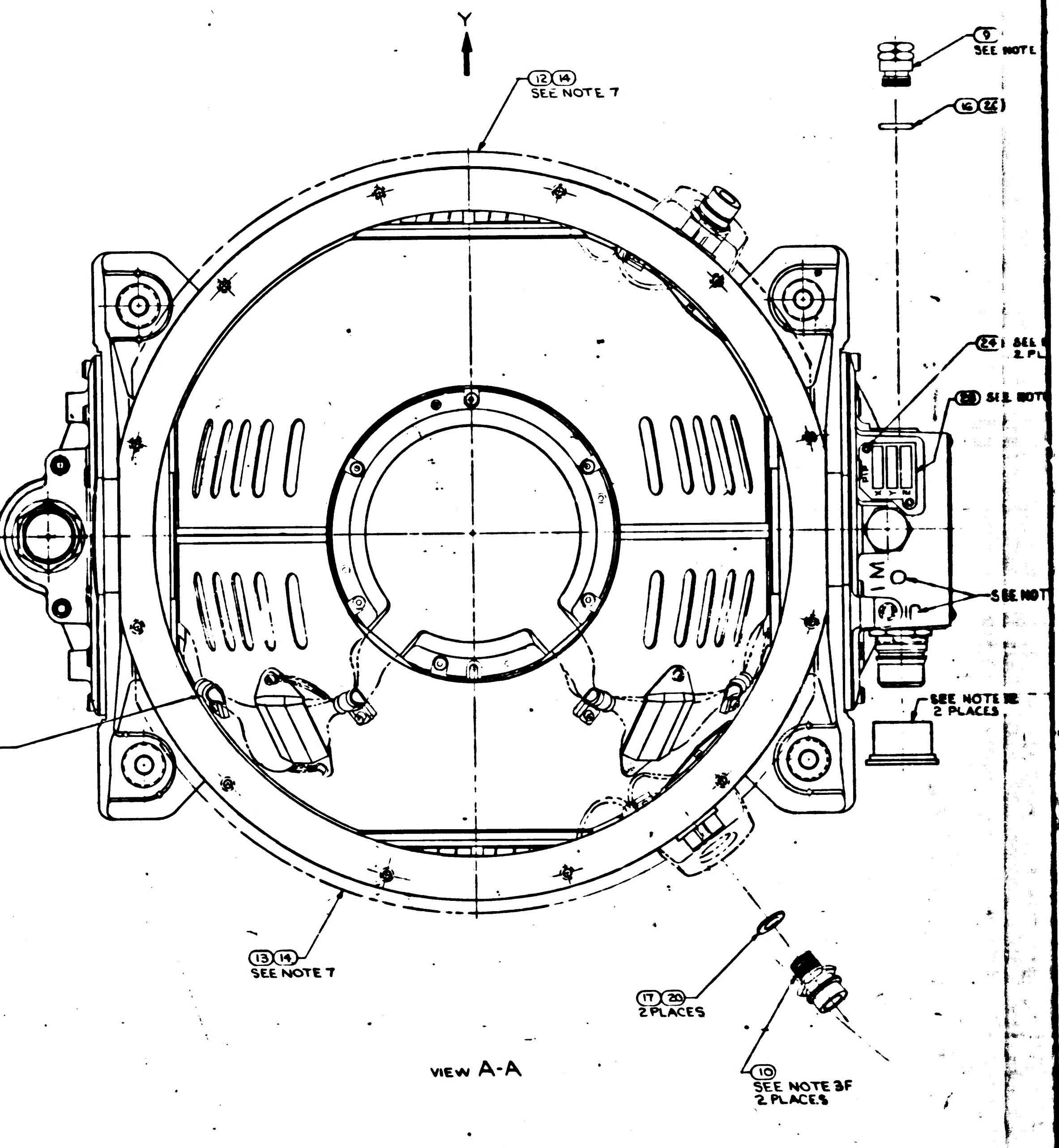
SCREW SELECTION CHART ㉜

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011623-11	

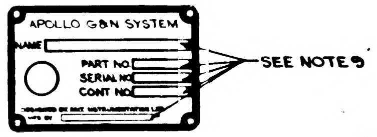

E
A
3
22 SEE NOTE 3E 12 PLACES
15 20
11 SEE NOTE 3F
18 20
2 61 54 60 62 63 64
SEE NOTE 12 2 PLACES
19 20
4 42
22 SEE NOTE 3E 12 PLACES
B
B
SEE NOTE 3G 2 PLACES
SEE NOTE 3D AND 21 6 PLACES
8
27
25 SEE NOTE 3C 4 PLACES
26 SEE NOTE 3C AND 22 2 PLACES
SEE NOTE 12 4 PLACES
21 SEE NOTE 3D AND 21 6 PLACES
7
SEE NOTE 3A 6 PLACES
E10 REF
1 61


SEE NOTE 8
J2
C
C

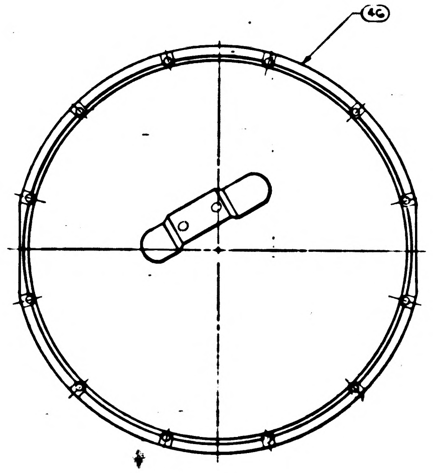
VIEW C-C


Y
12 14 SEE NOTE 7
9 SEE NOTE
16 24
24 SEE 2 PL
28 SEE NOTE
SEE NOTE
M
SEE NOTE 12 2 PLACES
30 29 23 SEE NOTE 3C 6 PLACES
13 14 SEE NOTE 7
17 20 2 PLACES
10 SEE NOTE 3F 2 PLACES

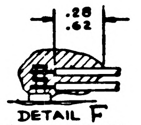
VIEW A-A


APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
SEE NOTE 9

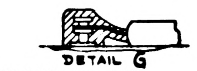
VIEW B-B



VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 131, 171, 191, 211, 231, CONFIGURATION



DETAIL F
(-071 AND ON CONFIGURATION)



DETAIL G

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	
	BF	REVISED PER TDRR 35745			
	BG	REVISED PER TDRR 35750			
	BH	REVISED PER TDRR 35751		16 APR 68	
	BJ	REVISED PER TDRR 36003		16 APR 68	
	BK	REVISED PER TDRR 36472		25 JUL 68	
	BL	REVISED PER TDRR 36560		30 JUL 68	
	BM	REVISED PER TDRR 36591		31 JUL 68	

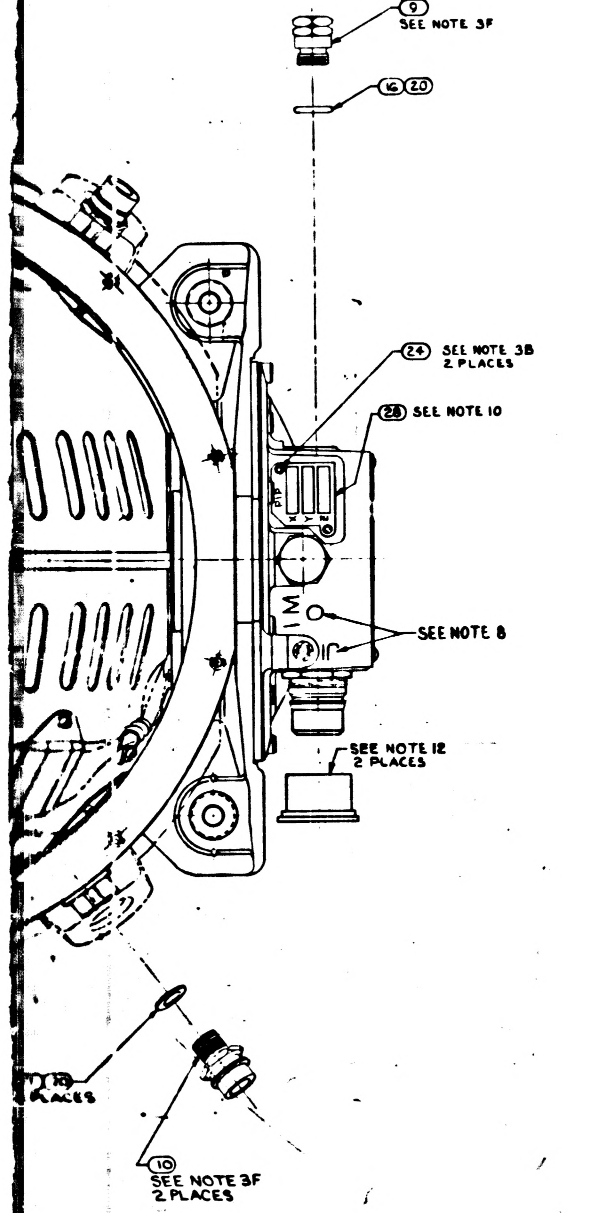
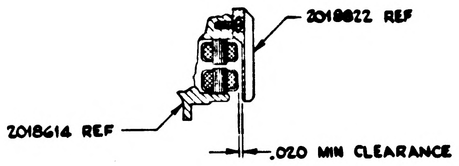


TABLE III

IMU CONFIGURATION 2018601	ALLOWABLE GYRO CONFIGURATIONS 2021500-											
	011	021	031	041	051	061	071	081	091	101	111	121
-011			X	X	X	X	X				X	X
-021			X		X		X				X	X
-031			X	X	X	X	X				X	X
-041					X		X					
-051					X		X					
-061					X		X					
-071					X		X					
-081					X		X					
-091			X		X		X				X	X
-111							X					
-121							X					
-131			X	X	X	X	X				X	X
-141			X		X		X				X	X
-151							X					
-161							X					
-171			X	X	X	X	X				X	X
-181			X		X		X				X	X
-191								X		X	⊗	⊗
-201								X		X	⊗	⊗
-211								X		X	X	
-221											X	X
-231											X	X

⊗ DENOTES IMU WILL CHANGE PART NUMBER IF THREE -111 OR HIGHER CONFIGURATION GYROS ARE USED.



DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
1	–	–	1	–	1	–	1	–	1	–	1	–	1	1	–	1	–	–	–	1	–	67		2018738-021	CASE CENTER, MACHINING ASSY	
																						66				
																						65				
–	–	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	–	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
																						61				
–	–	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
																						57				
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
–	–	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	16
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
																						51				
																						50				
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	49		2021500	IRIG PREALIGNED ASSY	SEE TABLE III
–	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	–	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
–	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
–	–	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT, AND MID, GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT,BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001486	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	[illegible]	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	[illegible]	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
–	–	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
–	–	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
–	–	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN, T.M. OUTER AXIS	
–	–	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
–	–	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	–	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
–	–	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
–	1	1	–	1	–	1	–	1	–	1	–	1	–	–	1	–	1	1	1	–	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED — LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

G007001	G015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DTB DATE 3/5/65
CHECKED G QUINN 3/11/65
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J3
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

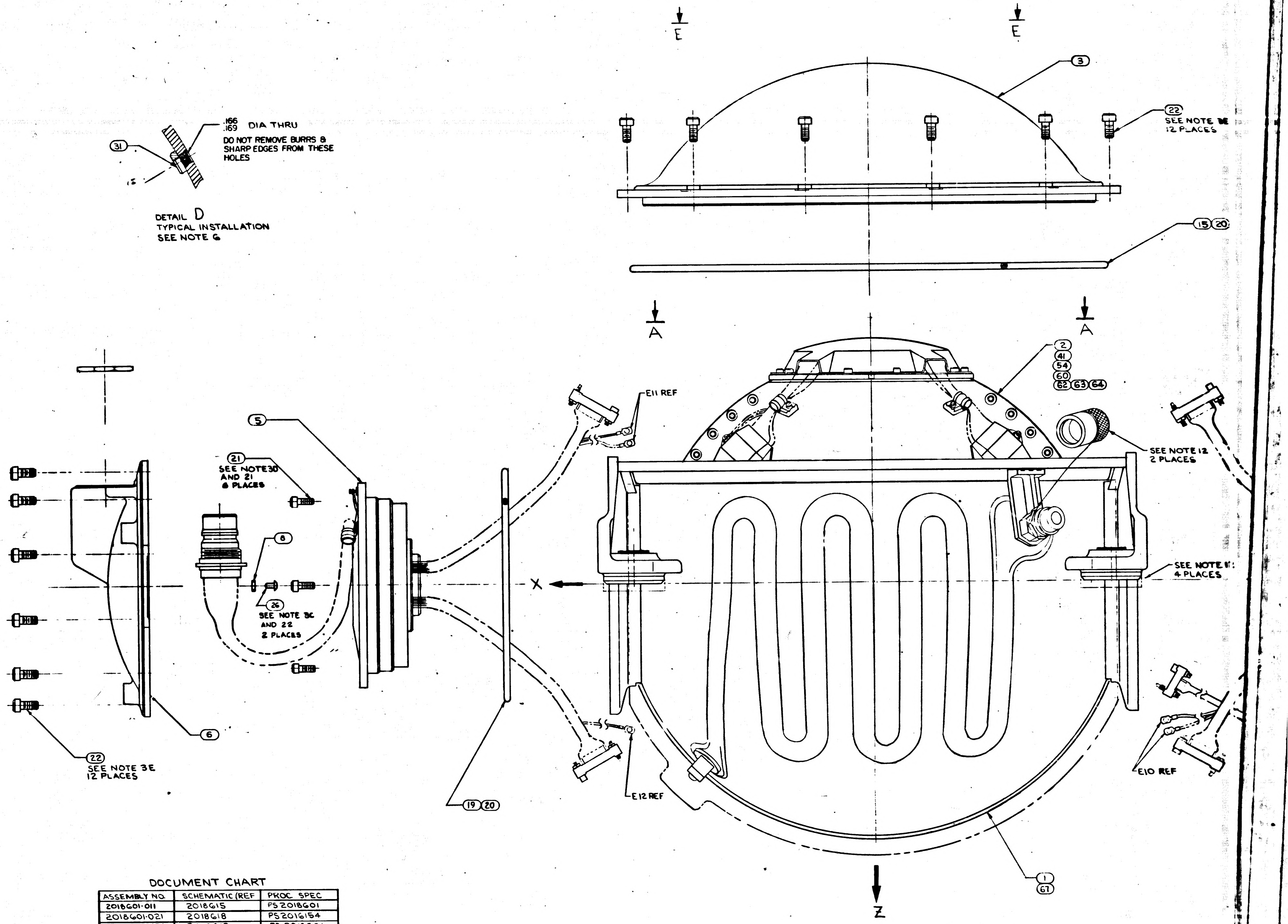
2018601 BA

37 2018601

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 6.5 IN.-LB
   - D. 13.0 IN.-LB
   - E. 35.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM ① USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM ① OR (67)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
    - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.

    CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (60) TO SCREW THREADS.AND UNDERSIDE OF SCREW HEAD.
23.
24.



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154
2018601-071	2018618	PS 2016152
2018601-081	2018618	PS 2016154
2018601-111	2018618	PS 2016152
2018601-121	2018618	PS 2016154
2018601-131	2018615	PS 2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS 2016152
2018601-161	2021398	PS 2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

CABLE CLAMP (29)

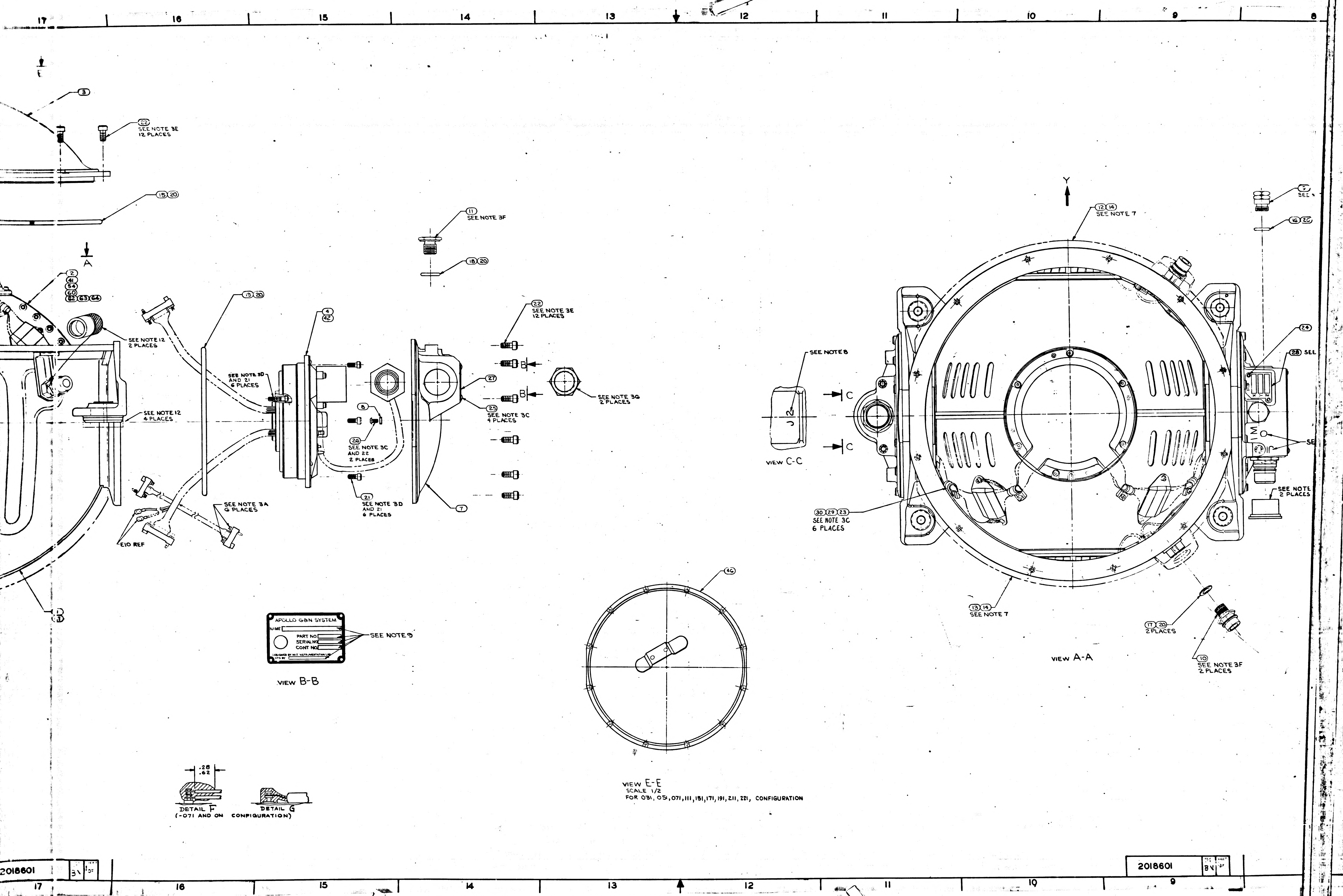
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

TABLE II

SCREW SELECTION CHART (32)

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

2018601 | 3 | OF



17
16
15
14
13
12
11
10
9
8
E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
2
41
54
60
62 63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
SEE NOTE 3D
AND 21
6 PLACES
E10 REF
SEE NOTE 3A
6 PLACES
D
4
42
11
SEE NOTE 3F
18 20
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
27
25
SEE NOTE 3C
4 PLACES
7
22
SEE NOTE 3E
12 PLACES
B
B
SEE NOTE 3G
2 PLACES
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY M.I.T. INSTRUMENTATION LAB
MFD BY
SEE NOTE 9
.28
.62
46
SEE NOTE 8
J2
C
C
Y
12 14
SEE NOTE 7
24
28 SEE
PIP
X Y Z
IM
SE
SEE NOTE
2 PLACES
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES
SEE
16 20

VIEW B-B

VIEW C-C

VIEW A-A

DETAIL F
DETAIL G
(-071 AND ON CONFIGURATION)

VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211, 221, CONFIGURATION

REVISIONS

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	
	BF	REVISED PER TDRR 35745		25 MAR 68	
	BG	REVISED PER TDRR 35750		8 MAR 68	
	BH	REVISED PER TDRR 35751		16 APR 68	JJJ
	BJ	REVISED PER TDRR 36003		18 APR 68	JJJ
	BK	REVISED PER TDRR 36472		[illegible]	
	BL	REVISED PER TDRR 36560		[illegible]	
	BM	REVISED PER TDRR 36591		31 [illegible] 68	
	BN	REVISED PER TDRR 37265		3-[illegible]-68	3.

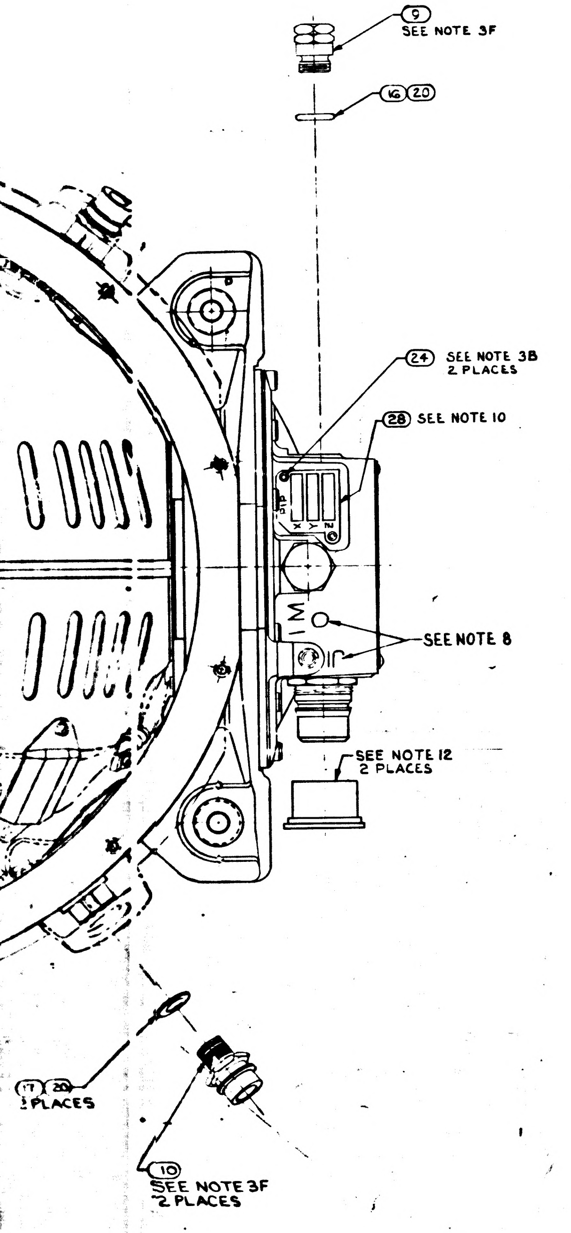
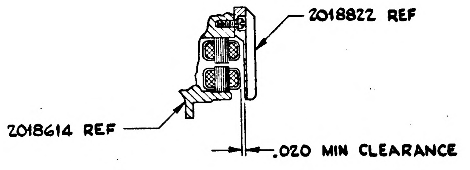


TABLE III

IMU CONFIGURATION 2018601	ALLOWABLE GYRO CONFIGURATIONS 2021500- 011	021	031	041	051	061	071	081	091	101	111	121			151
-011			X	X	X	X	X				X				X
-021			X		X		X				X				X
-031			X	X	X	X	X				X				X
-041					X		X								
-051					X		X								
-061					X		X								
-071					X		X								X
-081					X		X								
-091			X		X		X				X				
-111							X								
-121							X								X
-131			X	X	X	X	X				X				
-141			X		X		X				X				X
-151							X								
-161							X								
-171			X	X	X	X	X				X				
-181			X		X		X				X				
-191								X		X	⊗				⊗
-201								X		X	⊗				⊗
-211								X		X	X				
-221											X				X
-231											X				X

⊗ DENOTES IMU WILL CHANGE PART NUMBER IF THREE -111 OR HIGHER CONFIGURATION GYROS ARE USED.



DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO.	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
1	–	–	1	–	1	–	1	–	1	–	1	–	1	1	–	1	–	–	–	1	–	67		2018738-021	CASE CENTER, MACHINING ASSY	
																						66				
																						65				
–	–	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	–	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
																						61				
–	–	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
																						57				
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
–	–	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
																						51				
																						50				
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	49		2021500	IRIG PREALIGNED ASSY	SEE TABLE III
–	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	–	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
–	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
–	–	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT. AND MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT, BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
–	–	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
–	–	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
–	–	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN. T.M. OUTER AXIS	
–	–	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
–	–	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	–	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
–	–	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
–	1	1	–	1	–	1	–	1	–	1	–	1	–	–	1	–	1	1	1	–	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED — LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

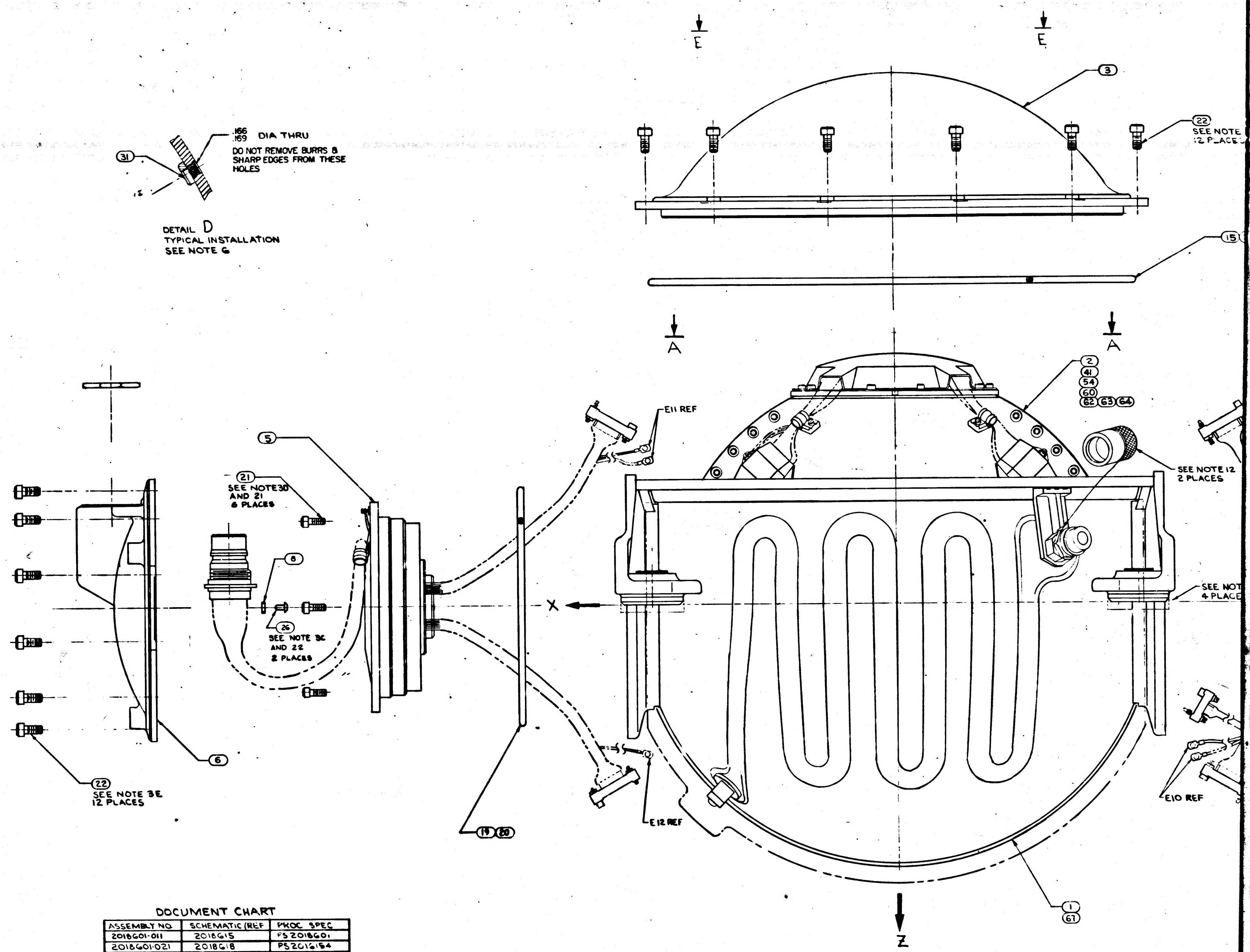
MIT INSTRUMENTATION LAB
Cambridge, Mass
DWG NO CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230 SIZE J3 NASA DRAWING NO. 2018601
SCALE 1/1 WT SHEET 1 OF 1

2018601 BN



NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 6.5 IN.-LB
   - D. 13.0 IN.-LB
   - E. 35.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM ① USING ITEM ⑭ ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\substack{.23\\.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\substack{.10\\.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS ⑩, ⑰ AND ⑳ ARE ASSEMBLIED TO CASE, ITEM ① OR (67)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
    - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.

    CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (59). TO SCREW THREADS. AND UNDERSIDE OF SCREW HEAD.
23.
24.

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154
2018601-071	2018618	PS 2016152
2018601-081	2018618	PS 2016154
2018601-111	2018618	PS 2016152
2018601-121	2018618	PS 2016154
2018601-131	2018615	PS 2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS 2016152
2018601-161	2021398	PS 2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

CABLE CLAMP (29)

PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

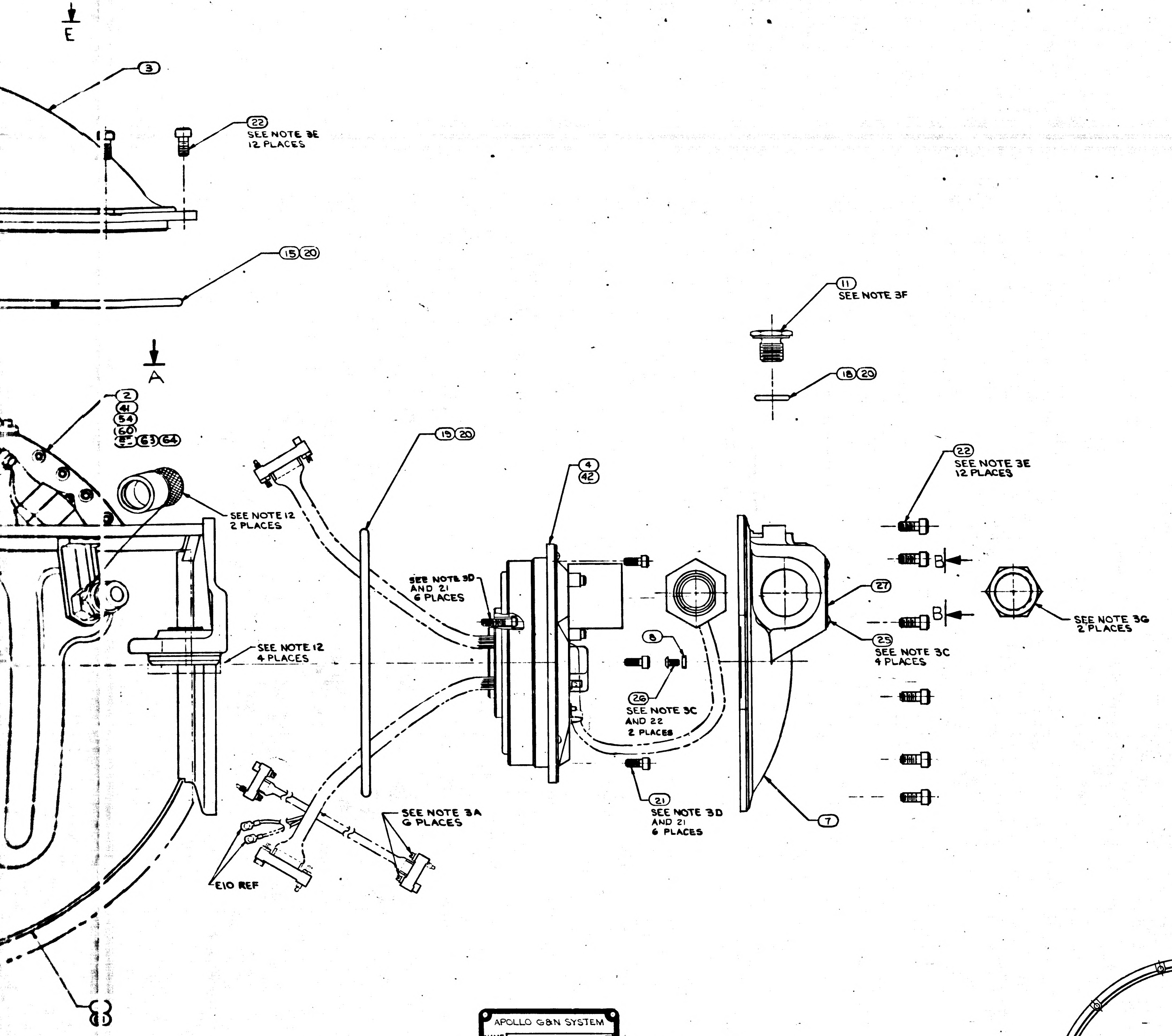
TABLE II

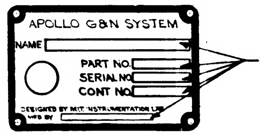
SCREW SELECTION CHART (32)

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

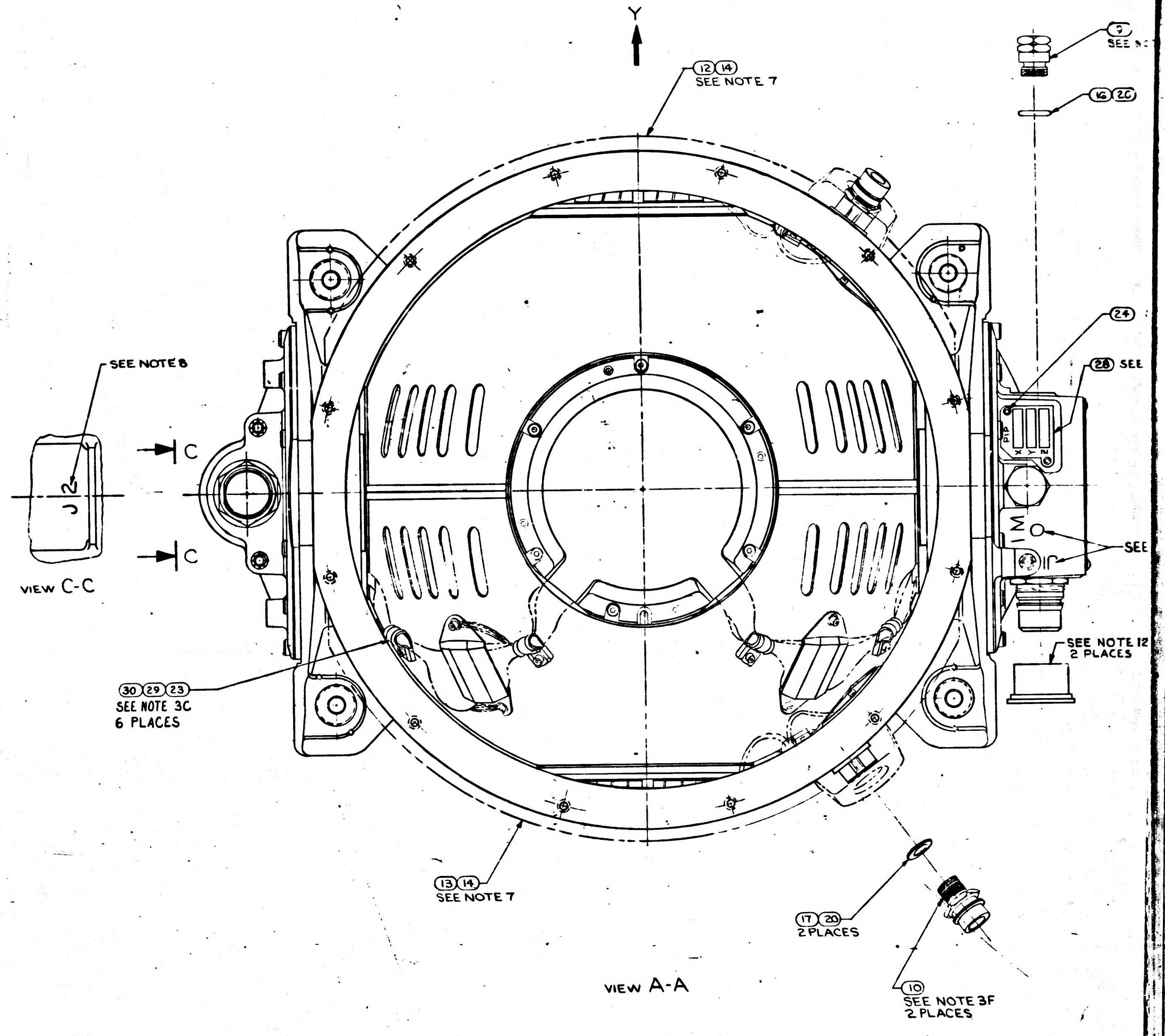
2018601 | 3 | SHEET 1 OF

1/2018601


E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
2
41
54
60
63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
SEE NOTE 3D
AND 21
6 PLACES
4
42
11
SEE NOTE 3F
18 20
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
27
25
SEE NOTE 3C
4 PLACES
7
22
SEE NOTE 3E
12 PLACES
B
B
SEE NOTE 3G
2 PLACES
SEE NOTE 3A
6 PLACES
E10 REF

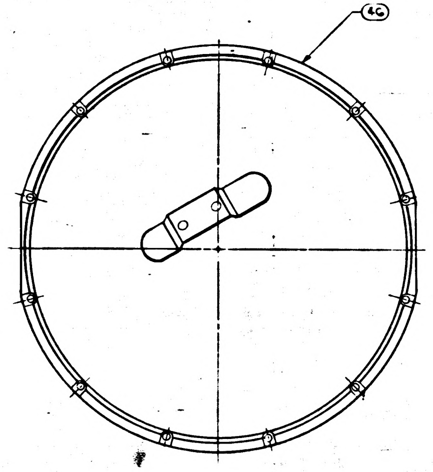

APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
DESIGNED BY M.I.T. INSTRUMENTATION LAB
SEE NOTE 9

VIEW B-B

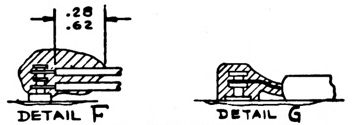

SEE NOTE 8
J2
C
C
Y
12 14
SEE NOTE 7
24
28 SEE
9
SEE N
16 26
X Y Z
IMU
SEE
SEE NOTE 12
2 PLACES
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES

VIEW C-C

VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211, 221, CONFIGURATION



DETAIL F
(-071 AND ON

DETAIL G
CONFIGURATION)

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	
	BF	REVISED PER TDRR 35745		25 MAR 68	
	BG	REVISED PER TDRR 35750		8 MAR 68	
	BH	REVISED PER TDRR 35751		16 APR 68	JJJ
	BJ	REVISED PER TDRR 36003		18 APR 68	JJJ
	BK	REVISED PER TDRR 36472		25 JUL 68	
	BL	REVISED PER TDRR 36560		30 JUL 68	
	BM	REVISED PER TDRR 36591		31 JUL 68	SA
	BN	REVISED PER TDRR 37265		3 FEB 69	B.
	BP	REVISED PER TDRR 37367		26 FEB 69	SA

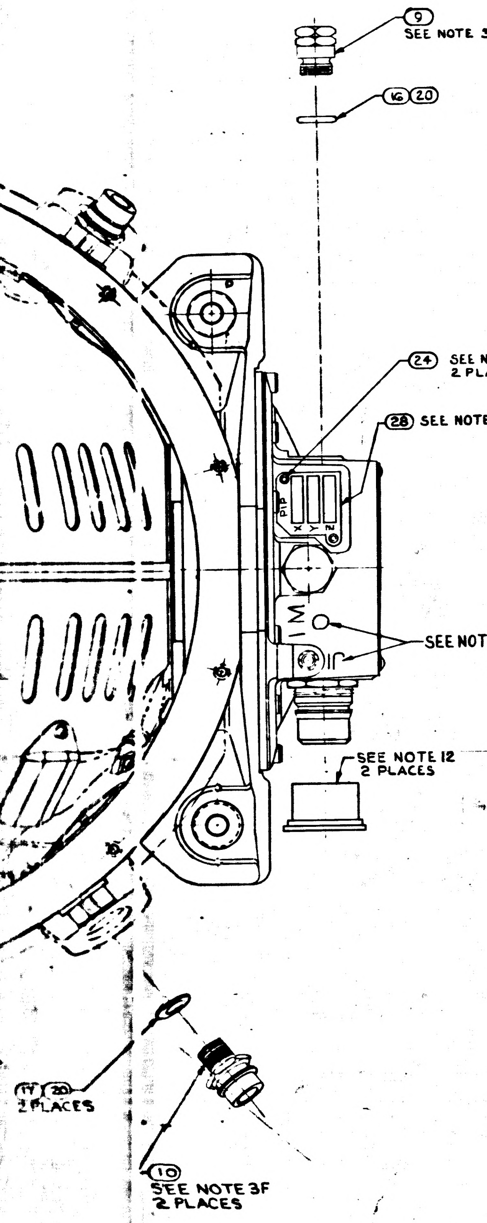
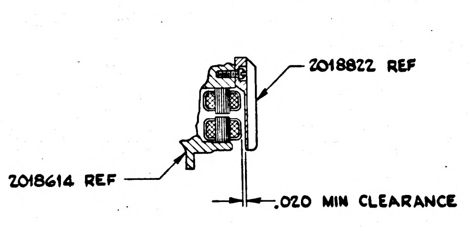


TABLE III

IMU CONFIGURATION 2018601	ALLOWABLE GYRO CONFIGURATIONS 2021500-													
	011	021	031	041	051	061	071	081	091	101	111	121		151
-011			X	X	X	X	X				X			X
-021			X		X		X				X			X
-031			X	X	X	X	X				X			X
-041					X		X							
-051					X		X							
-061					X		X							
-071					X		X							X
-081					X		X							
-091			X		X		X				X			
-111							X							
-121							X							X
-131			X	X	X	X	X				X			
-141			X		X		X				X			X
-151							X							
-161							X							
-171			X	X	X	X	X				X			
-181			X		X		X				X			
-191								X		X	⊗			⊗
-201								X		X	⊗			⊗
-211								X		X	X			
-221											X			X
-231											X			X

⊗ DENOTES IMU WILL CHANGE PART NUMBER IF THREE -111 OR HIGHER CONFIGURATION GYROS ARE USED.



DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO.	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	-	-	1	-	67		2018738-021	CASE CENTER, MACHINING ASSY	
																						66				
																						65				
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
																						61				
-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM,DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
																						57				
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
																						51				
																						50				
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	49		2021500	IRIG PREALIGNED ASSY	SEE TABLE III
-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	-	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT. AND MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT,BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
-	-	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN. T.M. OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR, OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	1	1	-	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED

LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

NEXT ASSY	USED ON
G007001	G015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL W.O. 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J3
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

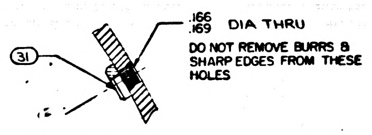
2018601 BP

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED
      1.0 IN.-LB WHILE ENGAGING PINS
   B. 3.5 IN.-LB
   C. 6.5 IN.-LB
   D. 13.0 IN.-LB
   E. 35.0 IN.-LB
   F. 70.0 IN.-LB
   G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\begin{matrix}.23\\.27\end{matrix}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\begin{matrix}.10\\.14\end{matrix}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM (1) OR (67)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16.

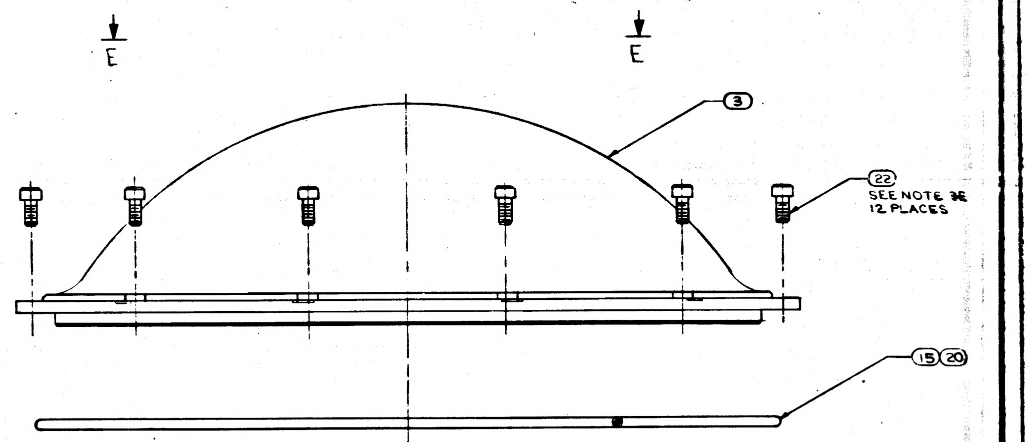
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19.

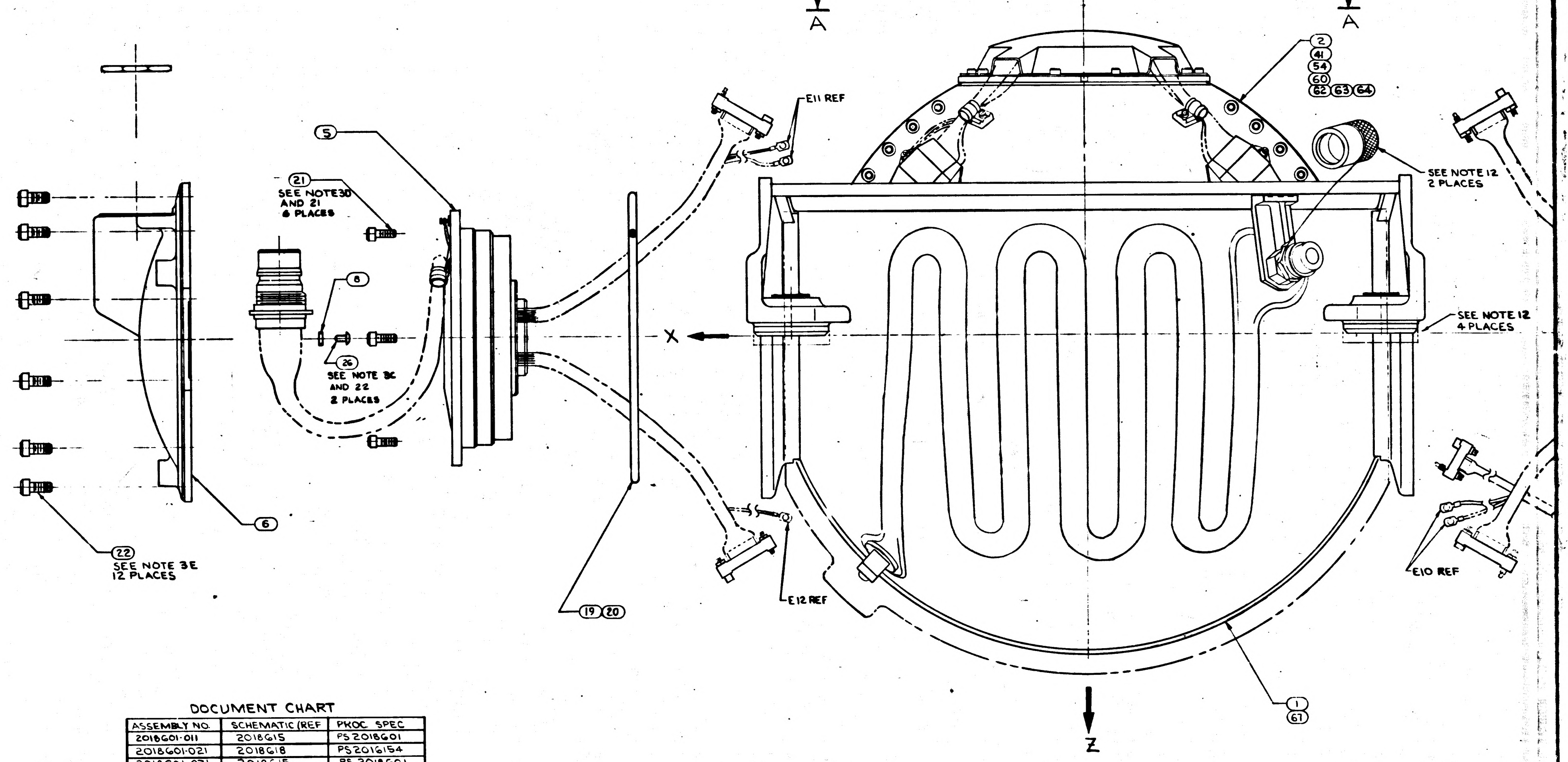
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
   A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
   B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
   CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23.

24.



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6





DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154
2018601-071	2018618	PS 2016152
2018601-081	2018618	PS 2016154
2018601-111	2018618	PS 2016152
2018601-121	2018618	PS 2016154
2018601-131	2018615	PS 2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS 2016152
2018601-161	2021398	PS 2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

CABLE CLAMP (29)

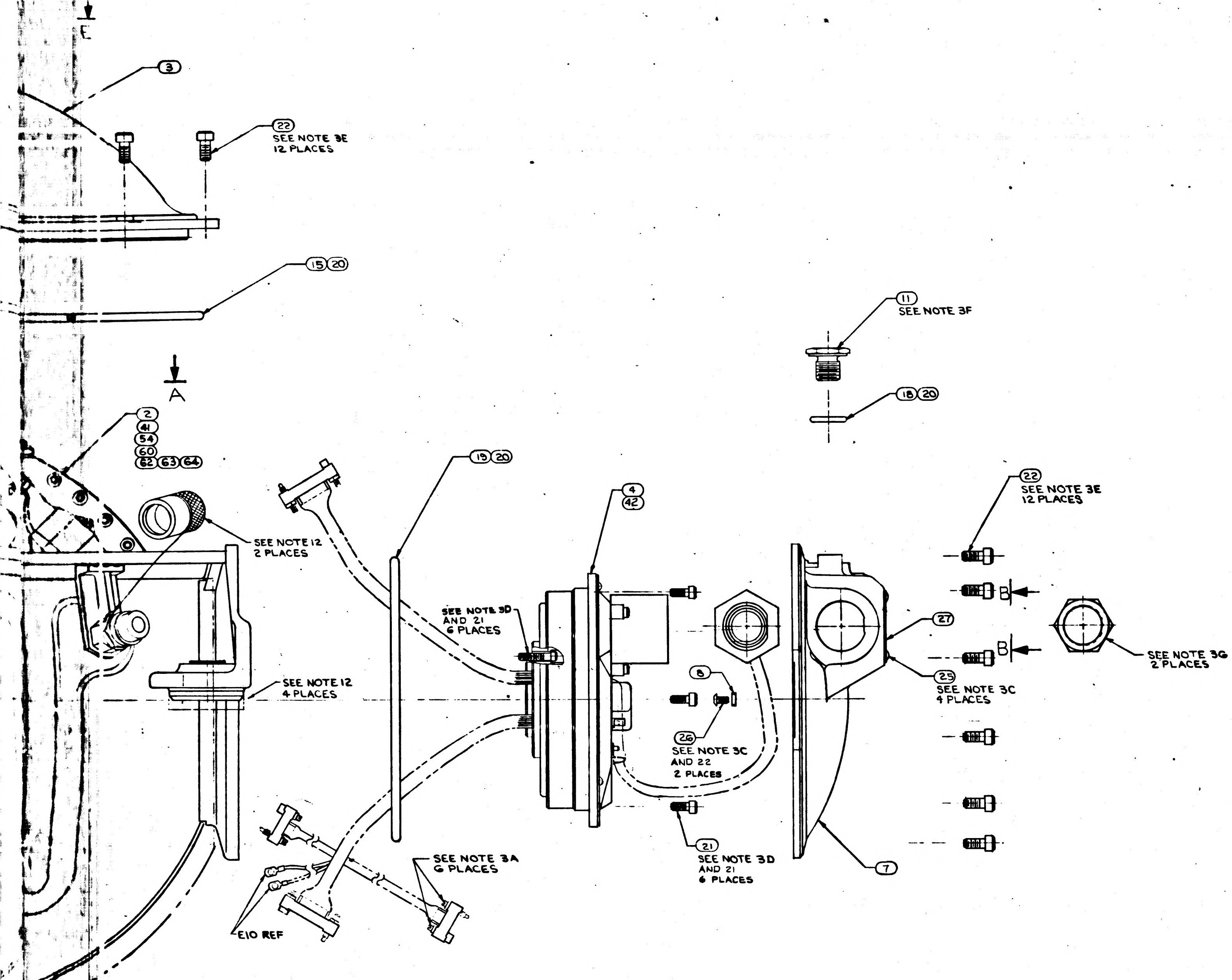
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

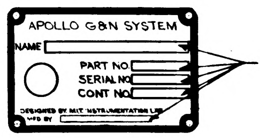
TABLE II

SCREW SELECTION CHART (32)

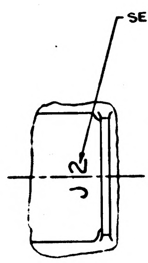
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	STABLE MEMBER
-6	
-7	
-10	
1011625-11	

2018601 | 3R | 1 OF

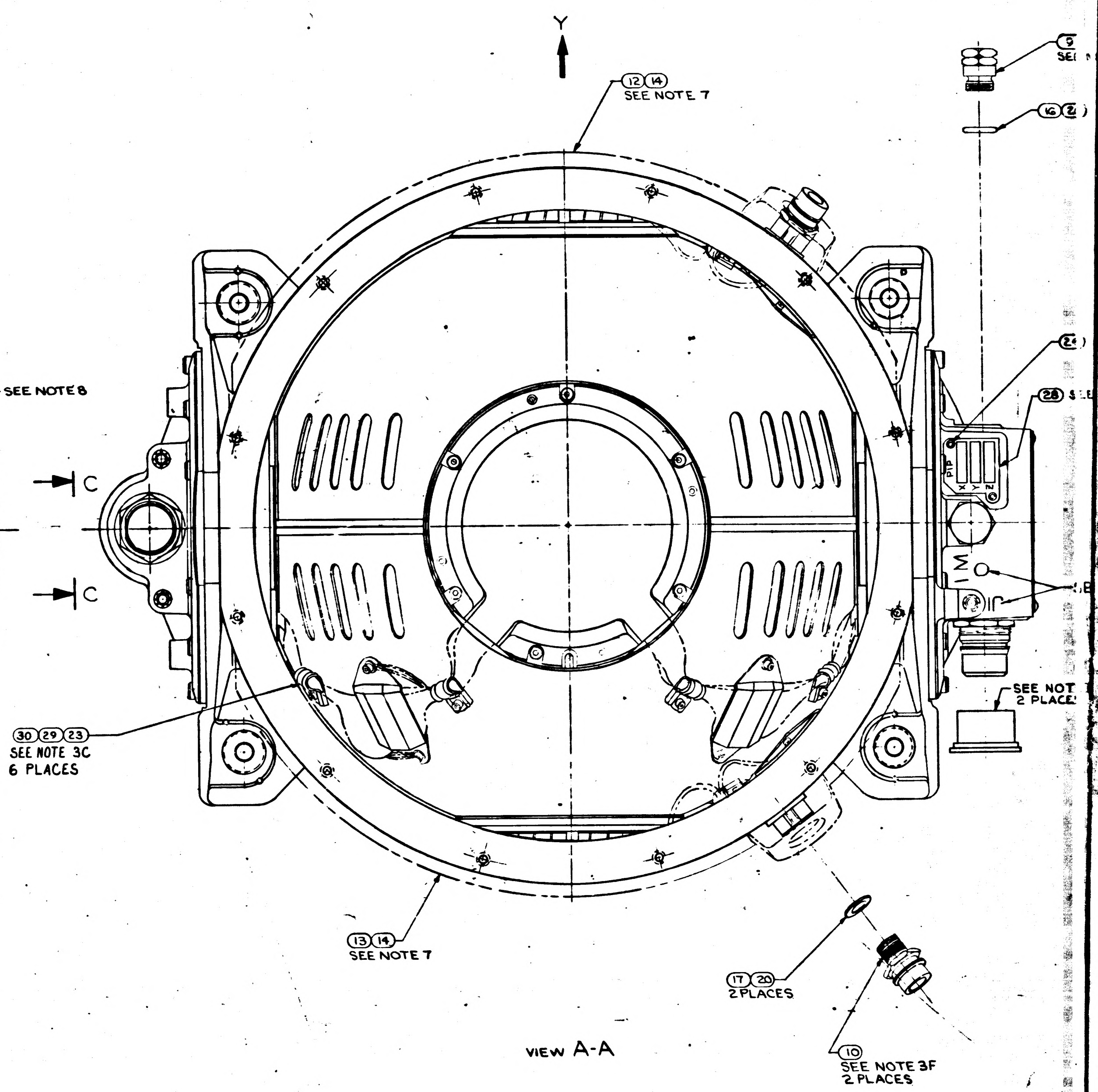

E
3
22
SEE NOTE 3E
12 PLACES
15 20
11
SEE NOTE 3F
18 20
A
2
41
54
60
62 63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
SEE NOTE 3D
AND 21
6 PLACES
4
42
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
22
SEE NOTE 3E
12 PLACES
B
B
27
25
SEE NOTE 3C
4 PLACES
SEE NOTE 3G
2 PLACES
7
SEE NOTE 3A
6 PLACES
E10 REF
1
61


APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY M.I.T. INSTRUMENTATION LAB
MFD BY
SEE NOTE 9

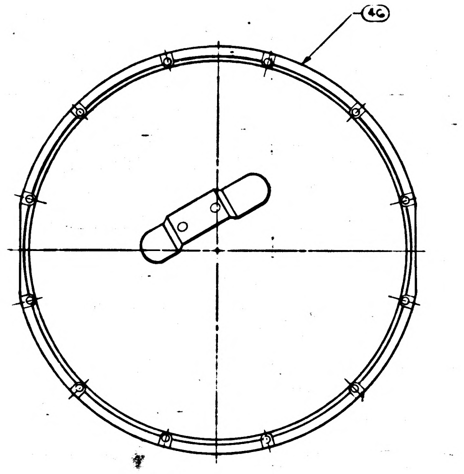
VIEW B-B


SEE NOTE 8
J2

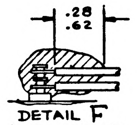
VIEW C-C


Y
12 14
SEE NOTE 7
9
16
24
28
C
C
PIP
X Y Z
I M
SEE NOT
2 PLACE
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES

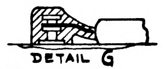
VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211, 221, CONFIGURATION



DETAIL F
(-071 AND ON



DETAIL G
CONFIGURATION)

2018601 BR

2/2018601

REVISIONS

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	T/C
	BF	REVISED PER TDRR 35745		25 MAR 68	T
	BG	REVISED PER TDRR 35750		8 MAR 68	T
	BH	REVISED PER TDRR 35751		16 APR 68	JJJ
	BJ	REVISED PER TDRR 36003		18 APR 68	JJJ
	BK	REVISED PER TDRR 36472		25 JUL 68	
	BL	REVISED PER TDRR 36560		30 JUL 68	T
	BM	REVISED PER TDRR 36591		31 JUL 68	SA
	BN	REVISED PER TDRR 37265		3 FEB 69	B
	BP	REVISED PER TDRR 37367		26 JUN 69	SA
	BR	REVISED PER TDRR 3-896		8 OCT 69	

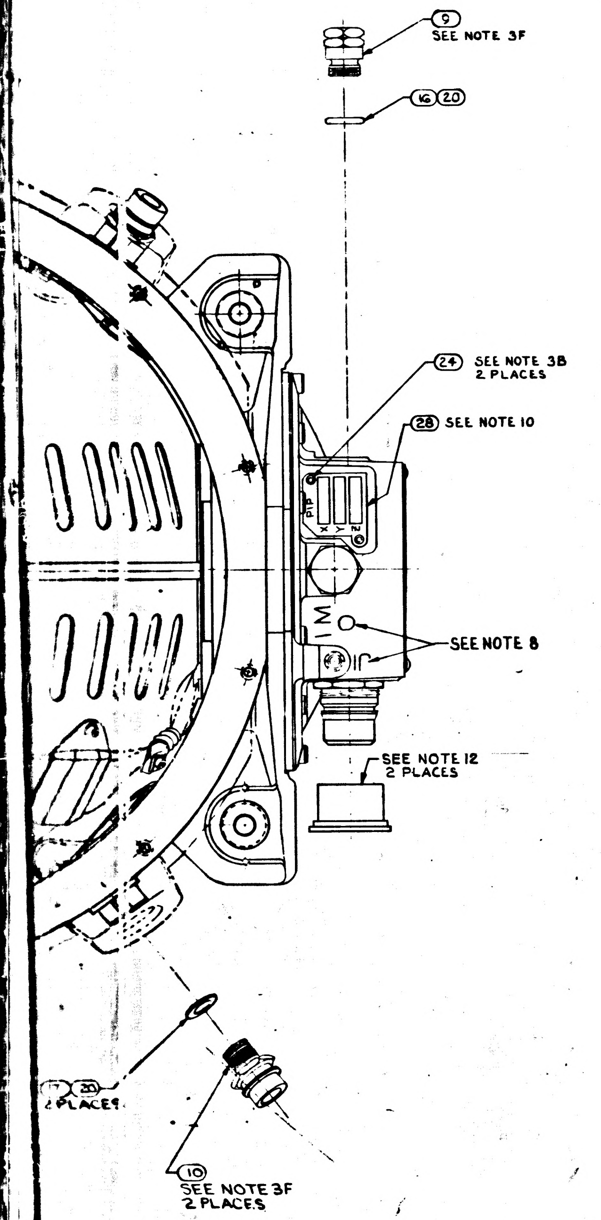
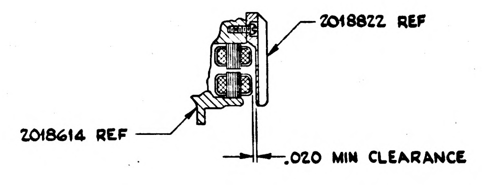


TABLE III

IMU CONFIGURATION 2018601	ALLOWABLE GYRO CONFIGURATIONS 2021500-																	
	011	021	031	041	051	061	071	081	091	101	111	121			151			181
-011			X	X	X	X	X				X				X			X
-021			X		X		X				X				X			X
-031			X	X	X	X	X				X				X			X
-041					X		X											
-051					X		X											
-061					X		X											
-071					X		X								X			X
-081					X		X											
-091			X		X		X				X							
-111							X											
-121							X								X			X
-131			X	X	X	X	X				X							
-141			X		X		X				X				X			X
-151							X											
-161							X											
-171			X	X	X	X	X				X							
-181			X		X		X				X							
-191								X		X	⊗				⊗			⊗
-201								X		X	⊗				⊗			⊗
-211								X		X	X							
-221											X				X			X
-231											X				X			X

⊗ DENOTES IMU WILL CHANGE PART NUMBER IF THREE -111 OR HIGHER CONFIGURATION GYROS ARE USED.



DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO.	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	-	-	1	-	67		2018738-021	CASE CENTER, MACHINING ASSY	
																						66				
																						65				
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
																						61				
-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
																						57				
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
																						51				
																						50				
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	49		2021500	IRIG PREALIGNED ASSY	SEE TABLE III
-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	-	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT. AND MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT, BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW,BUTTON HD,SELF-LKG,SOC,SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
-	-	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN. T.M. OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR, OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	1	1	-	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED

LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J3
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

NOTES:

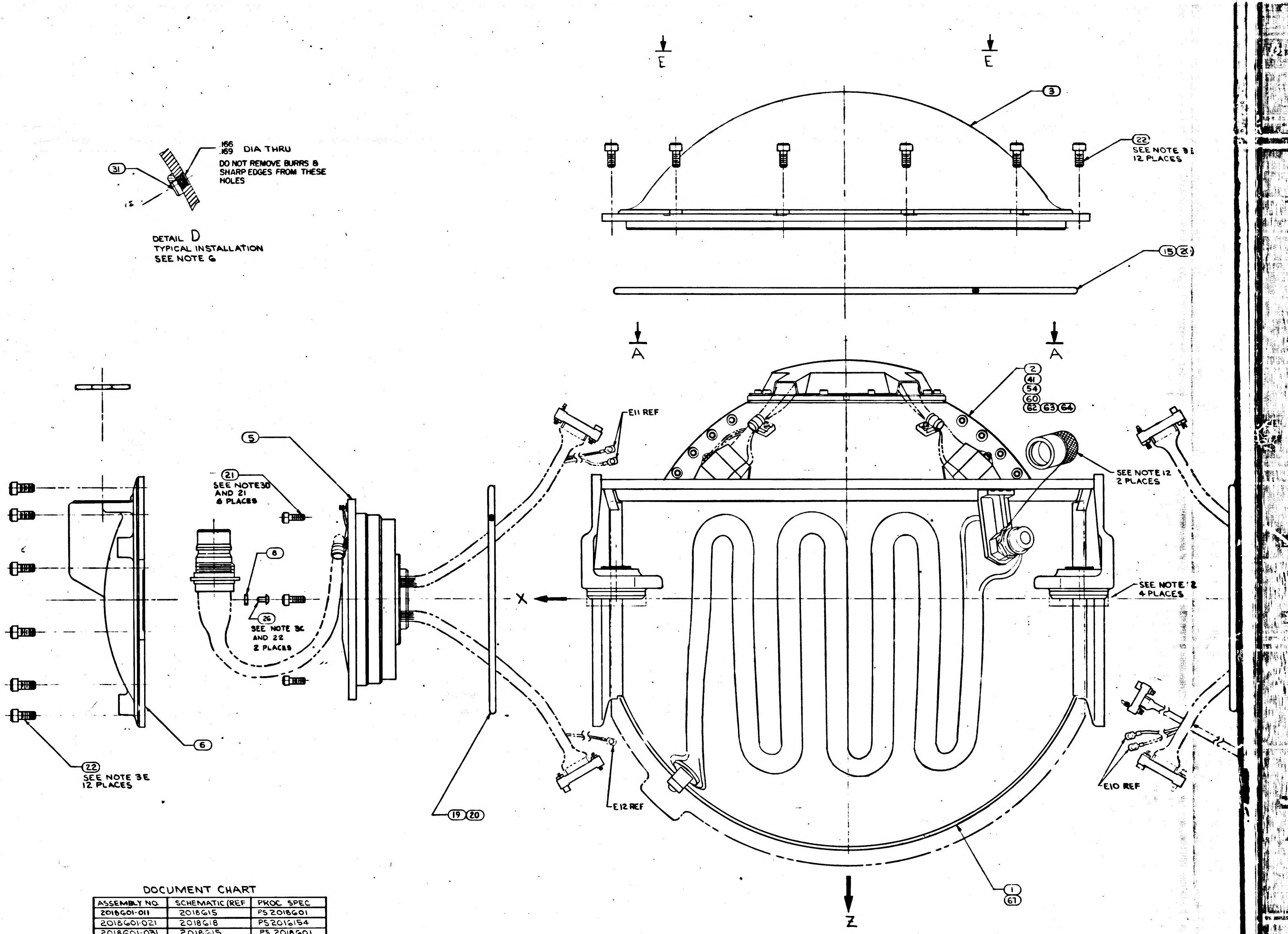
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 6.5 IN.-LB
   - D. 13.0 IN.-LB
   - E. 35.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10) , (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM (1) OR (67)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16.

17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19.

20. APPLY CONFORMED COATING OF ITEMS (55) , (56) , (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
    - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.

    CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS.AND UNDERSIDE OF SCREW HEAD.
23.

24.



DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS 2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS 2016154
2018601-071	2018618	PS 2016152
2018601-081	2018618	PS 2016154
2018601-111	2018618	PS 2016152
2018601-121	2018618	PS 2016154
2018601-131	2018615	PS 2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS 2016152
2018601-161	2021398	PS 2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

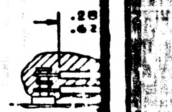
CABLE CLAMP (29)

PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

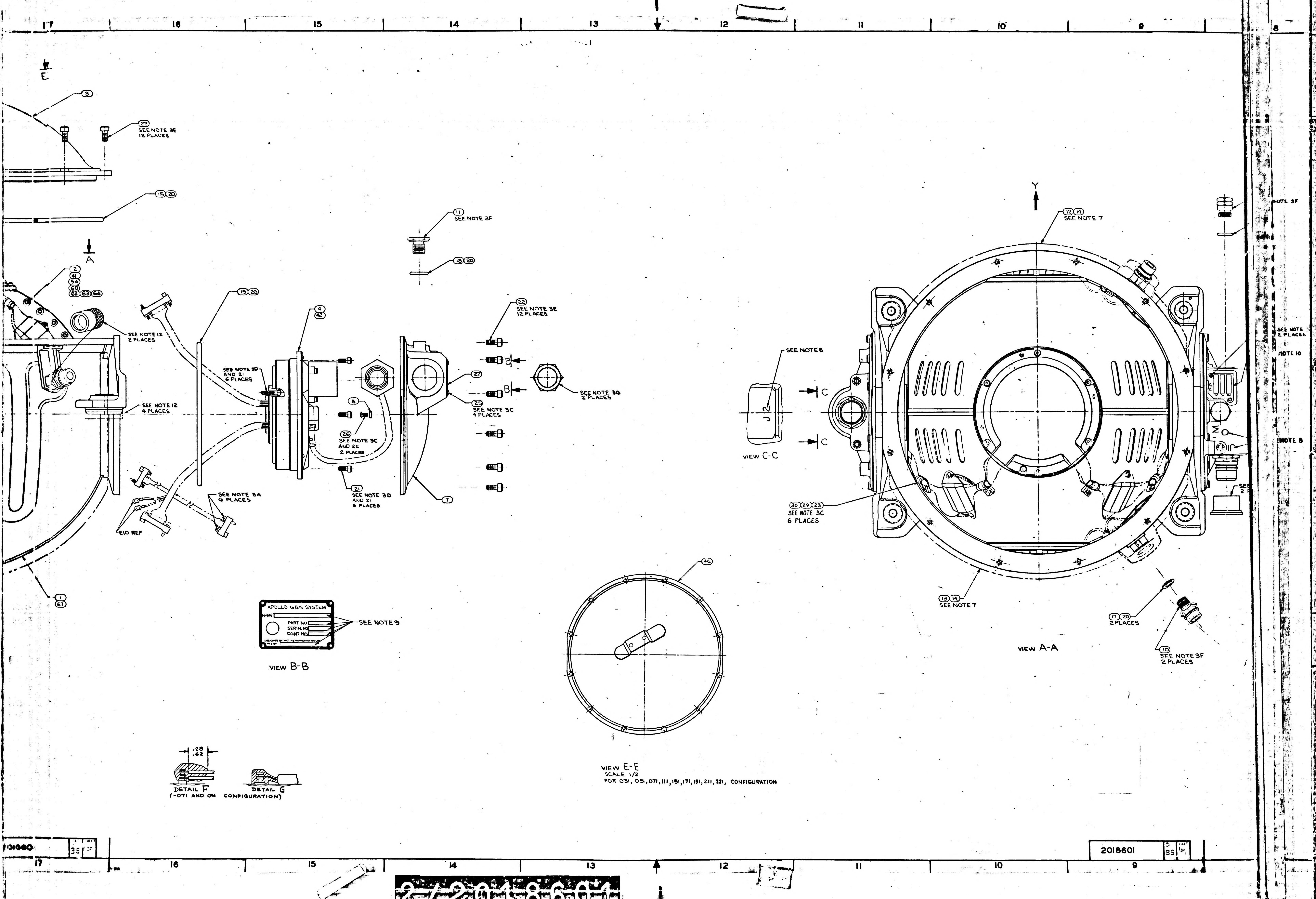
TABLE II

SCREW SELECTION CHART (32)

PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	



DETAIL
(-071 AND


17
16
15
14
13
12
11
10
9
8
E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
2
41
54
60
62 63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
SEE NOTE 3D
AND 21
6 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
1
61
11
SEE NOTE 3F
18 20
4
42
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
27
25
SEE NOTE 3C
4 PLACES
7
22
SEE NOTE 3E
12 PLACES
B
B
SEE NOTE 3G
2 PLACES
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO
CONT NO
DESIGNED BY M.I.T. INSTRUMENTATION LAB
MFD BY
SEE NOTE 9
VIEW B-B
46
VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211, 221, CONFIGURATION
.28
.62
DETAIL F
DETAIL G
(-071 AND ON CONFIGURATION)
SEE NOTE 8
J2
C
C
VIEW C-C
Y
12 14
SEE NOTE 7
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
PIP
X
Y
Z
IM
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES
VIEW A-A
NOTE 3F
SEE NOTE 3
2 PLACES
NOTE 10
NOTE 8
SEE
2 P
01060
BS
2018601
BS
2/2018601

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	TJC
	BF	REVISED PER TDRR 35745		25 MAR 68	
	BG	REVISED PER TDRR 35750		[illegible] MAR 68	
	BH	REVISED PER TDRR 35751		16 APR 68	JJJ
	BJ	REVISED PER TDRR 36003		18 APR 68	JJJ
	BK	REVISED PER TDRR 36472		25 JUL 68	
	BL	REVISED PER TDRR 36560		30 JUL 68	
	BM	REVISED PER TDRR 36591		31 JUL 68	SA
	BN	REVISED PER TDRR 37265		3-FEB-69	B.
	BP	REVISED PER TDRR 37367		26 FEB 69	SA
	BR	REVISED PER TDRR 3-896		31 OCT 69	
	BS	REVISED PER TDRR 38106		21 MAY -70	B.

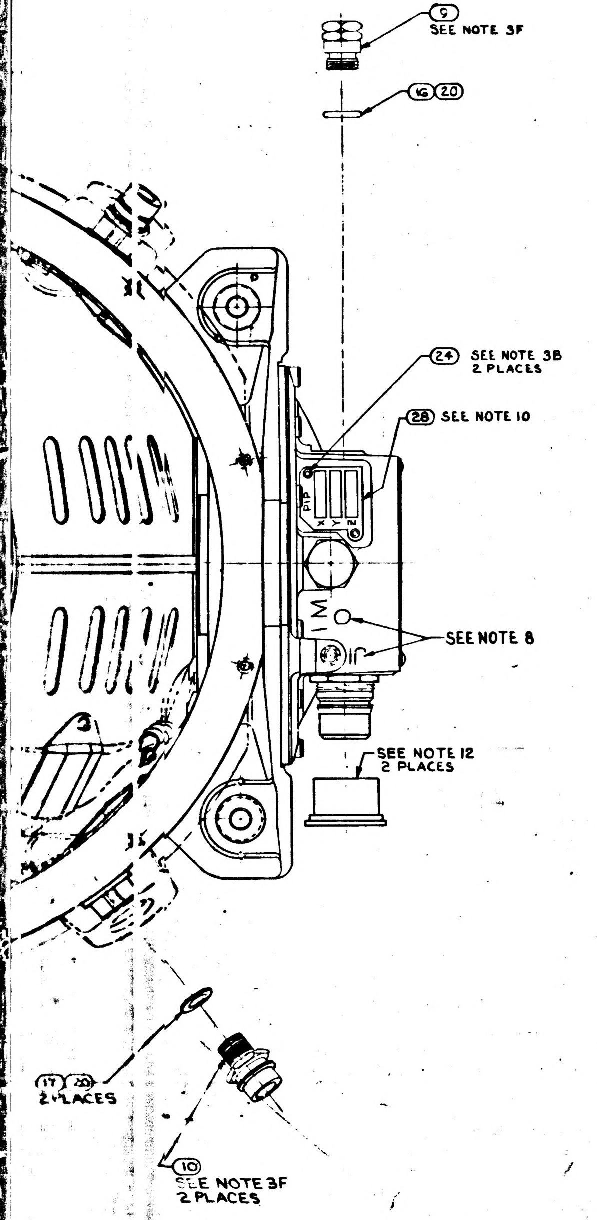
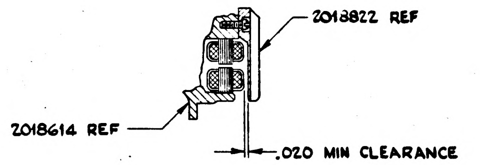


TABLE III

IMU CONFIGURATION 2018601	ALLOWABLE GYRO CONFIGURATIONS 2021500- 011	021	031	041	051	061	071	081	091	101	111	121			151		171	181
-011			X	X	X	X	X				X				X		X	X
-021			X		X		X				X				X		X	X
-031			X	X	X	X	X				X				X		X	X
-041					X		X											
-051					X		X											
-061					X		X											
-071					X		X								X		X	X
-081					X		X											
-091			X		X		X				X							
-111							X											
-121							X								X		X	X
-131			X	X	X	X	X				X							
-141			X		X		X				X				X		X	X
-151							X											
-161							X											
-171			X	X	X	X	X				X							
-181			X		X		X				X							
-191								X		X	⊗				⊗		⊗	⊗
-201								X		X	⊗				⊗		⊗	⊗
-211								X		X	X							
-221											Y				X		X	X
-231											X				X		X	X

⊗ DENOTES IMU WILL CHANGE PART NUMBER IF THREE -111 OR HIGHER CONFIGURATION GYROS ARE USED.



DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO.	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	-	-	1	-	67		2018738-021	CASE CENTER, MACHINING ASSY	
																						66				
																						65				
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
																						61				
-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
																						57				
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
																						51				
																						50				
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	49		2021500	IRIG PREALIGNED ASSY	SEE TABLE III
-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	-	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011 25-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018334	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT. AND MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT, BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1000159-6	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
-	-	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN. T.M. OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	1	1	-	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED | LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

NEXT ASSY	USED ON
G007001	G015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

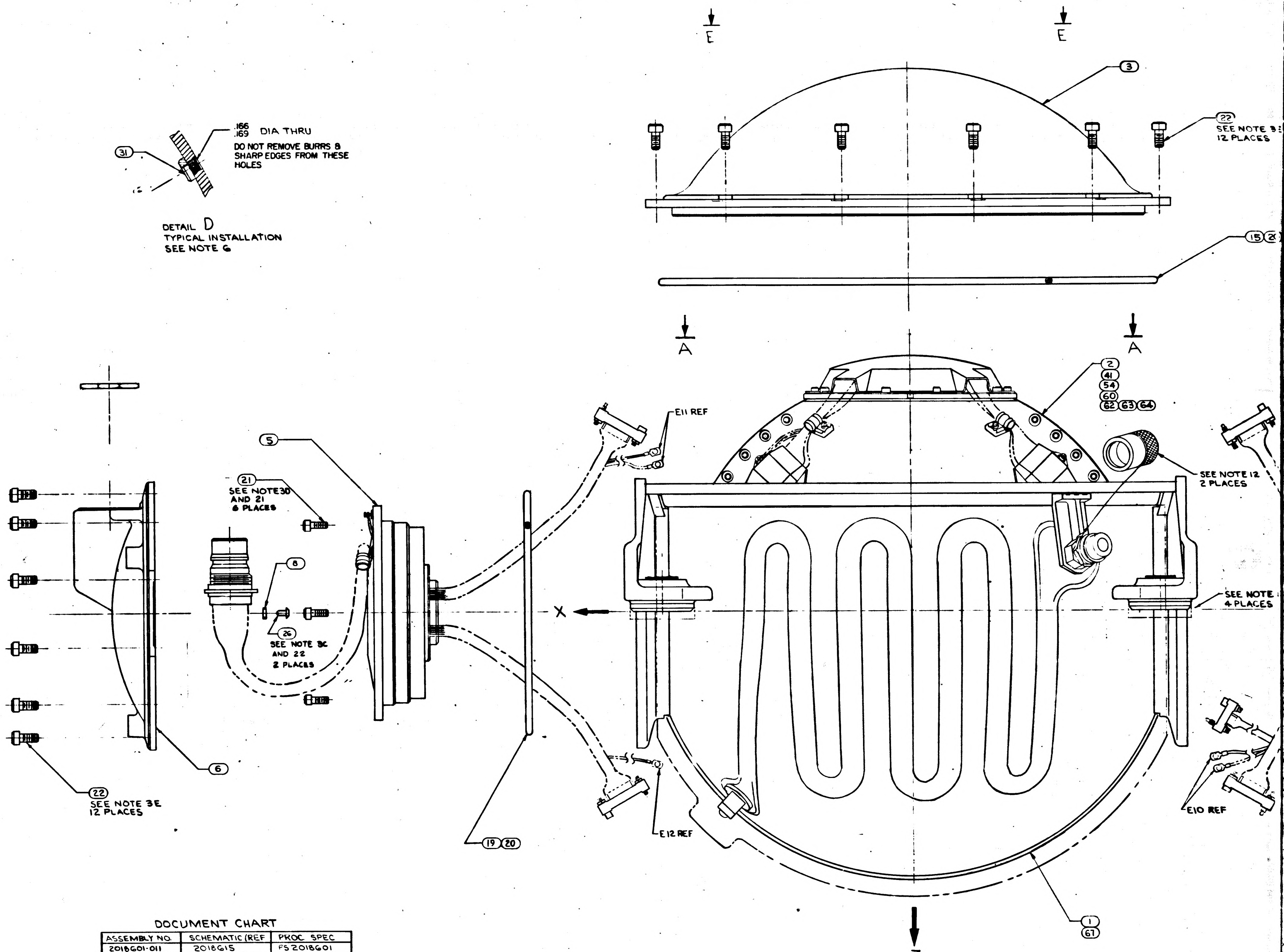
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 [illegible] 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 [illegible] 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230 | SIZE J3 | NASA DRAWING NO. 2018601
SCALE 1/1 | WT | SHEET 1 OF 1

2018601 | BS | SHEET OF



NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 6.5 IN.-LB
   - D. 13.0 IN.-LB
   - E. 35.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\substack{.23\\.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\substack{.10\\.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10) , (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM (1) OR (67)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19.
20. APPLY CONFORMED COATING OF ITEMS (55) , (56) , (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
    - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.

    CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS.AND UNDERSIDE OF SCREW HEAD.
23.
24.

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC. SPEC
2018601-011	2018615	PS2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154
2018601-131	2018615	PS2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS2016152
2018601-161	2021398	PS2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154

TABLE I

CABLE CLAMP (29)

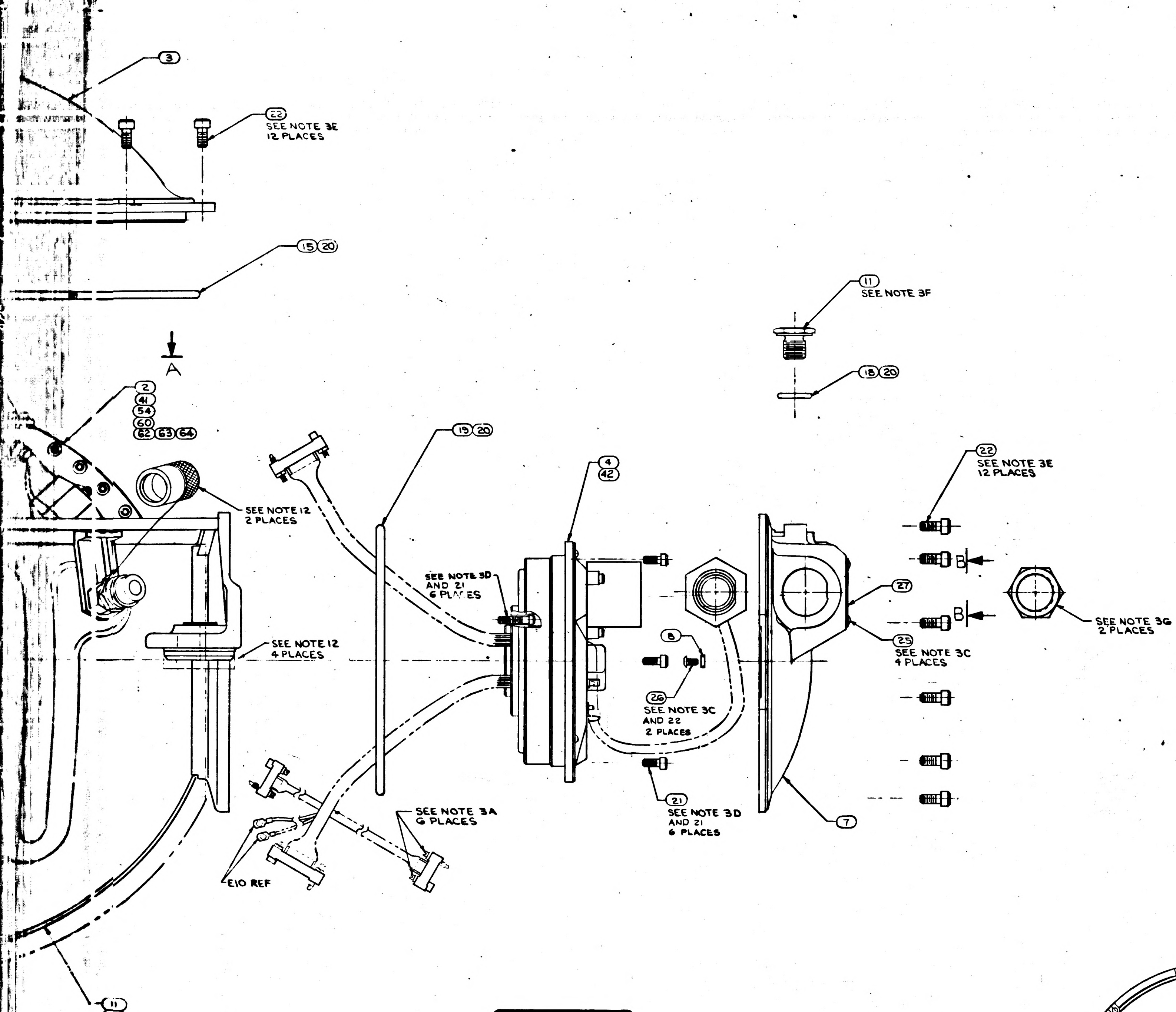
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

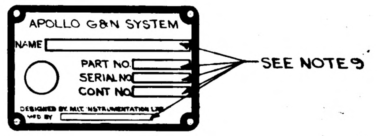
TABLE II

SCREW SELECTION CHART (32)

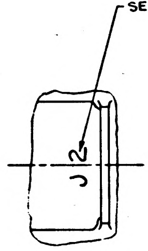
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	
-7	STABLE MEMBER
-10	
1011625-11	

2018601 | 3 | 1 OF

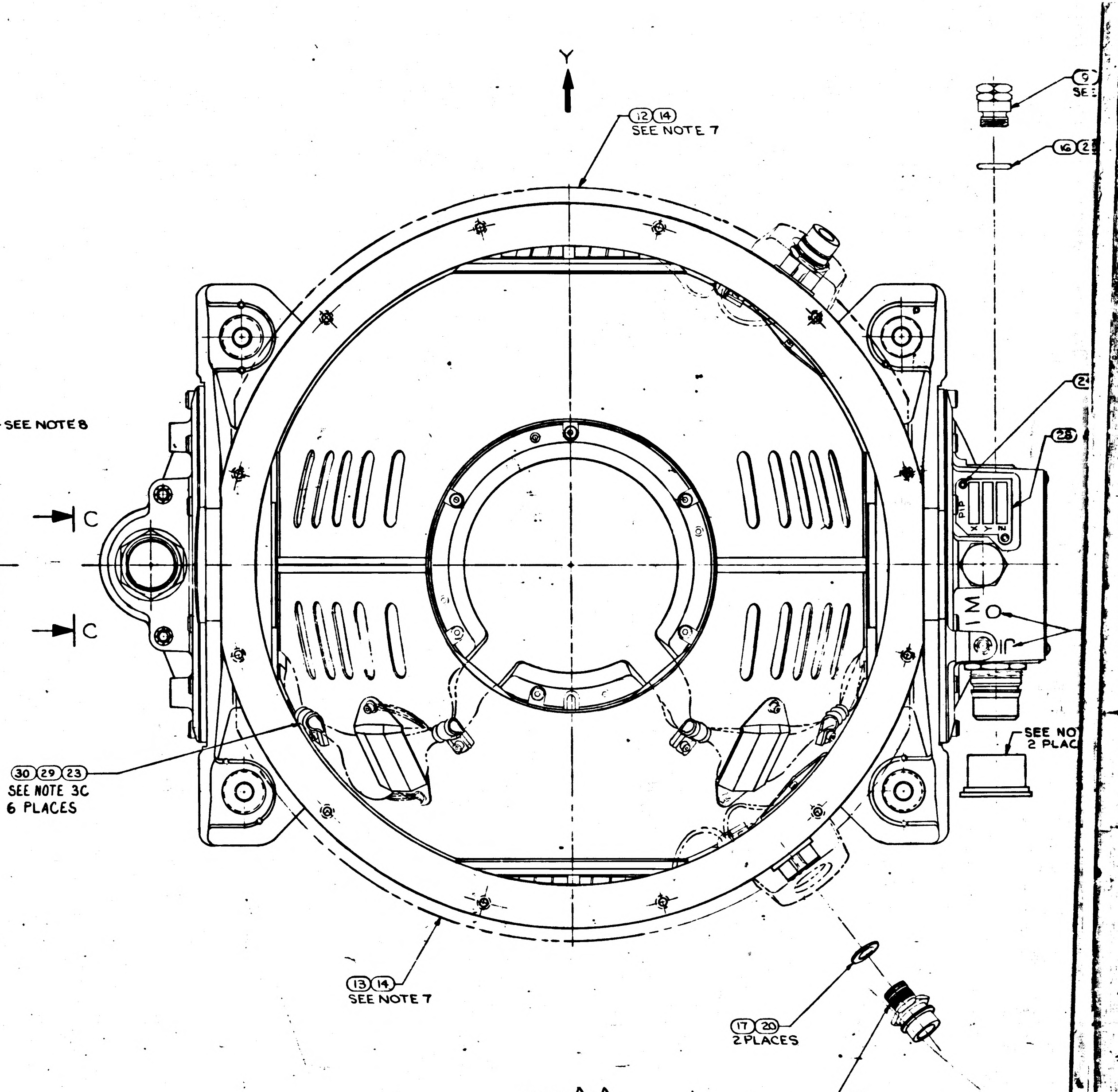

3
22
SEE NOTE 3E
12 PLACES
15 20
A
2
41
54
60
62 63 64
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
SEE NOTE 3D
AND 21
6 PLACES
4
42
11
SEE NOTE 3F
18 20
22
SEE NOTE 3E
12 PLACES
B
B
27
25
SEE NOTE 3C
4 PLACES
SEE NOTE 3G
2 PLACES
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
7
SEE NOTE 3A
6 PLACES
E10 REF
11
61


APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY M.I.T. INSTRUMENTATION LAB
MFD BY
SEE NOTE 9

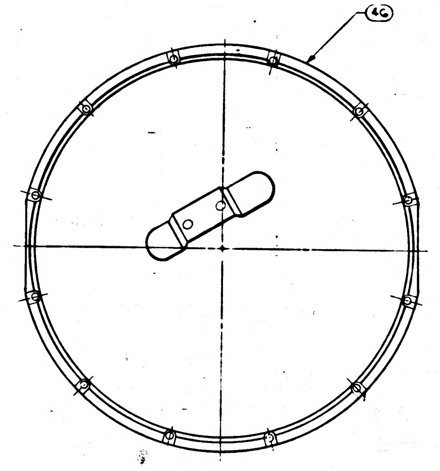
VIEW B-B


SEE NOTE 8
J2
C
C

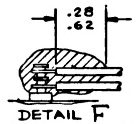
VIEW C-C

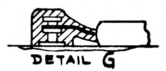

Y
12 14
SEE NOTE 7
9
SE
16 2
24
28
PIP
X Y Z
IMU
SEE NO
2 PLAC
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES

VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211, 221, CONFIGURATION





DETAIL F
(-071 AND ON CONFIGURATION)

DETAIL G

REVISIONS

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	
	BF	REVISED PER TDRR 35745		25 MAR 68	
	BG	REVISED PER TDRR 35750		8 MAR 68	
	BH	REVISED PER TDRR 35751		16 APR 68	JJJ
	BJ	REVISED PER TDRR 36003		18 APR 68	JJJ
	BK	REVISED PER TDRR 36472		25 JUL 68	
	BL	REVISED PER TDRR 36560		30 JUL 68	
	BM	REVISED PER TDRR 36591		31 JUL 68	
	BN	REVISED PER TDRR 37265		3-FEB-69	
	BP	REVISED PER TDRR 37367		20 [illegible] 69	
	BR	REVISED PER TDRR 37896		3 OCT 69	
	BS	REVISED PER TDRR 38106		3 MAY -70	
	BT	REVISED PER TDRR 38181		8 [illegible] 70	

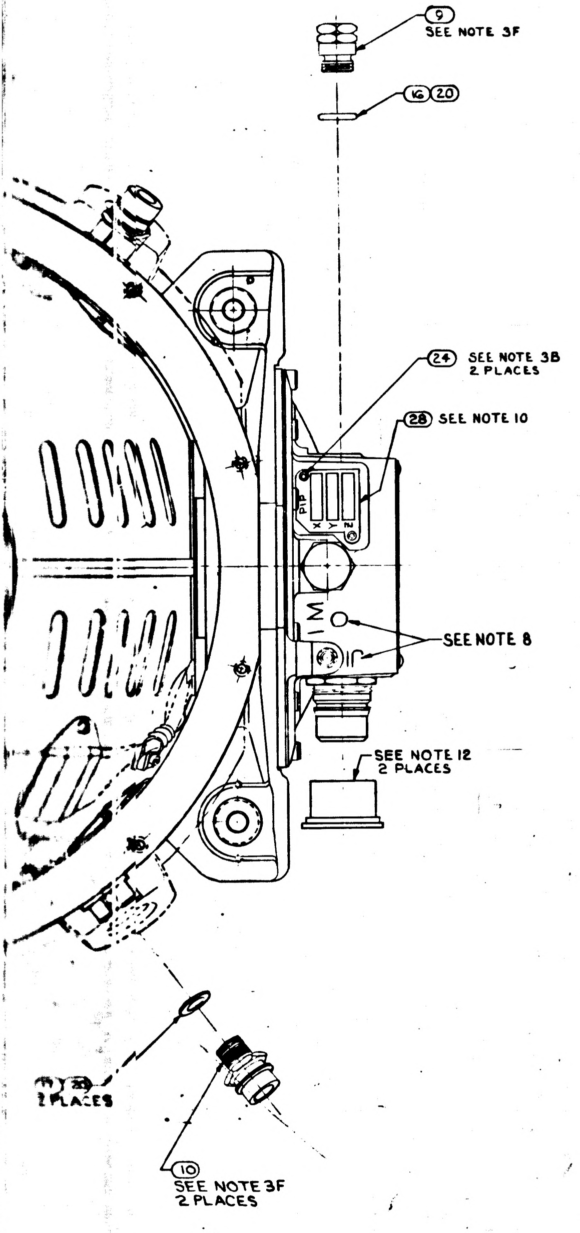
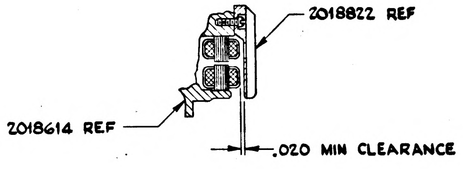


TABLE III

IMU CONFIGURATION 2018601	ALLOWABLE GYRO CONFIGURATIONS 2021500-																	
	011	021	031	041	051	061	071	081	091	101	111	121			151		171	181
-011			X	X	X	X	X				X				X		X	X
-021			X		X		X				X				X		X	X
-031			X	X	X	X	X				X				X		X	X
-041					X		X											
-051					X		X											
-061					X		X											
-071					X		X								X		X	X
-081					X		X											
-091			X		X		X				X							
-111							X											
-121							X								X		X	X
-131			X	X	X	X	X				X							
-141			X		X		X				X				X		X	X
-151							X											
-161							X											
-171			X	X	X	X	X				X							
-181			X		X		X				X							
-191								X		X	⊗				⊗		⊗	⊗
-201								X		X	⊗				⊗		⊗	⊗
-211								X		X	X							
-221											X				X		X	X
-231											X				X		X	X

⊗ DENOTES IMU WILL CHANGE PART NUMBER IF THREE -111 OR HIGHER CONFIGURATION GYROS ARE USED.



DETAIL IGSA RESOLVER, INNER AXIS

-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO.	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	-	-	1	-	67		2018738-021	CASE CENTER, MACHINING ASSY	
																						66				
																						65				
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
																						61				
-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
																						57				
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
																						51				
																						50				
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	49		2021500	IRIG PREALIGNED ASSY	SEE TABLE III
-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	-	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																						39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT. AND MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT, BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																						33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1009005-006	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
-	-	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135-001	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN. T.M. OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR OUTER AXIS	
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	-	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	1	1	-	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED

LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

NEXT ASSY	USED ON
G007001	G015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

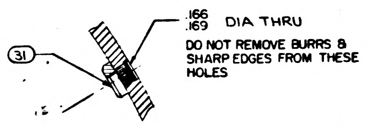
CODE IDENT NO. 80230
SIZE J3
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

2018601 BT

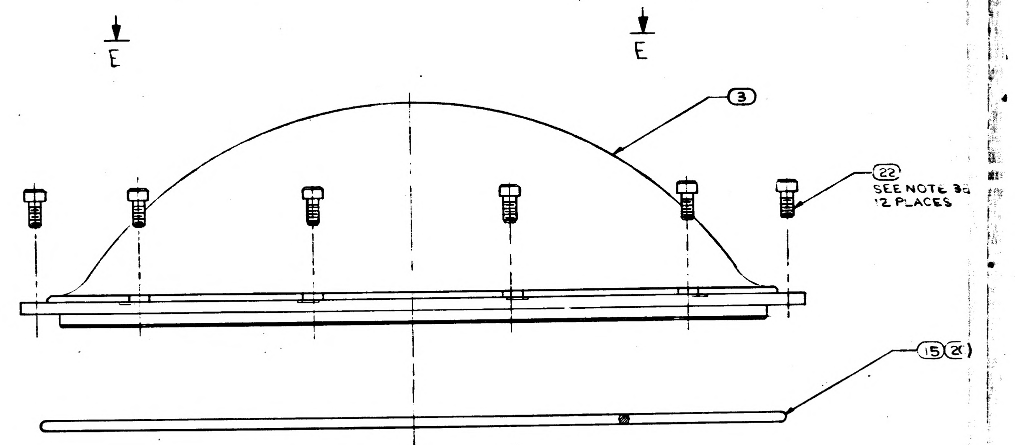
2018601

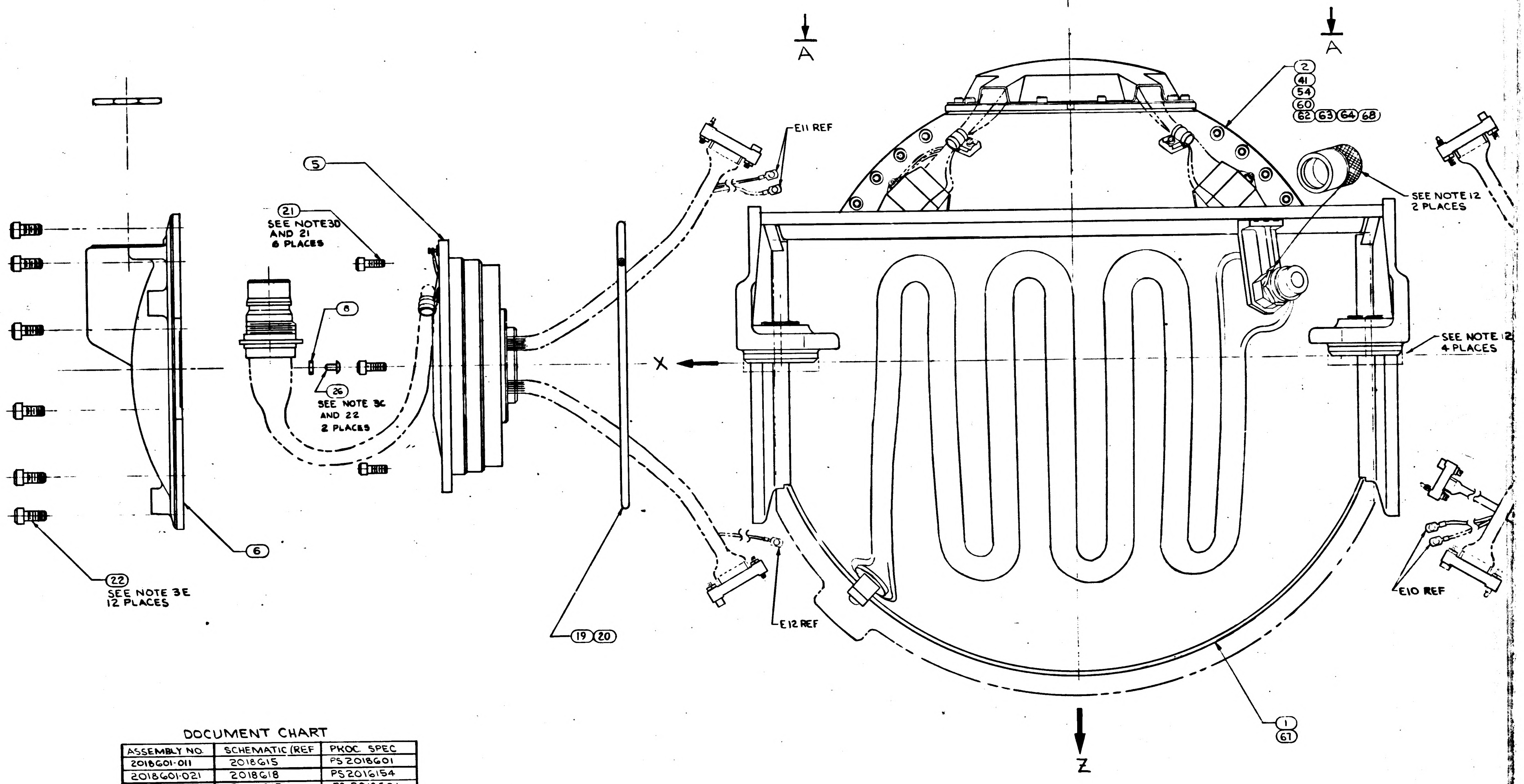
2018601 BT SHEET 1 OF 1

3/2018601



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6





NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED
      1.0 IN.-LB WHILE ENGAGING PINS
   B. 3.5 IN.-LB
   C. 6.5 IN.-LB
   D. 13.0 IN.-LB
   E. 35.0 IN.-LB
   F. 70.0 IN.-LB
   G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM ① USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM ① OR (67)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19.
20. APPLY CONFORMED COATING OF ITEMS (55), (56), (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B" BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
   A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
   B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
   CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23.
24.

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PROC SPEC
2018601-011	2018615	PS2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154
2018601-131	2018615	PS2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS2016152
2018601-161	2021398	PS2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154
2018601-241	2021398	PS2016152
2018601-251	2021398	PS2016154

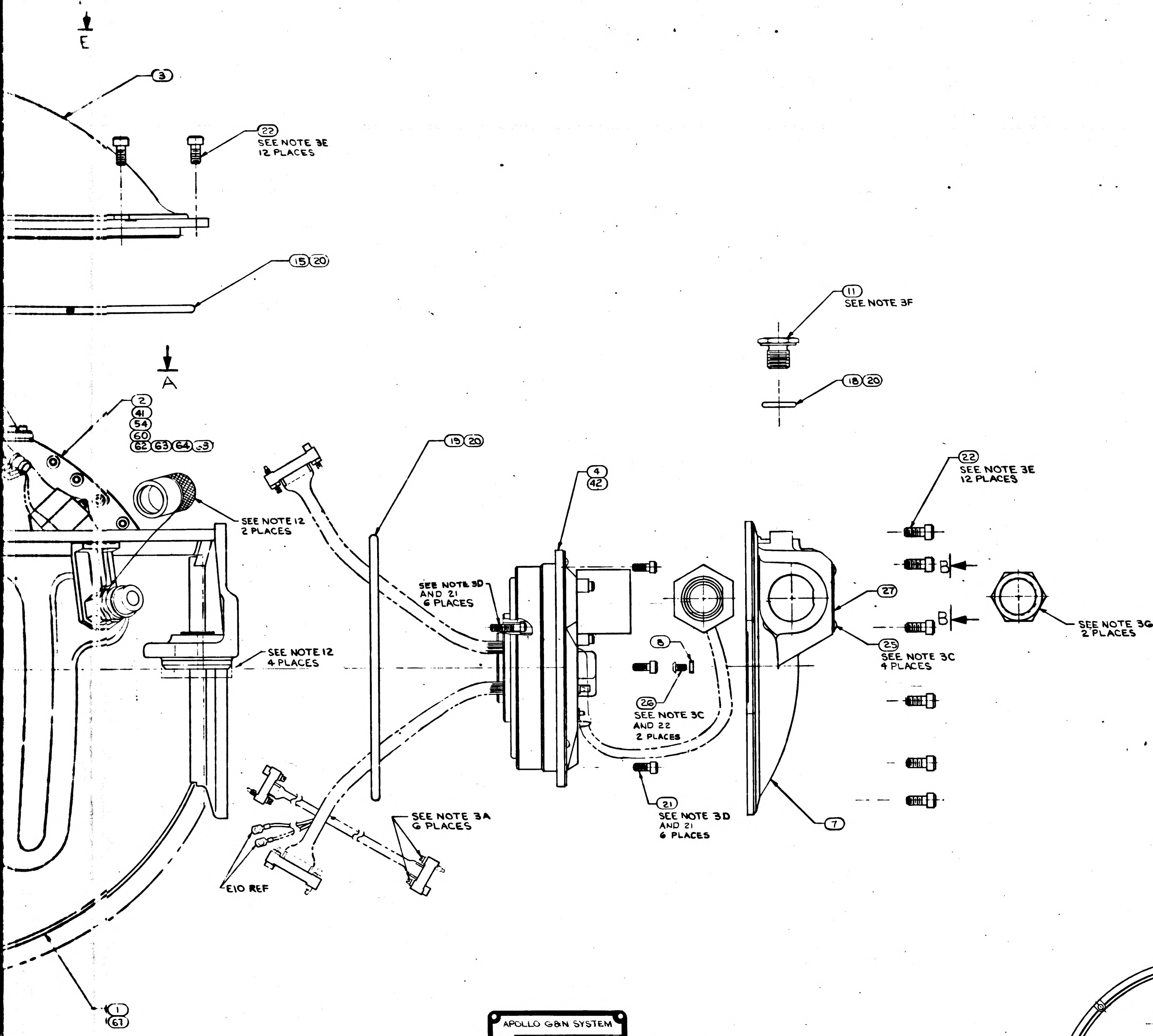
TABLE I

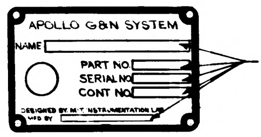
CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

TABLE II

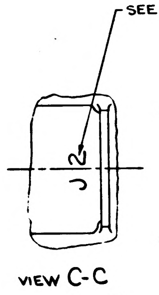
SCREW SELECTION CHART (32)	
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	

2018601 | 9J | SHEET 1 OF 1

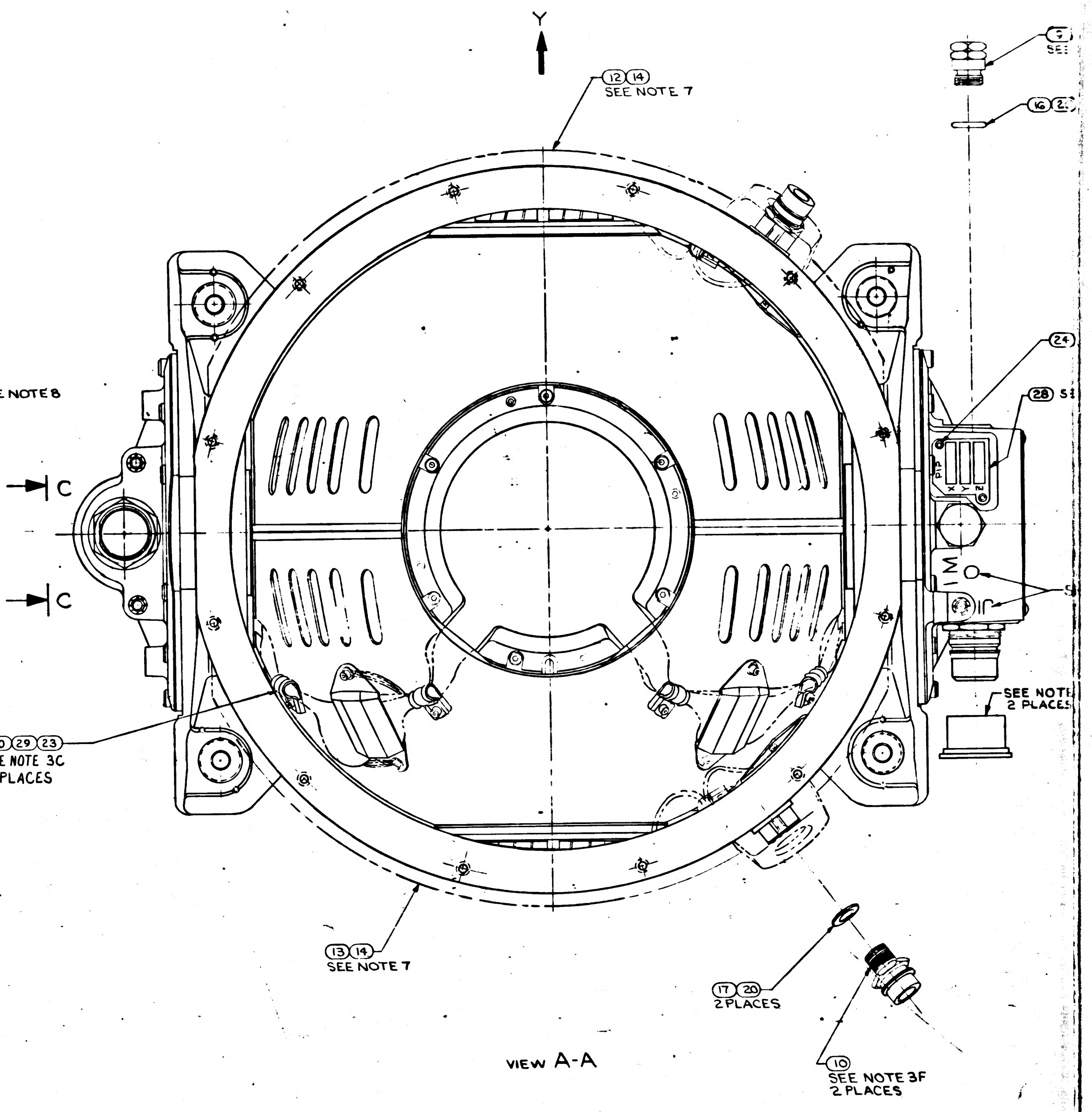

E
3
22
SEE NOTE 3E
12 PLACES
15 20
A
2
41
54
60
62 63 64 65
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
15 20
SEE NOTE 3D
AND 21
6 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
1
67
4
42
11
SEE NOTE 3F
18 20
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
22
SEE NOTE 3E
12 PLACES
B
B
27
25
SEE NOTE 3C
4 PLACES
7
SEE NOTE 3G
2 PLACES


APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
DESIGNED BY M.I.T. INSTRUMENTATION LAB
MFG BY
SEE NOTE 9

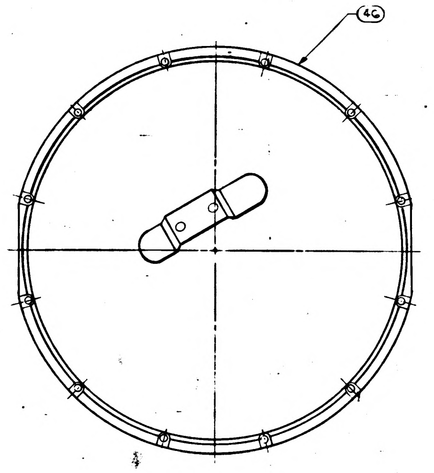
VIEW B-B


SEE NOTE 8
J2

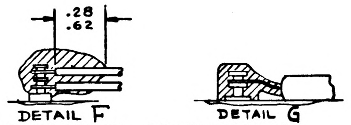
VIEW C-C


Y
12 14
SEE NOTE 7
C
C
24
28
X Y Z
M
30 29 23
SEE NOTE 3C
6 PLACES
SEE NOTE
2 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES
16
SE

VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211, 221, 241 CONFIGURATION.



DETAIL F
DETAIL G
(-071 AND ON CONFIGURATION)

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	
	BF	REVISED PER TDRR 35745		25 MAR 68	
	BG	REVISED PER TDRR 35750		8 MAR 68	
	BH	REVISED PER TDRR 35751		16 APR 68	JJJ
	BJ	REVISED PER TDRR 36003		18 APR 68	JJJ
	BK	REVISED PER TDRR 36472		[illegible]	
	BL	REVISED PER TDRR 36560		30 JUL 68	
	BM	REVISED PER TDRR 36591		31 JUL 68	
	BN	REVISED PER TDRR 37265		3-FEB-69	
	BP	REVISED PER TDRR 37367		26 FEB 69	
	BR	REVISED PER TDRR 37896		[illegible]	
	BS	REVISED PER TDRR 38106		[illegible] 70	
	BT	REVISED PER TDRR 38181		[illegible]	
	BU	REVISED PER TDRR 38320		[illegible]	

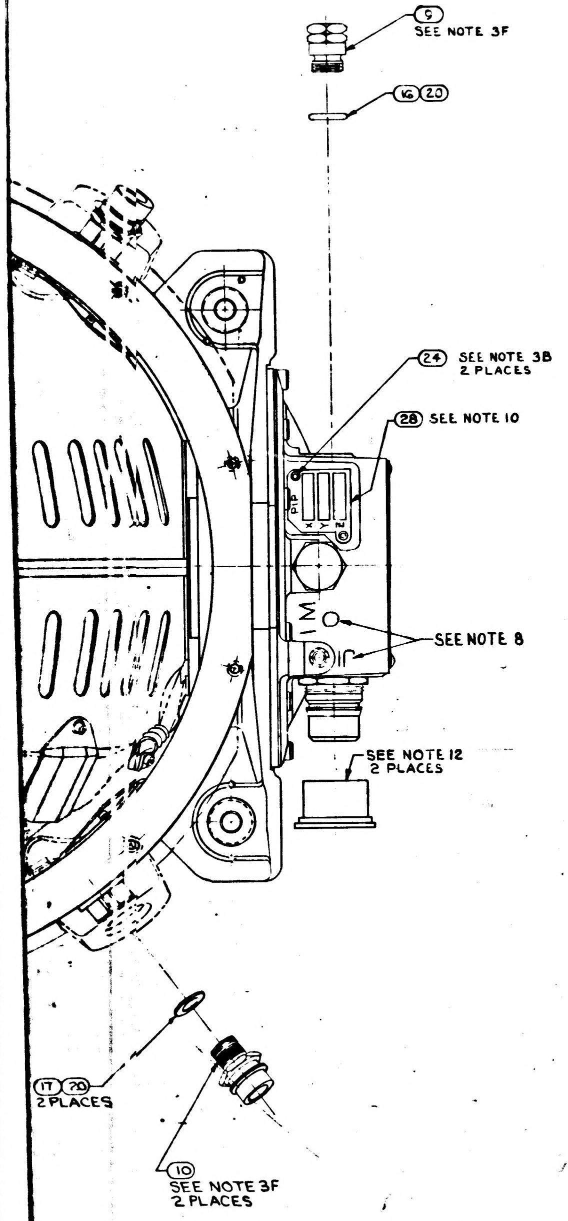
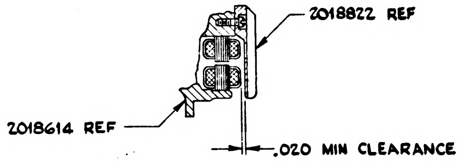


TABLE III

IMU CONFIGURATION 2018601	ALLOWABLE GYRO CONFIGURATIONS 2021500- 011	021	031	041	051	061	071	081	091	101	111	121			151		171	181
-011			X	X	X	X	X				X				X		X	X
-021			X		X		X				X				X		X	X
-031			X	X	X	X	X				X				X		X	X
-041					X		X											
-051					X		X											
-061					X		X											
-071					X		X								X		X	X
-081					X		X											
-091			X		X		X				X							
-111							X											
-121							X								X		X	X
-131			X	X	X	X	X				X							
-141			X		X		X				X				X		X	X
-151							X											
-161							X											
-171			X	X	X	X	X				X							
-181			X		X		X				X							
-191								X		X	⊗				⊗		⊗	⊗
-201								X		X	⊗				⊗		⊗	⊗
-211								X		X	X							
-221											X				X		X	X
-231											X				X		X	X
-241											X				X		X	X
-251											X				X		X	X

⊗ DENOTES IMU WILL CHANGE PART NUMBER IF THREE -111 OR HIGHER CONFIGURATION GYROS ARE USED.



DETAIL IGSA RESOLVER, INNER AXIS

-251	-241	-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO.	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
1	1																							68		2018602-081	OUTER AXIS ASSEMBLY	
1	—	1	—	—	1	—	1	—	1	—	1	—	1	—	1	1	—	1	—	—	—	1	—	67		2018738-021	CASE CENTER, MACHINING ASSY	
																								66				
																								65				
—	—	—	—	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	—		—	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
—	—	1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
																								61				
—	—	—	—	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-		-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
																								57				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
—	—	—	—	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
																								51				
																								50				
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	49		2021500	IRIG PREALIGNED ASSY	SEE TABLE III
—	3	-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	—	3	—	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
—	1	-	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
—	—	—	—	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																								39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT. AND MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT, BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																								33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1009005-006	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
—	—	—	—	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
—	—	—	—	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
—	—	—	—	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135-001	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN. T.M. OUTER AXIS	
—	—	—	—	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR, OUTER AXIS	
—	—	—	—	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	—	1	—	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
—	—	—	—	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
—	1	—	1	1	—	1	—	1	—	1	—	1	—	1	—	—	1	—	1	1	1	—	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED

LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

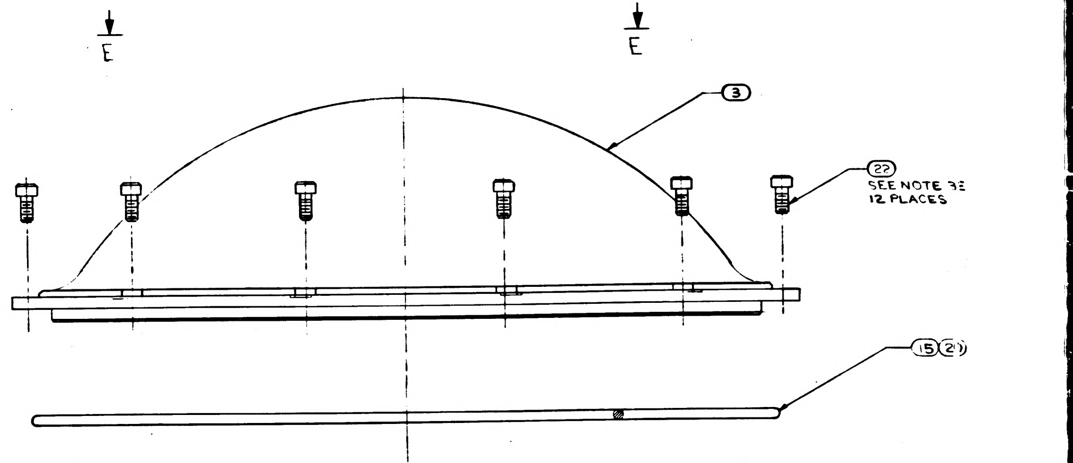
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

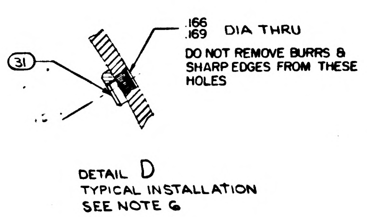
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL W.J. [illegible] 3-23-65
MIT APPROVAL W. [illegible] 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

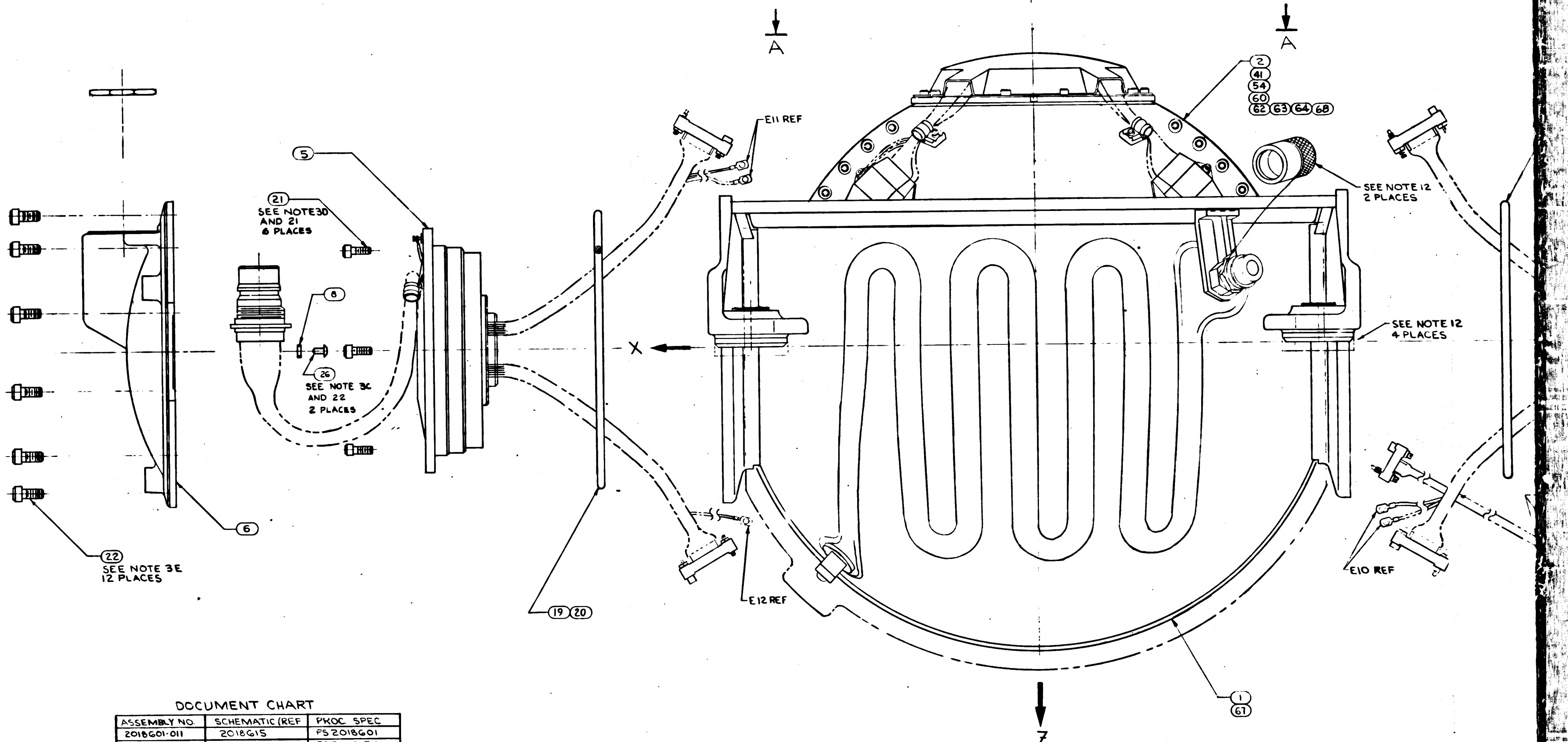
INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J3
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1





DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6



NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS AS SPECIFIED IN THE APPLICABLE SPECIFICATION SEE DOCUMENT CHART.
3. SCREW TORQUE REQUIREMENTS ± 7%.
   - A. 2.0 IN.-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN.-LB WHILE ENGAGING PINS
   - B. 3.5 IN.-LB
   - C. 6.5 IN.-LB
   - D. 13.0 IN.-LB
   - E. 35.0 IN.-LB
   - F. 70.0 IN.-LB
   - G. 80.0 IN.-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED AS REQUIRED. SEE NOTE 6.
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14) ADJOINING SURFACES OF ITEMS (12) AND (13) TO BE BONDED TO EACH OTHER.
8. MARK CHARACTERS $\begin{smallmatrix}.23\\.27\end{smallmatrix}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. ENGRAVE CHARACTERS $\begin{smallmatrix}.10\\.14\end{smallmatrix}$ HIGH AND FILL, COLOR BLACK PER ND 1002019.
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASSY NASA DRAWING NO. 2018639 OR 2001730 IN APPROPRIATE BLOCKS PER ND 1002019.
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND 1002223 WHEN ITEMS (10) , (17) AND (20) ARE ASSEMBLIED TO CASE, ITEM (1) OR (67)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 142°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 OR 2001730 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE.
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.
15. SEE NASA DRAWING NO. 2018605 FOR INSTALLATION INFORMATION.
16.
17. APPLY SEALING COMPOUND PER NASA DRAWING NO. 1006338-000 TO SECURE PRECISION RESOLVER ADJUST POT SCREW HEADS SUBSEQUENT TO ISS LEVEL ADJUSTMENT.
18. TAPE (53) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
19.
20. APPLY CONFORMED COATING OF ITEMS (55) , (56) , (58) PREPARED IN ACCORDANCE WITH ND 1002009, METHOD J, STAKING COMPOUND, EXCEPT AS NOTED IN "A" AND "B' BELOW, AND APPLY A COATING AS SHOWN IN DETAIL "F" TO ALL TERMINALS CONTAINING INSULATED WIRE, AND TO ALL TURRET TYPE TERMINALS ON PIPA SUSPENSION MODULES AS SHOWN IN DETAIL "G".
    - A. MIX COMPOUND USING 3-4% OF ITEM (58) FOR USE IN AREAS WHICH ARE NOT READILY ACCESSIBLE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.
    - B. MIX COMPOUND USING 5-6% OF ITEM (58) FOR ALL AREAS OTHER THAN LISTED IN "A" ABOVE. DO NOT USE COLORANT PER 1008822-1. INTERNAL VOIDS ARE PERMISSABLE.

    CURE APPLIED COATINGS AT 130° ± 10°F FOR A MINIMUM OF 24 HOURS.
21. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS.
22. APPLY A UNIFORM THIN FILM OF ITEM (59) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
23.
24.

DOCUMENT CHART

ASSEMBLY NO.	SCHEMATIC (REF	PKOC SPEC
2018601-011	2018615	PS 2018601
2018601-021	2018618	PS2016154
2018601-031	2018615	PS 2018601
2018601-041	2018618	PS 2016152
2018601-051	2018618	PS 2016152
2018601-061	2018618	PS2016154
2018601-071	2018618	PS2016152
2018601-081	2018618	PS2016154
2018601-111	2018618	PS2016152
2018601-121	2018618	PS2016154
2018601-131	2018615	PS2018601
2018601-141	2018618	PS 2016154
2018601-151	2021398	PS2016152
2018601-161	2021398	PS2016154
2018601-171	2021402	PS 2018601
2018601-181	2021398	PS 2016154
2018601-191	2021398	PS 2016152
2018601-201	2021398	PS 2016154
2018601-211	2018618	PS 2016152
2018601-221	2021398	PS 2016152
2018601-231	2021398	PS 2016154
2018601-241	2021398	PS2016152
2018601-251	2021398	PS2016154

TABLE I

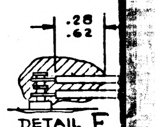
CABLE CLAMP (29)

PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

TABLE II

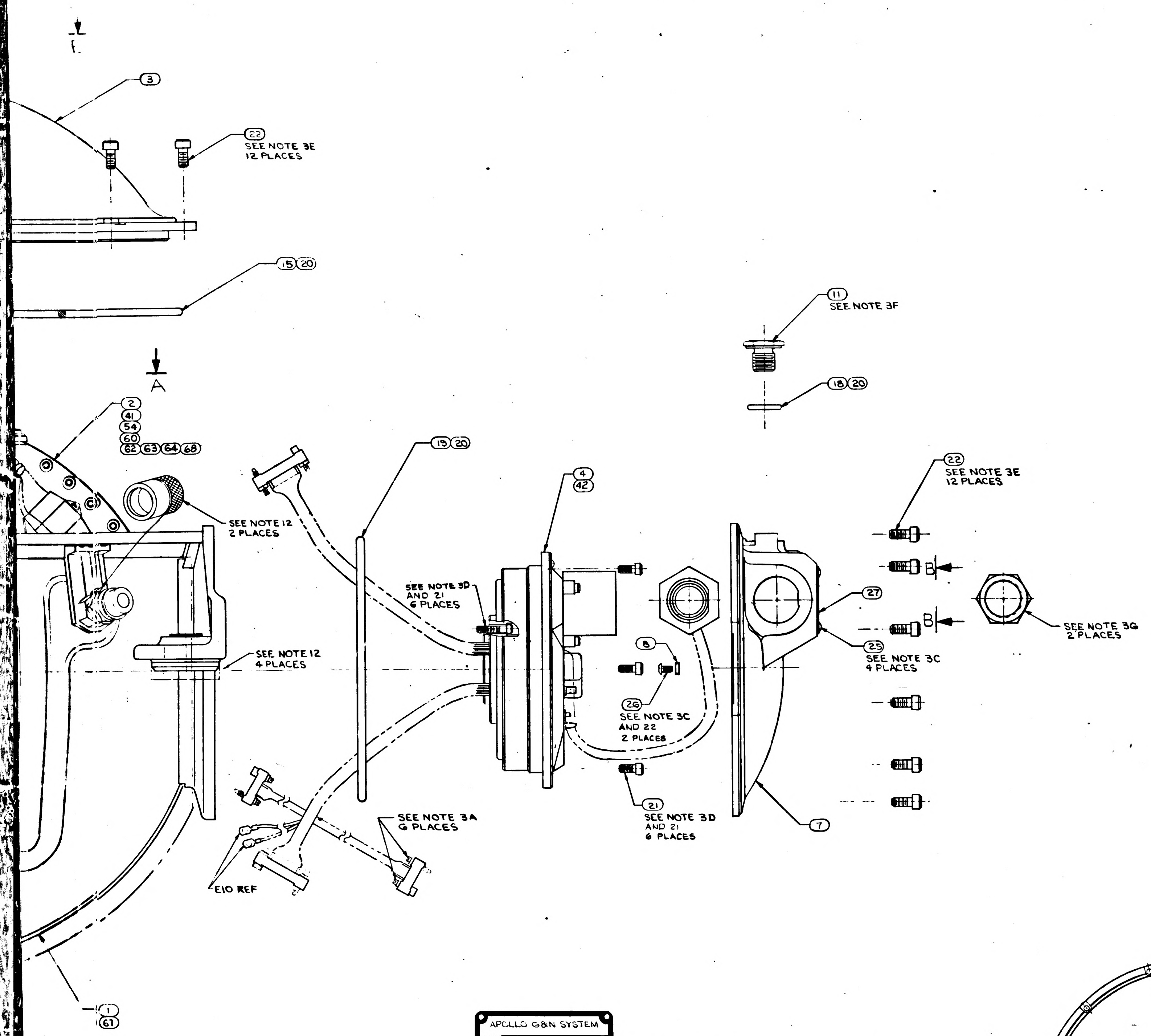
SCREW SELECTION CHART (32)

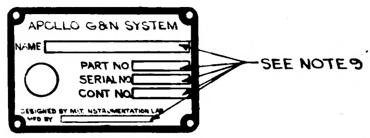
PART NO.	USED ON
1001488-1	MIDDLE AND OUTER GIMBAL
-2	
-3	
-4	
-5	
-6	STABLE MEMBER
-7	
-10	
1011625-11	



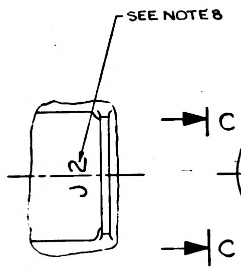
DETAIL F
(-071 AND O

2018601 BV 1 OF 1

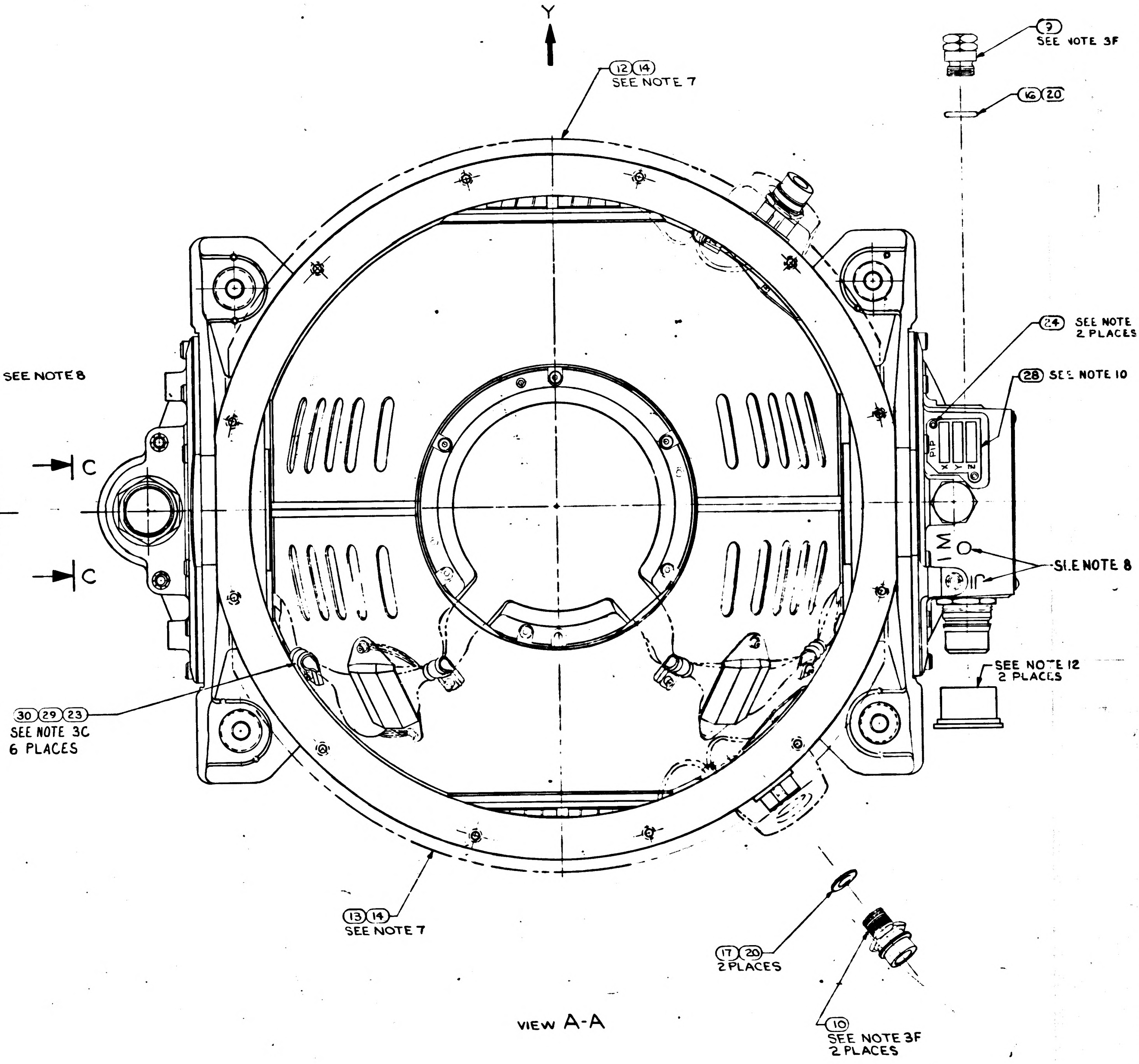

A
3
22
SEE NOTE 3E
12 PLACES
15 20
2 41 54 60 62 63 64 68
SEE NOTE 12
2 PLACES
SEE NOTE 12
4 PLACES
19 20
SEE NOTE 3D
AND 21
6 PLACES
SEE NOTE 3A
6 PLACES
E10 REF
1 61
4 42
8
26
SEE NOTE 3C
AND 22
2 PLACES
21
SEE NOTE 3D
AND 21
6 PLACES
11
SEE NOTE 3F
18 20
22
SEE NOTE 3E
12 PLACES
B
B
27
25
SEE NOTE 3C
4 PLACES
SEE NOTE 3G
2 PLACES
7


APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
DESIGNED BY M.I.T. INSTRUMENTATION LAB
MFD BY
SEE NOTE 9

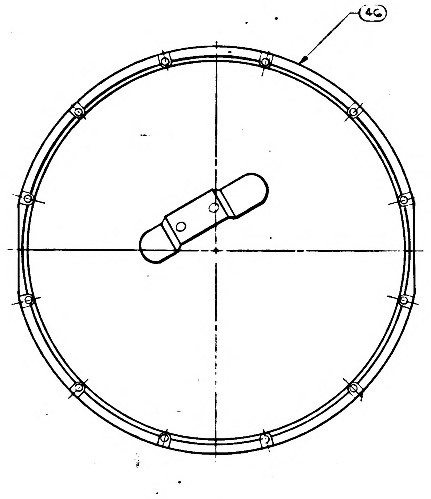
VIEW B-B


SEE NOTE 8
J2

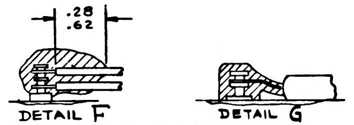
VIEW C-C


Y
12 14
SEE NOTE 7
9
SEE NOTE 3F
16 20
24
SEE NOTE 3
2 PLACES
28 SEE NOTE 10
PIP
X Y Z
IM
SEE NOTE 8
SEE NOTE 12
2 PLACES
C
C
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
17 20
2 PLACES
10
SEE NOTE 3F
2 PLACES

VIEW A-A



VIEW E-E
SCALE 1/2
FOR 031, 051, 071, 111, 151, 171, 191, 211, 221, 241 CONFIGURATION.



DETAIL F DETAIL G
(-071 AND ON CONFIGURATION)

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	BE	REPLACES REV BD WITH CHANGE PER TDRR 35738		20 MAR 68	
	BF	REVISED PER TDRR 35745		25 MAR 68	
	BG	REVISED PER TDRR 35750		8 MAR 68	
	BH	REVISED PER TDRR 35751		16 APR 68	JJJ
	BJ	REVISED PER TDRR 36003		18 APR 68	JJJ
	BK	REVISED PER TDRR 36472		23 JUL 68	
	BL	REVISED PER TDRR 36560		30 JUL 68	J.E.G.
	BM	REVISED PER TDRR 36591		31 JUL 68	SA
	BN	REVISED PER TDRR 37265		3-FEB-69	B.
	BP	REVISED PER TDRR 37367		26 FEB 69	SA RWH
	BR	REVISED PER TDRR 37896		31 OCT 69	
	BS	REVISED PER TDRR 38106		21 MAY -70	B.
	BT	REVISED PER TDRR 38181		8 JUL 70	JJJ
	BU	REVISED PER TDRR 38320		15 FEB 71	REB
	BV	REVISED PER TDRR 38562		10 JAN 72	DKD

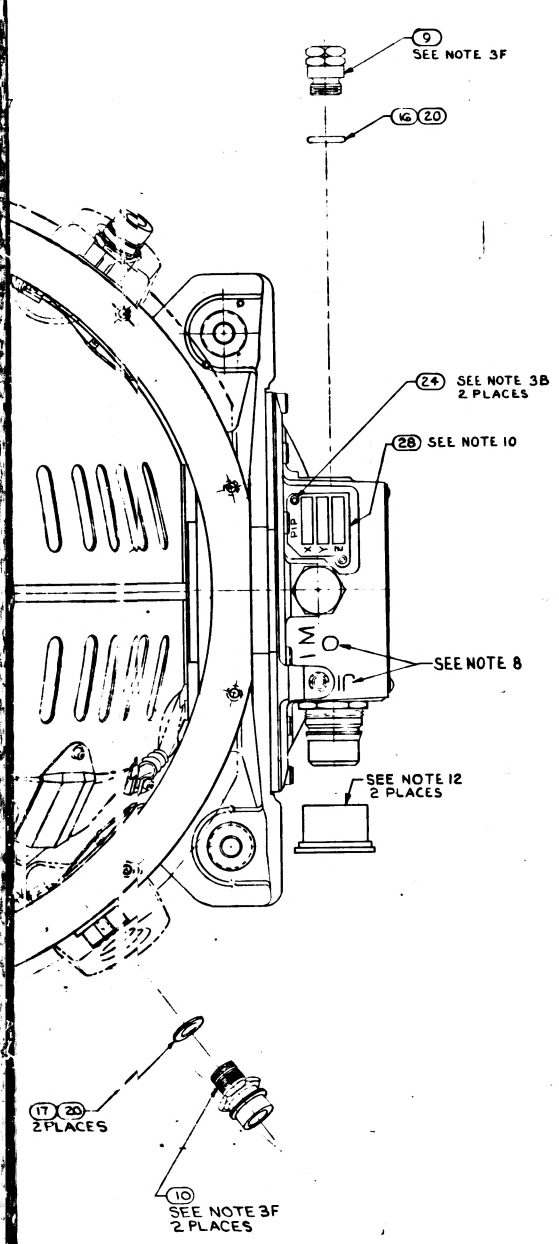
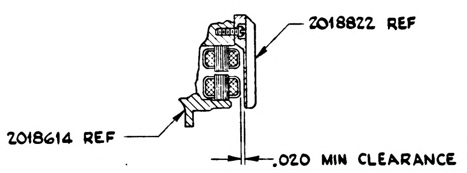


TABLE III

IMU CONFIGURATION 2018601	ALLOWABLE GYRO CONFIGURATIONS 2021500- 011	021	031	041	051	061	071	081	091	101	111	121			151		171	181	191
-011			X	X	X	X	X				X				X		X	X	X
-021			X		X		X				X				X		X	X	X
-031			X	X	X	X	X				X				X		X	X	X
-041					X		X												
-051					X		X												
-061					X		X												
-071					X		X								X		X	X	X
-081					X		X												
-091			X		X		X				X								
-111							X												
-121							X								X		X	X	X
-131			X	X	X	X	X				X								
-141			X		X		X				X				X		X	X	X
-151							X												
-161							X												
-171			X	X	X	X	X				X								
-181			X		X		X				X								
-191								X		X	⊗				⊗		⊗	⊗	⊗
-201								X		X	⊗				⊗		⊗	⊗	⊗
-211								X		X	X								
-221											X				X		X	X	X
-231											X				X		X	X	X
-241											X				X		X	X	X
-251											X				X		X	X	X

⊗ DENOTES IMU WILL CHANGE PART NUMBER IF THREE -111 OR HIGHER CONFIGURATION GYROS ARE USED.



DETAIL IGSA RESOLVER, INNER AXIS

-251	-241	-231	-221	-211	-201	-191	-181	-171	-161	-151	-141	-131	-121	-111	-091	-081	-071	-061	-051	-041	-031	-021	-011	ITEM NO.	CODE IDENT NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES OR REMARKS
1	1																							68		2018602-081	OUTER AXIS ASSEMBLY	
1	—	1	—	—	1	—	1	—	1	—	1	—	1	—	1	1	—	1	—	—	—	1	—	67		2018738-021	CASE CENTER, MACHINING ASSY	
																								66				
																								65				
—	—	—	—	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64		2018602-061	OUTER AXIS ASSEMBLY	
	—		—	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63		2018602-071	OUTER AXIS ASSEMBLY	
—	—	1	1	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	62		2018602-051	OUTER AXIS ASSEMBLY	
																								61				
—	—	—	—	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	60		2018602-041	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	59		1008930	GREASE, MOLYBDENUM, DISULFIDE	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	58		1006277	SILICA, PULVERIZED, PYROGENIC	
																								57				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	56		1008821-2	CURING AGENT	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	-	-	A/R	A/R	-	-	A/R	A/R	A/R	A/R	A/R	-	-	-	-	-	-	55		1008821-1	EPOXY RESIN	
—	—	—	—	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	54		2018602-031	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	53		MIL-I-15125, TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	18
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	52		1006338-000	SEALING COMPOUND SILICONE RUBBER	17
																								51				
																								50				
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	49		2021500	IRIG PREALIGNED ASSY	SEE TABLE III
—	3	-	3	3	-	3	-	3	-	3	-	3	-	3	-	-	3	-	3	3	3	-	-	48		2018844-021	CALIBRATED PIP ASSY	15
3	—	3	—	-	3	-	3	-	3	-	3	-	3	-	3	3	-	3	-	-	-	3	3	47		2018844-011	CALIBRATED PIP ASSY	15
—	1	—	1	1	-	1	-	1	-	1	-	1	-	1	-	-	1	-	1	-	1	-	-	46		2018839	CASE COVER ASSEMBLY	
1	1	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	45		2018609-021	IGSA, TORQUE MOTOR OUTER AXIS	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	44		1011625-11	SCREW, HEX, SOC HD SELF-LKG	6
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	43		2018834	WEIGHT, BALANCE S/M	5
1	1	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	-	1	-	42		2018612-021	IGSA RESOLVER OUTER AXIS	
—	—	—	—	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	1	-	1	-	41		2018602-021	OUTER AXIS ASSEMBLY	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	40		2018833	WEIGHT, BALANCE OUTER GIMBAL	5
																								39				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	38		2018832	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	37		2018831	WEIGHT, BALANCE S/M	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	36		1000263	WEIGHT BALANCE OUT. AND MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	35		1000262	WEIGHT, BALANCE MID. GIMBAL	5
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	34		1000261	WEIGHT, BALANCE MID. GIMBAL	5
																								33				
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	32		1001488	SCREW, HEX, SOC HD, SELF-LKG	6
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31		1010861-6	NUT, PLAIN CLINCH	6
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	30		1000223	WASHER, CABLE CLAMP	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	29		1000220	CLAMP, CABLE	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	28		1000022	PLATE, INFORMATION	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27		2018795	PLATE, IDENTIFICATION	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	26		1006783-18	SCREW, BUTTON HD, HEX SOC	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25		1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	24		1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	23		1001488-1	SCREW, HEX SOC HEAD	
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	22		1001489-46	SCREW, HEX SOC HEAD	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	21		1001489-18	SCREW, HEX SOC HEAD	
A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	20		MIL-L-4343	LUBRICANT, DOW CORNING NO. 55	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19		1000159-16	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18		1000159-17	PACKING, PREFORMED "O" RING	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	17		1009005-006	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16		1000159-5	PACKING, PREFORMED "O" RING	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15		1000159-15	PACKING, PREFORMED "O" RING	
—	—	—	—	-	-	-	-	-	-	-	-	-	-	-	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	A/R	14		1010838	ADHESIVE	
—	—	—	—	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	13		2018806	INSULATION CASE HEAT EXCH (L.H.)	
—	—	—	—	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	12		2018805	INSULATION CASE HEAT EXCH (R.H.)	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11		2018775	COVER ACCESS RSVR MODULE	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	10		1000135-001	COUPLING, HALF, QUICK DISCONNECT	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9		2018773	VALVE. PRESSURE ASSEMBLY	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8		2018818	STRAP, ASSY OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7		2018769	MOUNT, CONN, RSVR OUTER AXIS	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6		2018774	MOUNT, CONN. T.M. OUTER AXIS	
—	—	—	—	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	5		2018609-011	IGSA, TORQUE MOTOR, OUTER AXIS	
—	—	—	—	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	4		2018612-011	IGSA, RESOLVER OUTER AXIS	
1	—	1	—	-	1	-	1	-	1	-	1	-	1	-	1	1	-	1	-	1	-	1	1	3		2018710	CASE COVER	
—	—	—	—	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	2		2018602-011	OUTER AXIS ASSEMBLY	
—	1	—	1	1	—	1	—	1	—	1	—	1	—	1	—	—	1	—	1	1	1	—	1	1		2018738-011	CASE CENTER, MACHINING ASSY	

QUANTITY REQUIRED

LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES.

REPLACE REV BD
WITH CHANGES

NEXT ASSY	USED ON
G007001	G015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DTB DATE 3/5/65
CHECKED G QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY

CODE IDENT NO. 80230
SIZE J3
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

2018601 BV

PART NO.	NOMENCLATURE	QTY REQ'D
2018753	PLATE, BEARING RET.	1
1000261	WEIGHT, BAL M.G.	A/R
1000262	WEIGHT BAL M.G	A/R
1000263	WEIGHT BAL MG&OG	A/R
1000268	WEIGHT BAL OG	A/R
1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602	OUTER AXIS ASSY	1
2018756	CLIP, RETAINER TM OA	6
2018730	SHAFT, STUB RSVR	1
2018739	HSG, BRG RSVR	1
2018621	BEARING DUPLEX	2
2018631	RESOLVER	1
2018732	CLIP, WIRE RET	1
2018733	PLATE, BEARING RET	1
2018731	CLIP, WIRE RET	3
100100-1	TERMINAL	2
2018754	SHAFT, STUB TM OA	1
2018755	HOUSING, BEARING TMOA	1

Ⓡ

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7JUL64	WK	
	A	TDRR 10903	14JUL64		WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL:

MIT INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED		7Jul64
CHECKED		
DRAWN	WCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE 7/7/64

INERTIAL
MEASUREMENT
UNIT
(BLOCK II)

SCALE	UNIT WT.	CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO.
2018601

SHEET OF

2018601

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

11-15-65

APOLLO G&N Specification
PS2018601 REV A
Original Issue Date: 16 Nov 1965
Release Authority: TDRR 24009
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
1/11/66	A	25177	4, 7-11, 13-17, 22-24, 26, 27	WK	ACM

This specification consists of page 1 to 31 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce MIT/IL 11/15/65 W Kupfer 16 Nov 65	R. Temple 11/22/65 R. Pillar/JHH ACSP

3.1.2.5 Standby to Operate Time. Within 15 minutes after switching from standby (See 6.2) to the operate mode; the PIPA temperature shall be within ±0.8°F of the temperature control point specified in 3.1.2.3 and the IRIG temperature shall be within ±0.9°F of the temperature control point specified in 3.1.2.4 under the environment specified in 3.1.2.3.

3.1.2.6 Standby to Operate Temperature Change. The change in temperature of the PIPA's, when switching from standby to the operate mode, shall be a maximum of 0.5°F under the environment specified in 3.1.2.3.

3.1.2.7 Temperature Alarm Limits

3.1.2.7.1 Operate Mode Limits. A temperature alarm signal shall be generated when the PIPA temperature is less than 127.0° ±3.0°F or greater than 137.0° ±2.0°F under the environment specified in 3.1.2.3.

3.1.2.7.2 Standby Mode Limits. A temperature alarm signal shall be generated when the PIPA temperature is less than 127.0° ±3.0°F or greater than 137.0° ±2.0°F under the environment specified in 3.1.2.3.

3.1.2.8 Blower Operation. The airflow direction shall be from the middle gimbal to the outer case in the Operate Mode.

3.1.2.9 Blower, Fixed Heater, and Bias Heater Current. The combined blower, fixed heater, and bias heater current shall be 0.40 to 0.94 amp under the environment specified in 3.1.2.3.

3.1.2.10 Temperature Control Current. The temperature control current shall be 2.75 ±1.00 amp under the environment specified in 3.1.2.3.

3.1.2.11 Coolant Composition. The coolant composition used in the liquid coolant loop shall be in accordance with Specification **MH01-01349-416.**

3.1.2.12 Torque Motor Phasing. Application of dc voltage in accordance with Table I shall cause the stable member and the middle and outer gimbals to rotate ccw, when viewed along the axis of rotation from the resolver end.

3.1.2.14 Precision Resolver Alignment Module. The 16X resolver sine outputs, at the pins specified in Table III, shall increase 0.36V rms, minimum, in-phase, with respect to the resolver excitation when the precision resolver alignment module potentiometers are rotated fully cw from the extreme ccw position for each axis.

TABLE III

PRECISION RESOLVER ALIGNMENT MODULE SENSITIVITY

AXIS	16X RESOLVER OUTPUT TERMINALS*	
	Hi	Lo
Inner	J1-35	J1-36
Middle	J1-43	J1-44
Outer	J1-53	J1-54

*The gimbals shall be locked such that the 16X resolver outputs at the terminals shown shall be 0 to 0.6 volt in phase with respect to the resolver excitation.

3.1.2.15 PIP Phasing

a. The "X" PIP shall be approximately at null when the gimbals and stable member are at the normal zero positions (see Figure 1). The "X" PIP output at pins J2-6 (Hi) and J2-7 (Lo) shall increase in phase when the float is driven away from null with a ccw rotation of the stable member as viewed from the resolver end of the IGA.

b. The "Y" PIP shall be approximately at null when the gimbals and stable member are at the normal zero positions. The "Y" PIP output at pins J2-17 (Hi) and J2-18 (Lo) shall increase in phase when the float is driven away from null with a cw rotation of the OG as viewed from the resolver end of the OGA.

c. The "Z" PIP shall be approximately at null when the MG and stable member are at their normal zero positions and the OG is 90° ccw from its normal zero position. The "Z" PIP output at pins J2-35 (Hi) and J2-36 (Lo) shall increase in phase when the float is driven away from null by a cw rotation of the OG as viewed from the resolver end of the OGA.

3.1.2.16 IRIG and Gyro Error Resolver Phasing

a. The IRIG and gyro error resolver outputs shall be as specified in Table IV when torqued electrically from null.

TABLE IV

IRIG AND GYRO ERROR RESOLVER OUTPUTS

IRIG	STABLE MEMBER POSITION ±5°	INPUT TERMINALS		OUTPUT TERMINALS		MAGNITUDE	PHASE*
		Hi	Lo	Hi	Lo		
X	0°	J2-5	J2-34	J2-23	J2-20	Increasing	Inphase
	0°	J2-5	J2-34	J2-22	J2-20	↑	Inphase
	90° CCW	J2-5	J2-34	J2-21	J2-20		Inphase
	0°	J2-4	J2-34	J2-23	J2-20		Out-of-phase
Y	0°	J2-16	J2-34	J2-19	J2-20		Inphase
	0°	J2-15	J2-34	J2-19	J2-20		Out-of-phase
Z	0°	J2-33	J2-34	J2-24	J2-20		Inphase
	0°	J2-33	J2-34	J2-21	J2-20		Inphase
	90° CCW	J2-33	J2-34	J2-22	J2-20	↓	Out-of-phase
	0°	J2-32	J2-34	J2-24	J2-20	Increasing	Out-of-phase

*NOTES:

1. The direction of rotation is defined as viewed along the axis of rotation from the resolver end.
2. The inertial component signal generator outputs are phased with respect to the signal generator excitation at pins J2-8 (Hi) and J2-9 (Lo).

b. The "X" IRIG output at pins J2-23 (Hi) and J2-20 (Lo) shall increase in phase when the gimbals are at their normal zero position, and the "X" IRIG float is driven away from null with a ccw rotation of the OG as viewed from the resolver end of the OGA.

c. The "Y" IRIG output at pins J2-19 (Hi) and J2-20 (Lo) shall increase in phase when the gimbals are at their normal zero position, and the "Y" IRIG float is driven away from null with a ccw rotation of the SM as viewed from the resolver end of the IGA.

d. The "Z" IRIG output at pins J2-24 (Hi) and J2-20 (Lo) shall increase in phase when the gimbals are at their normal zero position, and the "Z" IRIG float is driven away from null with a ccw rotation of the MG as viewed from the resolver end of the MGA.

3.1.2.17 **Balance.** The unbalance of each gimbal and stable member about their respective axes shall not exceed 0.1 oz-inch (0.2 oz-inch peak to peak).

3.1.2.18 Gimbal Torque

a. The torque motor current required to start cw and ccw rotation when the axis of rotation is horizontal shall not exceed 86 ma dc for the SM and middle gimbal and 106 ma dc for the outer gimbal.

b. The torque motor current required to complete one full cw and ccw revolution for each gimbal and the SM shall not exceed the maximum current required for 3.1.2.18.a.

3.1.2.19 Pressure. The internal pressure drop (ΔP) shall not exceed 0.25 psia in a 24 hour period at an initial assembly pressure (P_i) of 29.5±0.1 psia of dry air or nitrogen, an ambient temperature of 75° ±4°F, and atmospheric pressure of 14.7±1.0 psia.

3.1.2.20 Telemetry Signal Outputs. The blower telemetry signal shall be 28.0±2.8V rms. The control heater telemetry signal shall be 19.5 to 32.5 vdc when the control heaters switch on.

3.1.2.21 PTC Interlock. There shall be a PTC Interlock signal of 21.0 to 32.5 vdc when the control heater power is applied.

3.1.2.22 Resistance. The dc resistance of the electrical circuits shall be as specified in Table V.

3.1.2.23 Insulation Resistance. The insulation resistance of the electrical circuits shall be as specified in Table VII.

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with APOLLO G&N Drawing 2018601 and all drawings and engineering data referenced thereon.

3.2.2 Standards of Manufacturing, Manufacturing Process and Production

3.2.2.1 Continuity and DC Resistance. The resistance between terminal points shall be as specified in Table VI.

3.2.2.2 Selection of Heater Padding Resistors

3.2.2.2.1 Padding Setup. The heater padding resistors R1 through R6 shall be selected to maintain the PIPA and IRIG temperatures and blower operation as specified in 3.1.2.3, 3.1.2.4 and 3.1.2.8 from 5 to 50 percent heater duty cycle. With the following inputs applied to the assembly, the gimbals shall be positioned at 0° ±10°, the stable member shall be positioned at 90° ±10° ccw from zero as viewed from the resolver end of the IGA. Coolant shall be circulated through the heat exchanger.

TABLE V

RESISTANCE

SIGNAL	PINS		RESISTANCE VALUE (Ohms)	
	From (+)	To (-)	Minimum	Maximum
Chassis Ground	J1-1	Case	0.0	0.5
PIP & IRIG Control Htr	J1-2	J1-4	2K	9K
PTCInterlock (GSE)	J1-2	J1-19	4949	5051
PIP & IRIG Control Htr	J1-3	J1-5	2K	9K
PIP & IRIG Control Htr (GSE)	J1-6	J1-8	9	13
PIP & IRIG Control Htr (GSE)	J1-7	J1-9	9	13
Blower ØA	J1-10	J1-12	27	40
Blower ØB	J1-11	J1-12	27	40
PIP Temp Sensor	J1-14	J1-15	1542	1578
Temp Sensor Common	J1-15	J1-26	1.0	2.0
Temp Sensor Common	J1-16	J1-18	1.0	2.0
IRIG Temp Sensor	J1-17	J1-18	2300	2670
X IRIG Wheel (ØA)	J1-22	J1-21	40	55
Y IRIG Wheel (ØA)	J1-22	J1-24	↑	↑
Z IRIG Wheel (ØA)	J1-22	J1-25		
X IRIG Wheel (ØB)	J1-23	J1-21		
Y IRIG Wheel (ØB)	J1-23	J1-24	↓	↓
Z IRIG Wheel (ØB)	J1-23	J1-25	40	55
Resolver Excitation	J1-27	J1-28	6	31
PIP Temp Sensor (Tele)	J1-29	J1-30	1542	1578
IRIG Temp Sensor (Tele)	J1-31	J1-32	2300	2670
COS A_{IG} 16X	J1-33	J1-34	47	78
SIN A_{IG} 16X	J1-35	J1-36	47	78
COS A_{IG} 1X	J1-37	J1-38	72	119
SIN A_{IG} 1X	J1-39	J1-40	72	119
COS A_{MG} 16X	J1-41	J1-42	47	78
SIN A_{MG} 16X	J1-43	J1-44	47	78
COS A_{MG} 1X	J1-45	J1-46	72	119
SIN A_{MG} 1X	J1-47	J1-48	72	119
COS A_{OG} 16X	J1-51	J1-52	47	78
SIN A_{OG} 16X	J1-53	J1-54	47	78
COS A_{OG} 1X	J1-55	J1-56	72	119
SIN A_{OG} 1X	J1-57	J1-58	72	119
X IRIG Torque +	J2-4	J2-34	160	210
X IRIG Torque -	J2-5	J2-34	160	210
X PIP Error	J2-6	J2-7	30K	33K
Ducosyn Excitation	J2-8	J2-9	1	5
Ducosyn Feedback	J2-10	J2-11	1	5
Y IRIG Torque +	J2-15	J2-34	160	210
Y IRIG Torque -	J2-16	J2-34	160	210
Y PIP Error	J2-17	J2-18	30K	33K

TABLE V (Continued)

SIGNAL	PINS		RESISTANCE VALUE (Ohms)	
	From (+)	To (-)	Minimum	Maximum
IG Error	J2-19	J2-20	78	120
MG Error	J2-21	J2-20	77	130
OG Error	J2-22	J2-20	77	130
X IRIG Error	J2-23	J2-20	27	45
Z IRIG Error	J2-24	J2-20	27	45
Control Htr (Tele)	J2-25	J1-2	9.5K	10.5K
Z IRIG Torque +	J2-32	J2-34	160	210
Z IRIG Torque -	J2-33	J2-34	160	210
Z PIP Error	J2-35	J2-36	30K	33K
IG Motor	J2-39	J2-40	20	72
MG Motor	J2-41	J2-42	20	72
OG Motor	J2-51	J2-52	10	40
Blower (Tele)	J1-11	J1-20	4949	5051

TABLE VI(Continued)

FROM	TO	RESISTANCE (Ohms)	FROM	TO	RESISTANCE (Ohms)
J1-23	R5-1	<1.2	J2-16	P16-a	<1.1
A14-3	R5-2	<0.1	J2-17	A5-2	<1.2
J1-23	P17-R	<1.1	J2-18	A5-5	<1.2
J1-23	P16-R	<1.1	A5-9	P19-6	<0.1
J1-23	P15-R	<1.2	A5-7	P19-7	↕
J1-24	P16-B	<1.1.	A5-3	P19-21	
J1-24	P16-J	↕	A5-1	A6-1	<0.1
J1-25	P17-B		J2-19	P16-A	<1.1
J1-25	P17-J		J2-19	P16-S	<1.1
J2-1	P18-8		J2-20	P16-C	<1.1
J2-2	P18-2		J2-20	P17-C	<1.1
J2-2	P18-22		J2-20	P15-C	<1.2
J2-3	P18-4	<1.1	J2-23	P15-A	<1.2
J2-4	P15-b	<1.2	J2-23	P15-d	<1.2
J2-5	P15-a	<1.2	J2-24	P17-A	<1.1
J2-6	A4-2	<1.1	J2-24	P17-d	<1.1
P18-6	A4-9	<0.1	J2-32	P17-a	↕
P18-7	A4-7	<0.1	J2-33	P17-b	
P18-21	A4-3	<0.1	J2-34	P17-Z	
J2-7	A4-5	<1.1	J2-34	P16-Z	<1.1
J2-8	T1-1	<1.1	J2-34	P15-Z	<1.2
J2-8	J2-10	<2.0	J2-35	A6-2	<1.1
J2-9	T1-2	<1.1	J2-36	A6-5	↕
J2-9	J2-11	<2.0	J2-37	A4-4	
T1-3	P20-25	0.05 to 0.15	J2-37	P17-H	
T1-3	P19-25	↕	J2-37	P16-H	<1.1
T1-3	P18-25		J2-37	P15-H	<1.2
T1-4	P20-9		J2-38	P17-c	<1.1
T1-4	P19-9		↕	P16-c	<1.1
T1-4	P18-9	0.05 to 0.15		P15-c	<1.2
T1-5	P15-W	0.1 to 0.2		A4-1	<1.1
T1-5	P16-W	↕	J2-38	A6-1	<1.1
T1-5	P17-Y		J2-59	P20-8	↕
T1-6	P15-Y		J2-60	P20-2	
T1-6	P16-Y		J2-60	P20-22	
T1-6	P17-W	0.1 to 0.2	J2-61	P20-4	<1.1
T1-6	T1-7	<0.1	P20-6	A6-9	<0.1
T1-7	A4-4	<0.1	P20-7	A6-7	↑
T1-7	A6-4	<0.15	P20-21	A6-3	
T1-7	A5-4	<0.2	P20-1	P19-14	<0.25
J2-12	P19-8	<1.2	P20-14	P18-1	<0.25
J2-13	P19-2	↕	P20-23	P19-23	<0.35
J2-13	P19-22		↕	P18-23	<0.2
J2-14	P19-4	<1.2		A13-4	<0.2
J2-15	P16-b	<1.1	P20-23	R4-1	<0.35

TABLE VI(Continued)

FROM	TO	RESISTANCE (Ohms)	FROM	TO	RESISTANCE (Ohms)
A14-4	R4-2	<0.2	A15-1	A16-3	<0.1
A13-4	P17-T	<0.15	A15-3	A16-2	<0.1
↑	P16-T	↕	A17-1	A18-2	<0.1
	A10-2	<0.15	A8-Red	A10-1	Visual
	A11-2	<0.2	A8-Red	A10-2	↑
	A12-2	<0.2	A8-Blu	A10-3	
↓			A8-Blu	A10-4	
A13-4	P15-T	<0.3	A9-Red	A11-1	
P15-D	P16-K	<0.2	A9-Red	A11-2	
P16-D	P17-K	<0.1	A9-Blu	A11-3	
A13-3	A14-2	<0.2	A9-Blu	All-4	
J1-2	J1-19	4949 to 5051			
J1-20	K1-8	4949 to 5051	SHLD ON		
J1-26	E57	<0.2	A4-3,-7,-9	A4-3	
J1-29	E55	<0.2	SHLD ON		
J1-30	E56	<0.2	A5-3,-7,-9	A5-3	
J1-31	E58	<0.2	SHLD ON		
J1-32	E59	<0.2	A6-3,-7,-9	A6-3	
J2-25	A13-5	<1.2	E61	E22	↓
T1-8	P20-20	0.05 to 0.15	E62	E23	Visual
T1-8	P19-20	0.05 to 0.15			
T1-8	P18-20	0.05 to 0.15			
T1-8	T1-3	<0.1			

TABLE VII

INSULATION RESISTANCE

FROM	TO	RESISTANCE (megohms)
All pins on J1 except J1-1	Chassis	≥100
All pins on J2	Chassis	≥100
All circuits on J1 and J2	All other circuits on J1-J2	≥100

a. 28.0±0.5 vdc to the PIPA and IRIG control heaters at pins J1-2 (Hi), J1-3 (Hi), J1-4 (Lo), and J1-5 (Lo).

b. 29.00±0.29V rms, 3200±32 cps to the ducosyns at pins J2-8 (Hi) and J2-9 (Lo).

c. 28.0±0.1V rms, 800±8 cps to the IRIG wheels at pins J1-22 (ϕA), J1-23 (ϕB), J1-21 (com), J1-24 (com), and J1-25 (com). The wheel voltage shall be constant within 0.1V throughout the heater control calibration.

d. 28.00±0.28V rms, 800±80 cps to the gimbal angle resolvers at pins J1-27 (Hi) and J1-28 (Lo).

e. 28.0±1.4 vdc to the preamplifiers at pins J2-38 (28 vdc) and J2-37 (0 vdc).

f. 28.0±0.5V rms, 800±8 cps to the blowers at pins J1-10 (ϕA), J1-11 (ϕB) and J1-12 (com).

3.2.2.2.2 Selection of Control Heater Padding Resistor (R1). The control heater padding resistor (R1) shall be selected as follows:

a. The inertial component temperatures shall be stabilized with control heater duty cycle at 5±2 percent. The average PIPA temperature shall be 129.4° ±3.0°F and the ΔT (difference between the PIPA and IRIG indicated temperatures) shall be $\geq 4.0°F$. Duty cycle in percent $\frac{\text{time on}}{\text{time on + time off}} \times 100$

b. With the control heater duty cycle increased to 50±5 percent, the control heater padding resistor (R1) shall be selected to achieve a ΔT within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment.

NOTE: During stabilization, the PIPA and IRIG indicating sensors shall be monitored and data continuously recorded. The PIPA and IRIG temperatures are stabilized when they have not changed by more than 0.10°F over a one hour period. The measured average PIPA and IRIG indicating sensor data shall be converted to degrees Fahrenheit (see 6.1).

3.2.2.2.3 Selection of Thermostat Anticipatory Heater Padding Resistor (R4). The thermostat anticipatory heater padding resistor (R4) shall be selected as follows:

a. With the control heater duty cycle at 50±5 percent, the control thermostat anticipatory heater padding resistor (R4) shall be selected to achieve an average PIPA temperature within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment.

b. With the control heater duty cycle at 20±5 percent, the average PIPA temperature shall be within 0.25°F of the values obtained in 3.2.2.2.2.a and 3.2.2.2.3.a. If the requirement is not met, repeat 3.2.2.2.2.a and 3.2.2.2.3.a.

3.2.2.2.4 Selection of PIPA Fixed Heater Padding Resistor (R3). With the control heater duty cycle at 20±5 percent, allow for stabilization and record ΔT. If the ΔT is equal to or less than 5.7°F, a 1020 ohm resistor shall be selected for the PIPA fixed heater padding resistor (R3); and if the ΔT is greater than 5.7°F, the resistor shall be selected to achieve a ΔT of 5.6° ±0.1°F. Allow for stabilization after any adjustment.

3.2.2.2.5 Selection of Thermostat Bias Heater Padding Resistor (R5). With the control heater duty cycle at 20±5 percent, the thermostat bias heater padding resistor (R5) shall be selected to set the average PIPA temperature at 129.40° ±0.10°F. Allow for stabilization after any adjustment.

3.2.2.2.6 GSE Heater Padding Resistor (R2). The GSE heater padding resistor (R2) shall be of the value selected in 3.2.2.2.2.b.

4. QUALITY ASSURANCE PROVISIONS

4.1 PRODUCT PERFORMANCE AND CONFIGURATION REQUIREMENTS/QUALITY VERIFICATION CROSS REFERENCE INDEX

Test/Examination	Requirement	Method
Heat Exchanger Leak Rate	3.1.2.1	4.3.2
Heat Exchanger Pressure Drop	3.1.2.2	4.3.3
PIPA Temperature	3.1.2.3	4.3.5.5
IRIG Temperature	3.1.2.4	4.3.5.5
Standby to Operate Time	3.1.2.5	4.3.5.6
Standby to Operate Temperature Change	3.1.2.6	4.3.5.7
Temperature Alarm Limits	3.1.2.7	4.3.5.1
Blower Operation	3.1.2.8	4.3.5.2
Blower, Fixed Heater and Bias Heater Current	3.1.2.9	4.3.5.3
Temperature Control Current	3.1.2.10	4.3.5.4
Coolant Composition	3.1.2.11	4.3.18
Torque Motor Phasing	3.1.2.12	4.3.6
1X and 16X Resolver Phasing	3.1.2.13	4.3.7
Precision Resolver Alignment Module	3.1.2.14	4.3.8
PIP Phasing	3.1.2.15	4.3.9
IRIG and Gyro Error Resolver Phasing	3.1.2.16	4.3.10
Balance	3.1.2.17	4.3.11
Gimbal Torque	3.1.2.18	4.3.12
Pressure	3.1.2.19	4.3.13
Telemetry Signal Outputs	3.1.2.20	4.3.14
PTC Interlock	3.1.2.21	4.3.15
Resistance	3.1.2.22	4.3.4
Drawing Compliance	3.2.1	4.3.1
Continuity and DC Resistance	3.2.2.1	4.3.17
Insulation Resistance	3.1.2.23	4.3.16
Selection of Heater Padding Resistors	3.2.2.2	4.3.17

4.2 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.2.1 Test Conditions

4.2.1.1 Inertial Component Temperature. Unless otherwise specified, the inertial component temperatures shall be maintained as follows:

a. IRIG: 135.0° ±5.0°F
b. PIP: 130.0° ±5.0°F

4.3.5.2 Blower Operation. With the IMU in the operate mode the blowers shall run and the airflow direction through the blowers B8 and B9 shall be from the middle gimbal towards the outer case.

4.3.5.3 Blower, Fixed Heater, and Bias Heater Current. With the blowers turned off, the total current of the blower, fixed heaters, and bias heater at pin J1-12, shall be 0.03 to 0.35 amp; and with the blowers turned on, the total current shall be as specified in 3.1.2.9.

4.3.5.4 Temperature Control Current. With the control heaters turned on, the current shall be 2.15±0.35 amp. With the voltage in 4.2.1.4.c increased to 32.5±0.2 vdc, the current shall be 3.25±0.50 amp.

4.3.5.5 PIPA and IRIG Temperatures. With the IMU in the operate mode, the PIPA and IRIG temperature test shall be performed as follows:

a. With a control heater duty cycle of 5±2 percent, the average PIPA temperature shall be 129.4° ±0.4°F with a maximum instability of ±0.2°F and the average IRIG temperature shall be a point within the range of 134.0° and 136.0°F with ±0.2°F maximum instability. Allow for stabilization.

b. Repeat 4.3.5.5.a with control heater duty cycles of 20±5 percent and 50±5 percent.

c. With the voltage specified in 4.2.1.4.c increased to 32.5±0.2 vdc and the voltages specified in 4.2.1.4.e and h increased to 29.4±0.2V rms, 4.3.5.5.a shall be repeated at control heater duty cycles of 5±3 percent and 30±5 percent.

4.3.5.6 Standby to Operate Time. With the IMU in the standby mode, set the control heater duty cycle to 50±5 percent. (The control heater duty cycle will change to a lower level in the operate mode.) Within 15 minutes after switching from standby to the operate mode, the PIPA and IRIG temperatures shall be within 0.5°F of the respective temperature control points established in 4.3.5.5.a.

4.3.5.7 Standby to Operate Temperature Change. The change in temperature of the PIPA's, when switching from standby to the operate mode, shall be as specified in 3.1.2.6.

4.3.6 **Torque Motor Phasing.** With a dc voltage source connected to the pins specified in Table I and gradually increased from 0 vdc, the stable member and gimbals shall rotate as specified in 3.1.2.12.

4.3.7 **1X and 16X Resolver Phasing.** With 28.00±0.28V rms, 800 ±80 cps applied to pins J1-27 (Hi) and J1-28 (Lo), the resolver phasing shall be as specified in Table II when the gimbals and SM are rotated 4° maximum ccw from a position within 1° of electrical zero.

4.3.8 **Precision Resolver Alignment Module.** With 28.00 ±0.28 rms, 800 ±80 cps applied to pins J1-27 (Hi) and J1-28 (Lo) and the precision resolver alignment module potentiometers set fully ccw, the outputs of the 16X resolvers, at the pins specified in Table III, shall increase 0.36V rms minimum in phase with respect to the resolver excitation when the precision resolver alignment module potentiometers are rotated fully cw for each axis.

4.3.9 **PIP Phasing.** With 29.00 ±0.29V rms, 3200 +32, -32 cps excitation applied to the ducosyns at pins J2-8 (Hi) and J2-9 (Lo) and a 28.0 ±1.4 vdc source applied to the preamps at pins J2-38 (Hi) and J2-37 (Lo), PIP phasing shall be checked as follows:

a. With the gimbals and stable member at the normal zero positions, the X PIP shall be approximately at null. The X PIP output at pins J2-6 (Hi) and J2-7 (Lo) shall be increasing in phase when the float is driven away from null with a ccw rotation of the stable member as viewed from the resolver end of the IGA.

b. With the gimbals and stable member at their normal zero positions, the Y PIP shall be approximately at null. The Y PIP outputs at pins J2-17 (Hi) and J2-18 (Lo) shall be increasing in phase when the float is driven away from null with a cw rotation of the OG as viewed from the resolver end of the OGA.

c. With the MG and stable member at their normal zero positions, the Z PIP shall be approximately at null. With the OG positioned approximately 90° ccw from its normal zero position, the Z PIP output at pins J2-35 (Hi) and J2-36 (Lo) shall be increasing in phase when the float is driven away from null with a cw rotation of the OG as viewed from the resolver end of the OGA.

4.3.10 IRIG and GYRO Error Resolver Phasing

a. A 29.00±0.29V rms, 3200 +32, -32 cps excitation shall be applied to the ducosyns at pins J2-8 (Hi) and J2-9 (Lo).

CAUTION: Ducosyn excitation shall be applied 1/2 hour minimum before electrically torquing the IRIG's.

b. A 28.0±1.4 vdc source shall be applied to the preamps at pins J2-38 (Hi) and J2-37 (Lo).

c. A 28.0±1.4V rms, 800±8 cps source shall be applied to wheels at pins J1-22 (ØA), J1-23 (ØB), J1-21 (X IRIG wheel common), J1-24 (Y IRIG wheel common), and J1-25 (Z IRIG wheel common).

d. The IRIG and gyro error resolver outputs shall be as specified in Table IV when torqued electrically from null with a 60±2 cps current (which follows the profile of Figure 2) applied at the input terminals specified in Table IV.

e. With the gimbals at their normal zero position, and the X IRIG float driven away from null with a ccw rotation of the OG as viewed from the resolver end of the OGA, the X IRIG output at pin J2-23 (Hi) and J2-20 (Lo) shall be increasing in phase.

f. With the gimbals at their normal zero position, and the Y IRIG float driven away from null with a ccw rotation of the SM as viewed from the resolver end of the IGA, the Y IRIG output at pin J2-19 (Hi) and J2-20 (Lo) shall be increasing in phase.

g. With the gimbals at their normal zero position, and the X IRIG float driven away from null with a ccw rotation of the MG as viewed from the resolver end of the MGA, the Z IRIG output at pins J2-24 (Hi) and J2-20 (Lo) shall be increasing in phase.

4.3.11 Balance. With each gimbal and stable number set to their maximum unbalance position, the unbalance of each gimbal and stable member about their respective axes shall be as specified in 3.1.2.17.

4.3.12 Gimbal Torque

a. With the axis of rotation in the horizontal plane and a dc voltage applied in accordance with Table VIII and increased from 0 vdc until rotation starts, the maximum TM current required to start rotation at 18 intervals, 20° ±3° apart, in both the cw and ccw directions shall be as specified in 3.1.2.18.

b. Under the conditions of 4.3.12.a the torque required to complete one cw and one ccw rotation shall not exceed the maximum starting torque obtained in 4.3.12.a.

TABLE VIII

STARTING TORQUE TEST INPUT TERMINALS

GIMBAL	INPUT TERMINALS	
	+DC	Gnd
SM	J2-39	J2-40
MG	J2-41	J2-42
OG	J2-51	J2-52

4.3.12 Pressure. With the assembly internal pressure (P_i) at 29.5±0.1 psia of dry air or nitrogen, the pressure drop (ΔP) shall be as specified in 3.1.2.19 when tested over a 24 hour period. The pressure drop shall be corrected for changes in case temperature, and barometric pressure over the 24 hour period utilizing the following formula:

$$\Delta P_c = (P_i - P_f) \left[\frac{Ti+460}{\frac{Tf+Ti+460}{2}} \right] = \text{corrected pressure drop (psia)}$$

where: $Pi = P_G + P_{bi}$ = initial IMU absolute pressure (psia)

P_{bi} = initial barometric pressure (psi) = (inches Hg) $(0.489 \frac{psi}{in.\ HG})$

P_G = gauge pressure (psi)

$P_f = P_G + P_{bi} + (P_{bf} - P_{bi})$ = IMU absolute pressure after 24 hours (psia)

P_{bf} = final barometric pressure (psi) = (inches Hg) $(0.489 \frac{psi}{in.\ Hg})$

T_i = initial case temperature (°F).

T_f = final case temperature (°F)

4.3.14 Telemetry Signal Output. With the inputs specified in 4.2.1.4.c, g and h applied, the telemetry signals shall be as follows:

a. The blower telemetry signal voltage at pins J1-20 (Hi) and J1-12 (Lo) shall be 26.6 ±0.5V rms.

b. When the control heaters switch on, the control heater telemetry signal voltage at pins J2-25 (Lo) J1-2 (Hi) and J1-3 (Hi) shall be 20.0 ±2.0 vdc.

4.3.15 PTC Interlock. With the input specified in 4.2.1.4.c applied, the PTC Interlock signal voltage at pins J1-19 (Hi) and J1-4 (Lo) shall be 21.5 ±0.5V dc.

4.3.16 Insulation Resistance. The insulation resistance shall be as specified in Table VII when measured with a megohmmeter limited to a short circuit current of one milliampere at an output voltage of 50 +0-5V dc.

4.3.17 Verification. Test or examination data shall be examined to verify that the requirements of 3.1.2.11, 3.2.2.1 and 3.2.2.2 have been met.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES

6.1 Indicating Sensor Resistance to Degrees Conversion. Tables IX and X may be used to convert the measured PIP and IRIG indicating sensor resistance to degrees fahrenheit.

6.2 MODES OF OPERATION

6.2.1 Standby. The IMU shall be in the standby mode when power is applied as specified in 3.1.1.b and d.

6.2.2 Operate. The IMU shall be in the operate mode when power is applied as specified in 3.1.1.a through e.

PART NO.	NOMENCLATURE	QTY REQ'D
1000021	PLATE, IDENTIFICATION	1
1000261	WEIGHT, BAL M.G.	A/R
1000262	WEIGHT BAL M.G	A/R
1000263	WEIGHT BAL MG&OG	A/R
1000268	WEIGHT BAL OG	A/R
1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602	OUTER AXIS ASSY	1
2018756	CLIP, RETAINER TM OA	6
2018730	SHAFT, STUB RSVR	1
2018739	HSG. BRG RSVR	1
2018621	BEARING DUPLEX	2
2018631	RESOLVER	1
2018732	CLIP, WIRE RET	1
2018733	PLATE, BEARING RET	1
2018731	CLIP, WIRE RET	3
100100-1	TERMINAL	2
2018754	SHAFT, STUB TM OA	1
2018755	HOUSING, BEARING TMOA	1
2018738	CASE CTR MACH ASSY	1
2018710	COVER CASE	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10903	14 Jul 64		WK
	B	TDRR 11068	21 Jul 64		WK

MASTER

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LIST OF PARTS AND MATERIALS

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APPLICATION

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MIT/IL APPROVAL		7/7/64

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HOUSTON TEXAS

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APOLLO G&N Specification
PS2018601 REV B
Original Issue Date: 16 Nov 1965
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Class A Release
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
1/11/66	A	25177	4, 7-11, 13-17, 22-24, 26, 27	WK	ACM
2/23/66	B	26573	9, 20, 24	MGM	----

This specification consists of page 1 to 31 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce MIT/IL	R. Temple 4/22/65 R. Pillar/JHH ACSP A. E. Winberg

3.1.2.18 Gimbal Torque

a. The torque motor current required to start cw and ccw rotation when the axis of rotation is horizontal shall not exceed 86 ma dc for the SM and middle gimbal and 106 ma dc for the outer gimbal.

b. The torque motor current required to complete one full cw and ccw revolution for each gimbal and the SM shall not exceed the maximum current obtained for 3.1.2.18.a.

3.1.2.19 Pressure. The internal pressure drop (ΔP) shall not exceed 0.25 psia in a 24 hour period at an initial assembly pressure (P_i) of 29.5±0.1 psia of dry air or nitrogen, an ambient temperature of 75° ±4°F, and atmospheric pressure of 14.7±1.0 psia.

3.1.2.20 Telemetry Signal Outputs. The blower telemetry signal shall be 28.0±2.8V rms. The control heater telemetry signal shall be 19.5 to 32.5 vdc when the control heaters switch on.

3.1.2.21 PTC Interlock. There shall be a PTC Interlock signal of 21.0 to 32.5 vdc when the control heater power is applied.

3.1.2.22 Resistance. The dc resistance of the electrical circuits shall be as specified in Table V.

3.1.2.23 Insulation Resistance. The insulation resistance of the electrical circuits shall be as specified in Table VII.

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with APOLLO G&N Drawing 2018601 and all drawings and engineering data referenced thereon.

3.2.2 Standards of Manufacturing, Manufacturing Process and Production

3.2.2.1 Continuity and DC Resistance. The resistance between terminal points shall be as specified in Table VI.

3.2.2.2 Selection of Heater Padding Resistors

3.2.2.2.1 Padding Setup. The heater padding resistors R1 through R6 shall be selected to maintain the PIPA and IRIG temperatures and blower operation as specified in 3.1.2.3, 3.1.2.4 and 3.1.2.8 from 5 to 50 percent heater duty cycle. With the following inputs applied to the assembly, the gimbals shall be positioned at 0° ±10°, the stable member shall be positioned at 90° ±10° ccw from zero as viewed from the resolver end of the IGA. Coolant shall be circulated through the heat exchanger.

k. The total time that IRIG wheel power was applied shall be recorded in the system history log book.

l. The total IRIG wheel, fixed heater, and bias heater power shall be measured and recorded in the system history book.

4.3.2 Heat Exchanger Leak Rate. When tested with a differential pressure of 77.5, +4.0 -0 psig of helium, the leak rate of the heat exchanger shall be as specified in 3.1.2.1.

4.3.3 Heat Exchanger Pressure Drop. When tested with the quick disconnect couplings, the associated "O" rings installed, and water glycol coolant flowing at 33±1 lb/hr (3.6 ±0.1 gal/hr) at 45° ±2°F inlet temperature, the heat exchanger pressure drop shall be as specified in 3.1.2.2. The pressure drop shall be calculated by use of the following formula utilizing a differential mercury manometer to obtain H_1 and H_2:

$$\text{Pressure Drop} = 0.92\,(H_1 - H_2)\ \text{inch}$$

Where:

H_1 = High pressure side of the differential mercury manometer

H_2 = Low pressure side of the differential mercury manometer

4.3.4 Resistance. The resistance between pins shall be as specified in Table V when measured with an ohmmeter limited to an open circuit voltage ot 10 mv. The IMU shall be maintained at 130° ±3°F for the resistance measurements.

4.3.5 Temperature Control

4.3.5.1 Temperature Alarm Limits

4.3.5.1.1 Low Alarm Limit-Operate. With the IMU in the operate mode, the low alarm limit test shall be performed as follows:

a. With pins A13-1 and A13-3 shorted and the IMU temperature allowed to decrease from a stabilized heater control duty cycle of 20±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 127.0° ±3.0°F.

b. With the short in 4.3.5.1.1.a removed immediately after the temperature alarm indication and the IMU temperature allowed to increase, the PIPA temperature shall be within +1.0°F of the value recorded at the temperature alarm point when the alarm turns off.

c. With the voltage specified in 4.2.1.4.c increased to 32.5±0.2 vdc and the voltage specified in 4.1.1.4.e and h increased to 29.4±0.2V rms, 4.3.5.1.1.a and b shall be repeated.

4.3.10 IRIG and GYRO Error Resolver Phasing

a. A 29.00±0.29V rms, 3200 +32, -32 cps excitation shall be applied to the ducosyns at pins J2-8 (Hi) and J2-9 (Lo).

CAUTION: Ducosyn excitation shall be applied 1/2 hour minimum before electrically torquing the IRIG's.

b. A 28.0±1.4 vdc source shall be applied to the preamps at pins J2-38 (Hi) and J2-37 (Lo).

c. A 28.0±1.4V rms, 800±8 cps source shall be applied to wheels at pins J1-22 (ØA), J1-23 (ØB), J1-21 (X IRIG wheel common), J1-24 (Y IRIG wheel common), and J1-25 (Z IRIG wheel common).

d. The IRIG and gyro error resolver outputs shall be as specified in Table IV when torqued electrically from null with a 60±2 cps current (which follows the profile of Figure 2) applied at the input terminals specified in Table IV.

e. With the gimbals at their normal zero position, and the X IRIG float driven away from null with a ccw rotation of the OG as viewed from the resolver end of the OGA, the X IRIG output at pin J2-23 (Hi) and J2-20 (Lo) shall be increasing in phase.

f. With the gimbals at their normal zero position, and the Y IRIG float driven away from null with a ccw rotation of the SM as viewed from the resolver end of the IGA, the Y IRIG output at pin J2-19 (Hi) and J2-20 (Lo) shall be increasing in phase.

g. With the gimbals at their normal zero position, and the X IRIG float driven away from null with a ccw rotation of the MG as viewed from the resolver end of the MGA, the Z IRIG output at pins J2-24 (Hi) and J2-20 (Lo) shall be increasing in phase.

4.3.11 Balance. With each gimbal and stable number set to their maximum unbalance position, the unbalance of each gimbal and stable member about their respective axes shall be as specified in 3.1.2.17.

4.3.12 Gimbal Torque

a. With the axis of rotation in a horizontal plane, apply a dc voltage in accordance with Table VIII and increase it slowly from 0 vdc until rotation starts. Without changing the voltage, allow the gimbal to rotate to a stop. Again increase the voltage until the gimbal starts to rotate. Repeat this procedure for a complete revolution starting from four equally spaced positions in both the cw and ccw directions. The maximum TM current required to start the gimbals shall be specified in 3.1.2.18.

PART NO.	NOMENCLATURE	QTY REQ'D
~~1000021~~	~~PLATE, IDENTIFICATION~~	~~1~~
1000261	WEIGHT, BAL M.G.	A/R
1000262	WEIGHT BAL M.G	A/R
1000263	WEIGHT BAL MG & OG	A/R
1000268	WEIGHT BAL OG	A/R
1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602	OUTER AXIS ASSY	1
2018756	CLIP, RETAINER TM OA	6
2018730	SHAFT, STUB RSVR	1
2018739	HSG. BRG RSVR	1
2018621	BEARING DUPLEX	2
2018631	RESOLVER	1
2018732	CLIP, WIRE RET	1
2018733	PLATE, BEARING RET	1
2018731	CLIP, WIRE RET	3
100100-1	TERMINAL	2
2018754	SHAFT, STUB TM OA	1
2018755	HOUSING, BEARING TM OA	1
2018738	CASE CTR MACH ASSY	1
2018710	COVER CASE	1
2018766	PLATE BRG RET (TM)	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10903	14 JUL 64		WK
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	C	TDRR 11445	10 AUG 64		WK

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LIST OF PARTS AND MATERIALS

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APPLICATION

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MIT/IL APPROVAL		7/7/64

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PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

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2/23/66	B	26573	9, 20, 24	MGM	----
5/17/66	C	28922	10, 11 JH/AC	MGM	---

This specification consists of page 1 to 31 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce MIT/IL	R. Temple 11/22/65 R. Pillar/JHH ACSP

TABLE V

RESISTANCE

SIGNAL	PINS		RESISTANCE VALUE (Ohms)	
	From (+)	To (-)	Minimum	Maximum
Chassis Ground	J1-1	Case	0.0	0.5
PIP & IRIG Control Htr	J1-2	J1-4	2K	9K
PTCInterlock (GSE)	J1-2	J1-19	4949	5051
PIP & IRIG Control Htr	J1-3	J1-5	2K	9K
PIP & IRIG Control Htr (GSE)	J1-6	J1-8	9	13
PIP & IRIG Control Htr (GSE)	[illegible]	J1-9	9	13
Blower ØA	[illegible]	J1-12	27	40
Blower ØB	[illegible]	J1-12	27	40
PIP Temp Sensor	[illegible]	J1-15	1542	1578
Temp Sensor Common	J1-[illegible]	J1-26	1.0	2.0
Temp Sensor Common	[illegible]	J1-18	1.0	2.0
IRIG Temp Sensor	17	J1-18	2300	2670
X IRIG Wheel (ØA)	[illegible]	J1-21	40	55
Y IRIG Wheel (ØA)	J1-22	J1-24	↑	↑
Z IRIG Wheel (ØA)	J1-22	J1-25	|	|
X IRIG Wheel (ØB)	J1-23	J1-21	|	|
Y IRIG Wheel (ØB)	J1-23	J1-24	↓	↓
Z IRIG Wheel (ØB)	J1-23	J1-25	40	55
Resolver Excitation	J1-27	J1-28	6	31
PIP Temp Sensor (Tele)	J1-29	J1-30	1542	1578
IRIG Temp Sensor (Tele)	J1-31	J1-32	2300	2670
COS A_{IG} 16X	J1-33	J1-34	47	115
SIN A_{IG} 16X	J1-35	J1-36	47	115
COS A_{IG} 1X	J1-37	J1-38	72	119
SIN A_{IG} 1X	J1-39	J1-40	72	119
COS A_{MG} 16X	J1-41	J1-42	47	115
SIN A_{MG} 16X	J1-43	J1-44	47	115
COS A_{MG} 1X	J1-45	J1-46	72	119
SIN A_{MG} 1X	J1-47	J1-48	72	119
COS A_{OG} 16X	J1-51	J1-52	47	115
SIN A_{OG} 16X	J1-53	J1-54	47	115
COS A_{OG} 1X	J1-55	J1-56	72	119
SIN A_{OG} 1X	J1-57	J1-58	72	119
X IRIG Torque +	J2-4	J2-34	160	210
X IRIG Torque -	J2-5	J2-34	160	210
X PIP Error	J2-6	J2-7	30K	33K
Ducosyn Excitation	J2-8	J2-9	1	5
Ducosyn Feedback	J2-10	J2-11	1	5
Y IRIG Torque +	J2-15	J2-34	160	210
Y IRIG Torque -	J2-16	J2-34	160	210
Y PIP Error	J2-17	J2-18	30K	33K

TABLE V (Continued)

SIGNAL	PINS		RESISTANCE VALUE (Ohms)	
	From (+)	To (-)	Minimum	Maximum
IG Error	J2-19	J2-20	78	140
MG Error	J2-21	J2-20	77	230
OG Error	J2-22	J2-20	77	230
X IRIG Error	J2-23	J2-20	27	62
Z IRIG Error	J2-24	J2-20	27	62
Control Htr (Tele)	J2-25	J1-2	9.5K	10.5K
Z IRIG Torque +	J2-32	J2-34	160	210
Z IRIG Torque -	J2-33	J2-34	160	210
Z PIP Error	J2-35	J2-36	30K	33K
IG Motor	J2-39	J2-40	20	72
MG Motor	J2-41	J2-42	20	72
OG Motor	J2-51	J2-52	10	40
Blower (Tele)	J1-11	J1-20	4949	5051

4 3 2 1

PART NO.	NOMENCLATURE	QTY REQ'D
~~1000021~~	~~PLATE, IDENTIFICATION~~	~~1~~
1000261	WEIGHT, BAL M.G.	A/R
1000262	WEIGHT BAL M.G	A/R
1000263	WEIGHT BAL MG&OG	A/R
1000268	WEIGHT BAL OG	A/R
1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602	OUTER AXIS ASSY	1
2018756	CLIP, RETAINER TM OA	6
2018730	SHAFT, STUB RSVR	1
2018739	HSG, BRG RSVR	1
2018621	BEARING DUPLEX	2
2018631	RESOLVER	1
2018732	CLIP, WIRE RET	1
2018733	PLATE, BEARING RET	1
2018731	CLIP, WIRE RET	3
100100-1	TERMINAL	2
2018754	SHAFT, STUB TM OA	1
2018755	HOUSING, BEARING TMOA	1
2018738	CASE CTR MACH ASSY	1
2018710	COVER CASE	1
2018766	PLATE BRG RET (TM)	1
2018625	SLIP RING ASSY	2

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10903	14 JUL 64	SAH	WK
	B	TDRR 11068	21 JUL 64	SAH	WK
	C	TDRR 11445	10 AUG 64	SAH	WK
	D	TDRR 11885	17 AUG 64	SAH	WK

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APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE 7/7/64

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APOLLO G&N Specification
PS2018601 REV D
Original Issue Date: 16 Nov 1965
Release Authority: TDRR 24009
Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
1/11/66	A	25177	4, 7-11, 13-17, 22-24, 26, 27	WK	ACM
2/23/66	B	26573	9, 20, 24	MGM	----
5/17/66	C	28922	10, 11	MGM	---
5/18/66	D	29028	2, 21	MGM	---

This specification consists of page 1 to 31 inclusive.

APPROVALS	NASA/MSC	A. J. Boyce MIT/IL W. Kupfer 16 Nov 65	R. Pillar ACSP A. E. Winberg

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Inertial Measuring Unit, Part Number 2018601-011 and -031.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002071	Process Specification, Soldering of Electrical Connections
ND1002214	General Specification for Preservation, Packaging, Packing and Container Marking of Apollo Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment
PS2010604	Procurement Specification, Product Configuration and Acceptance Test Requirements, APOLLO CM/LEM G&N System Requirement Items

North American Aviation

MH01-01349-416	Ethylene Glycol-Water Solution

DRAWINGS

APOLLO G&N

2018601	Inertial Measuring Unit Assembly

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between requirements, the following order of precedence shall apply. The contractor shall also notify MIT/IL APOLLO Management of the conflict.

a. The contract
b. This specification
c. Documents listed in this section

4.3.5.1.2 Low Alarm Limit-Standby. With the IMU in the standby mode, the low alarm limit test shall be performed as follows:

a. With pins A13-1 and A13-3 shorted and the IMU temperature allowed to decrease from a stabilized heater control duty cycle of 40±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 127.0° ±3.0°F.

b. With the short in 4.3.5.1.2.a removed immediately after the temperature alarm indication and the IMU temperature allowed to increase, the PIPA temperature shall be within +1.0°F of the value recorded at the temperature alarm point when the alarm turns off.

4.3.5.1.3 High Alarm Limit-Operate. With pins A13-1 and A13-3 shorted and the IMU in the operate mode, the high alarm limit test shall be performed as follows:

a. With the voltage specified in 4.2.1.3.f applied to the GSE control heaters at pins J1-6 (Hi), J1-7 (Hi), J1-8 (Lo), and J1-9 (Lo), and the IMU temperature allowed to increase from a stabilized heater control duty cycle of 20±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 137.0° ±2.0°F.

   NOTE: Control heaters and GSE heaters shall not be energized simultaneously.

b. With the GSE heater voltage in 4.3.5.1.3.a removed immediately after the temperature alarm indication and the IMU temperature allowed to decrease, the PIPA temperature shall be within -1.0°F of the value recorded at the temperature alarm point when the alarm turns off.

4.3.5.1.4 High Alarm Limit-Standby. With pins A13-1 and A13-3 shorted and the IMU in the standby mode, the high alarm limit test shall be performed as follows:

a. With the voltage specified in 4.2.1.3.f applied to the GSE control heaters at pins J1-6 (Hi), J1-7 (Hi), J1-8 (Lo), and J1-9 (Lo), and the IMU temperature allowed to increase from a stabilized heater control duty cycle of 40±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 137.0° ±2.0°F.

   NOTE: Control heaters and GSE heaters shall not be energized simultaneously.

b. With the GSE heater voltage in 4.3.5.1.4.a removed immediately after the temperature alarm indication and the IMU temperature allowed to decrease, the PIPA temperature shall be within -1.0°F of the value recorded at the temperature alarm point when the alarm turns off.

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1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602	OUTER AXIS ASSY	1
2018756	CLIP, RETAINER TM OA	6
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018733~~	~~HSG, BRG RSVR~~	~~1~~
2018621	BEARING DUPLEX	1
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~
2018731	CLIP, WIRE RET	2
100100-1	TERMINAL	2
2018754	SHAFT, STUB TM OA	1
2018755	HOUSING, BEARING TMOA	1
2018738	CASE CTR MACH ASSY	1
2018710	COVER CASE	1
2018766	PLATE BRG RET (TM)	1
2018625	SLIP RING ASSY	2
2018606	RESOLVER ASSY OA	1

REVISIONS

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	B	TDRR 11068	21 Jul 64		WK
	C	TDRR 11445	10 AUG 64		WK
	D	TDRR 11885	17 AUG 64		WK
	E	TDRR 11991	25 AUG 64		WK

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MIT/IL APPROVAL		DATE 7/7/64

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APOLLO G&N Specification
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Original Issue Date: 16 Nov 1965
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Class A Release
CODE IDENT NO. 80230

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

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5/18/66	D	29028	2, 21	MGM	---
5/24/66	E	29158	7, 8, 24, 26, 27	MGM	---

This specification consists of page 1 to 31 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce MIT/IL 11/15/65	16 Nov 65	R. Temple 4/22/65 R. Pillar/JHA ACSP A.E. Winberg

3.1.2.14 Precision Resolver Alignment Module. The 16X resolver sine outputs, at the pins specified in Table III, shall increase 0.36V rms, minimum, in-phase, with respect to the resolver excitation when the precision resolver alignment module potentiometers are rotated fully cw from the extreme ccw position for each axis.

TABLE III

PRECISION RESOLVER ALIGNMENT MODULE SENSITIVITY

AXIS	16X RESOLVER OUTPUT TERMINALS*	
	Hi	Lo
Inner	J1-35	J1-36
Middle	J1-43	J1-44
Outer	J1-53	J1-54

*The gimbals shall be locked such that the 16X resolver outputs at the terminals shown shall be 0 to 0.6 volt in phase with respect to the resolver excitation.

3.1.2.15 PIP Phasing

a. The "X" PIP shall be approximately at null when the gimbals and stable member are at the normal zero positions (see Figure 1). The "X" PIP output at pins J2-6 (Hi) and J2-7 (Lo) shall increase in phase when the float is driven away from null with a ccw rotation of the stable member as viewed from the resolver end of the IGA.

b. The "Y" PIP shall be approximately at null when the gimbals and stable member are at the normal zero positions. The "Y" PIP output at pins J2-17 (Hi) and J2-18 (Lo) shall increase in phase when the float is driven away from null with a cw rotation of the OG as viewed from the resolver end of the OGA.

c. The "Z" PIP shall be approximately at null when the MG and stable member are at their normal zero positions and the OG is 90° ccw from its normal zero position. The "Z" PIP output at pins J2-35 (Hi) and J2-36 (Lo) shall increase in phase when the float is driven away from null by a cw rotation of the OG as viewed from the resolver end of the OGA.

3.1.2.16 IRIG and Gyro Error Resolver Phasing. The IRIG and gyro error resolver outputs shall be as specified in Table IV when torqued electrically from null.

TABLE IV

IRIG AND GYRO ERROR RESOLVER OUTPUTS

IRIG	STABLE MEMBER POSITION ±5°	INPUT TERMINALS		OUTPUT TERMINALS		MAGNITUDE	PHASE*
		Hi	Lo	Hi	Lo		
X	0°	J2-5	J2-34	J2-23	J2-20	Increasing	Inphase
	0°	J2-5	J2-34	J2-22	J2-20	↑	Inphase
	90° CCW	J2-5	J2-34	J2-21	J2-20		Inphase
	0°	J2-4	J2-34	J2-23	J2-20		Out-of-phase
Y	0°	J2-16	J2-34	J2-19	J2-20		Inphase
	0°	J2-15	J2-34	J2-19	J2-20		Out-of-phase
Z	0°	J2-33	J2-34	J2-24	J2-20		Inphase
	0°	J2-33	J2-34	J2-21	J2-20		Inphase
	90° CCW	J2-33	J2-34	J2-22	J2-20	↓	Out-of-phase
	0°	J2-32	J2-34	J2-24	J2-20	Increasing	Out-of-phase

*NOTES:

1. The direction of rotation is defined as viewed along the axis of rotation from the resolver end.

2. The inertial component signal generator outputs are phased with respect to the signal generator excitation at pins J2-8 (Hi) and J2-9(Lo).

3.1.2.17 Balance. The unbalance of each gimbal and stable member about their respective axes shall not exceed 0.1 oz-inch (0.2 oz-inch peak to peak).

4.3.10 IRIG and GYRO Error Resolver Phasing

a. A 29.00±0.29V rms, 3200 +32, -32 cps excitation shall be applied to the ducosyns at pins J2-8 (Hi) and J2-9 (Lo).

CAUTION: Ducosyn excitation shall be applied 1/2 hour minimum before electrically torquing the IRIG's.

b. A 28.0±1.4 vdc source shall be applied to the preamps at pins J2-38 (Hi) and J2-37 (Lo).

c. The IRIG and gyro error r [illegible] puts shall be as specified in Table IV when torqued electrically from [illegible] 30 2 cps current (which follows the profile of Figure 2) applied at the [illegible] inals specified in Table IV.

4.3.11 Balance. With each gimbal [illegible] member set to their maximum unbalance position, the unbalance of each gimbal and stab [illegible] er about their respective axes shall be as specified in 3.1.2.17.

4.3.12 Gimbal Torque

a. With the axis of rotation in a horizontal plane, apply a dc voltage in accordance with Table VIII and increase it slowly from 0 vdc until rotation starts. Without changing the voltage, allow the gimbal to rotate to a stop. Again increase the voltage until the gimbal starts to rotate. Repeat this procedure for a complete revolution starting from four equally spaced positions in both the cw and ccw directions. The maximum TM current required to start the gimbals shall be specified in 3.1.2.18.

b. Under the conditions of 4.3.12.a the torque required to complete one cw and one ccw rotation shall not exceed the maximum starting torque obtained in 4.3.12.a.

TABLE VIII

STARTING TORQUE TEST INPUT TERMINALS

GIMBAL	INPUT TERMINALS	
	+DC	Gnd
SM	J2-39	J2-40
MG	J2-41	J2-42
OG	J2-51	J2-52

4.3.13 Pressure. With the assembly internal pressure (P_i) at 29.5±0.1 psia of dry air or nitrogen, the pressure drop (ΔP) shall be as specified in 3.1.2.19 when tested over a 24 hour period. The pressure drop shall be corrected for changes in case temperature, and barometric pressure over the 24 hour period utilizing the following formula:

$$\Delta P_c = (P_i - P_f) \left[\frac{Ti+460}{\frac{Tf+Ti+460}{2}} \right] = \text{corrected pressure drop (psia)}$$

where: $Pi = P_G + P_{bi}$ = initial IMU absolute pressure (psia)

P_{bi} = initial barometric pressure (psi) = (inches Hg) $(0.489 \frac{\text{psi}}{\text{in. HG}})$

P_G = gauge pressure (psi)

$P_f = P_G + P_{bi} + (P_{bf} - P_{bi})$ = IMU absolute pressure after 24 hours (psia)

P_{bf} = final barometric pressure (psi) = (inches Hg) $(0.489 \frac{\text{psi}}{\text{in. Hg}})$

T_i = initial case temperature (°F).

T_f = final case temperature (°F).

4.3.14 Telemetry Signal Output. With the inputs specified in 4.2.1.4.c, g and h applied, the telemetry signals shall be as follows:

a. The blower telemetry signal voltage at pins J1-20 (Hi) and J1-12 (Lo) shall be 26.6±0.5V rms.

b. When the control heaters switch on, the control heater telemetry signal voltage at pins J2-25 (Lo) J1-2 (Hi) and J1-3 (Hi) shall be 20.0±2.0 vdc.

4.3.15 PTC Interlock. With the input specified in 4.2.1.4.c applied, the PTC Interlock signal voltage at pins J1-19 (Hi) and J1-4 (Lo) shall be 21.5±0.5V dc.

4.3.16 Insulation Resistance. The insulation resistance shall be as specified in Table VII. when measured with a megohmmeter limited to a short circuit current of one milliampere at an output voltage of 50 +0, -5V dc.

4.3.17 Verification. Test or examination data shall be examined to verify that the requirements of 3.1.2.11, 3.2.2.1 and 3.2.2.2 have been met.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES

6.1 Indicating Sensor Resistance to Degrees Conversion. Tables IX and X may be used to convert the measured PIP and IRIG indicating sensor resistance to degrees fahrenheit.

6.2 MODES OF OPERATION

6.2.1 Standby. The IMU shall be in the standby mode when power is applied as specified in 3.1.1.b and d.

6.2.2 Operate. The IMU shall be in the operate mode when power is applied as specified in 3.1.1.a through e.

PART NO.	NOMENCLATURE	QTY REQ'D
~~1000021~~	~~PLATE, IDENTIFICATION~~	~~1~~
1000261	WEIGHT, BAL M.G.	A/R
1000262	WEIGHT BAL M.G	A/R
1000263	WEIGHT BAL MG & OG	A/R
1000268	WEIGHT BAL OG	A/R
1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602	OUTER AXIS ASSY	1
2018756	CLIP, RETAINER TM OA	6
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018739~~	~~HSG, BRG RSVR~~	~~1~~
2018621	BEARING DUPLEX	1
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~
2018731	CLIP, WIRE RET	2
100100-1	TERMINAL	2
2018754	SHAFT, STUB TM OA	1
2018755	HOUSING, BEARING TM OA	1
2018738	CASE CTR MACH ASSY	1
2018710	COVER CASE	1
2018766	PLATE BRG RET (TM)	1
2018625	SLIP RING ASSY	2
2018606	RESOLVER ASSY OA	1
1000122	CONNECTOR ELECT	4

REVISIONS

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	C	TDRR 11445	10 AUG 64		WK
	D	TDRR 11885	17 AUG 64		WK
	E	TDRR 11991	25 AUG 64		WK
	F	TDRR 12641	10 SEP 64		DM

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APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE 7/7/64

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APOLLO G&N Specification
PS2018601 REV F
Original Issue Date: 16 Nov 1965
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

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5/24/66	E	29158	7, 8, 24, 26, 27	MGM	---
7/5/66	F	30016	15, 18, 20, 21, 22, 26, 27	MGM	---

This specification consists of page 1 to 31 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce MIT/IL	W Kupfer 16 Nov 65	R. Temple 11/22/65 R. Pillar/JHH ACSP A. E. Winberg

a. 28.0±0.5 vdc to the PIPA and IRIG control heaters at pins J1-2 (Hi), J1-3 (Hi), J1-4 (Lo), and J1-5 (Lo).

b. 29.00±0.29V rms, 3200±32 cps to the ducosyns at pins J2-8 (Hi) and J2-9 (Lo).

c. 28.0±0.1V rms, 800±8 cps to the IRIG wheels at pins J1-22 (ϕA), J1-23 (ϕB), J1-21 (com), J1-24 (com), and J1-25 (com). The wheel voltage shall be constant within 0.1V throughout the heater control calibration (see 6.3).

d. 28.00±2.5V rms, 800±80 cps to the gimbal angle resolvers at pins J1-27 (Hi) and J1-28 (Lo).

e. 28.0±1.4 vdc to the preamplifiers at pins J2-38 (28 vdc) and J2-37 (0 vdc).

f. 28.0±0.5V rms, 800±8 cps to the blowers at pins J1-10 (ϕA), J1-11 (ϕB) and J1-12 (com).

3.2.2.2.2 Selection of Control Heater Padding Resistor (R1). The control heater padding resistor (R1) shall be selected as follows:

a. The inertial component temperatures shall be stabilized with control heater duty cycle at 5±2 percent. The average PIPA temperature shall be 129.4° ±3.0°F and the ΔT (difference between the PIPA and IRIG indicated temperatures) shall be $\geq$4.0°F. Duty cycle in percent $\frac{\text{time on}}{\text{time on + time off}}$ X 100

b. With the control heater duty cycle increased to 50±5 percent, the control heater padding resistor (R1) shall be selected to achieve a ΔT within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment.

NOTE: During stabilization, the PIPA and IRIG indicating sensors shall be monitored and data continuously recorded. The PIPA and IRIG temperatures are stabilized when they have not changed by more than 0.10°F over a one hour period. The measured average PIPA and IRIG indicating sensor data shall be converted to degrees Fahrenheit (see 6.1).

3.2.2.2.3 Selection of Thermostat Anticipatory Heater Padding Resistor (R4). The thermostat anticipatory heater padding resistor (R4) shall be selected as follows:

a. With the control heater duty cycle at 50±5 percent, the control thermostat anticipatory heater padding resistor (R4) shall be selected to achieve an average PIPA temperature within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment.

b. With the control heater duty cycle at 20±5 percent, the average PIPA temperature shall be within 0.25°F of **the values** obtained in 3.2.2.2.2.a and 3.2.2.2.3.a. If the requirement is not met, repeat 3.2.2.2.2.a and 3.2.2.2.3.a.

4.2.1.2 Environmental. Unless otherwise specified, the unsealed assemblies shall be tested under the following ambient conditions:

a. Temperature: 75° ±4°F
b. Relative Humidity: 50 percent max
c. Pressure Differential: Internal positive 0.01 inch H_2O
d. Particle Count Tolerance: Maximum of 100,000 particles/cu ft of air between 1 and 10 microns. Maximum of 25,000 particles/ cu ft of air greater than 10 microns.
e. Atmospheric Pressure: 14.7±1.0 psia

4.2.1.3 Test Power. The following electrical inputs are necessary to perform the tests specified herein:

a. Gimbal angle resolver: 28.00±2.5V rms, 800±80 cps
b. Control heater: 21.5 to 32.5 vdc
c. Blower and IRIG wheel: 28.0±1.4V rms, 800±8 cps
d. Ducosyn: 29.00±0.29V rms, 3200±32 cps
e. Preamplifier: 28.0±1.4 vdc
f. GSE heater: 31V maximum from the GSE temperature control equipment

4.2.1.4 Test Setup. Unless otherwise specified herein, the tests in 4.3.5 shall be performed with the following conditions established. The IMU shall be in the standby mode when power is applied as specified in c and d, and shall be in the operate mode when power is applied as specified in c through h.

a. Padding resistors installed as selected in 3.2.2.3.

b. IMU completely assembled with provisions for shorting pins A13-1 and A13-3.

c. 21.5±0.2 vdc applied to the PIPA and IRIG control heaters at pins J1-2 (Hi), J1-3 (Hi), J1-4 (Lo), and J1-5 (Lo).

d. 29.00±0.29V rms, 3200±32 cps applied to the ducosyns at pins J2-8 (Hi) and J2-9 (Lo).

e. 26.6±0.2V rms, 800±8 cps applied to the IRIG wheels at pins J1-22 (ØA), J1-23 (ØB), J1-21 (com), J1-24 (com), and J1-25 (com) (see 6.3).

f. 28.00±2.5V rms, 800±80 cps applied to the gimbal angle resolvers at pins J1-27 (Hi) and J1-28 (Lo).

g. 28.0±1.4 vdc applied to the preamplifiers at pins J2-38 (28 vdc) and J2-37 (0 vdc).

k. The total time that IRIG wheel power was applied shall be recorded in the system history log book.

l. The total IRIG wheel, fixed heater, and bias heater power shall be measured and recorded in the system history book.

4.3.2 Heat Exchanger Leak Rate. When tested with a differential pressure of 77.5, +4.0 −0 psig of helium, the leak rate of the heat exchanger shall be as specified in 3.1.2.1.

4.3.3 Heat Exchanger Pressure Drop. When tested with the quick disconnect couplings, the associated "O" rings installed, and water glycol coolant flowing at 33±1 lb/hr (3.6 ±0.1 gal/hr) at 45° ±2°F inlet temperature, the heat exchanger pressure drop shall be as specified in 3.1.2.2. The pressure drop shall be calculated by use of the following formula utilizing a differential mercury manometer to obtain H_1 and H_2:

Pressure Drop = $0.92\ (H_1 - H_2)$ inch

Where:

H_1 = High pressure side of the differential mercury manometer

H_2 = Low pressure side of the differential mercury manometer

4.3.4 Resistance. The resistance between pins shall be as specified in Table V when measured with an ohmmeter limited to an open circuit voltage ot 10 mv. The IMU shall be maintained at 130° ±3°F for the resistance measurements.

4.3.5 Temperature Control

4.3.5.1 Temperature Alarm Limits

4.3.5.1.1 Low Alarm Limit-Operate. With the IMU in the operate mode, the low alarm limit test shall be performed as follows:

a. With pins A13-1 and A13-3 shorted and the IMU temperature allowed to decrease from a stabilized heater control duty cycle of 20±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 127.0° ±3.0°F.

b. With the short in 4.3.5.1.1.a removed immediately after the temperature alarm indication and the IMU temperature allowed to increase, the PIPA temperature shall be within +1.0, −0.5°F of the value recorded at the temperature alarm point when the alarm turns off.

c. With the voltage specified in 4.2.1.4.c increased to 32.5±0.2 vdc and the voltage specified in 4.1.1.4.e and h increased to 29.4±0.2V rms, 4.3.5.1.1.a and b shall be repeated (see 6.3).

4.3.5.1.2 Low Alarm Limit-Standby. With the IMU in the standby mode, the low alarm limit test shall be performed as follows:

a. With pins A13-1 and A13-3 shorted and the IMU temperature allowed to decrease from a stabilized heater control duty cycle of 40±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 127.0° ±3.0°F.

b. With the short in 4.3.5.1.2.a removed immediately after the temperature alarm indication and the IMU temperature allowed to increase, the PIPA temperature shall be within +1.0°, -0.5°F of the value recorded at the temperature alarm point when the alarm turns off.

4.3.5.1.3 High Alarm Limit-Operate. With pins A13-1 and A13-3 shorted and the IMU in the operate mode, the high alarm limit test shall be performed as follows:

a. With the voltage specified in 4.2.1.3.f applied to the GSE control heaters at pins J1-6 (Hi), J1-7 (Hi), J1-8 (Lo), and J1-9 (Lo), and the IMU temperature allowed to increase from a stabilized heater control duty cycle of 20±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 137.0° ±2.0°F.

   NOTE: Control heaters and GSE heaters shall not be energized simultaneously.

b. With the GSE heater voltage in 4.3.5.1.3.a removed immediately after the temperature alarm indication and the IMU temperature allowed to decrease, the PIPA temperature shall be within +0.5°, -1.0°F of the value recorded at the temperature alarm point when the alarm turns off.

4.3.5.1.4 High Alarm Limit-Standby. With pins A13-1 and A13-3 shorted and the IMU in the standby mode, the high alarm limit test shall be performed as follows:

a. With the voltage specified in 4.2.1.3.f applied to the GSE control heaters at pins J1-6 (Hi), J1-7 (Hi), J1-8 (Lo), and J1-9 (Lo), and the IMU temperature allowed to increase from a stabilized heater control duty cycle of 40±5 percent, there shall be a temperature alarm indication when the PIPA temperature reaches 137.0° ±2.0°F.

   NOTE: Control heaters and GSE heaters shall not be energized simultaneously.

b. With the GSE heater voltage in 4.3.5.1.4.a removed immediately after the temperature alarm indication and the IMU temperature allowed to decrease, the PIPA temperature shall be within +0.5°, -1.0°F of the value recorded at the temperature alarm point when the alarm turns off.

4.3.5.2 Blower Operation. With the IMU in the operate mode the blowers shall run and the airflow direction through the blowers B8 and B9 shall be from the middle gimbal towards the outer case.

4.3.5.3 Blower, Fixed Heater, and Bias Heater Current. With the blowers turned off, the total current of the blower, fixed heaters, and bias heater at pin J1-12, shall be 0.03 to 0.35 amp; and with the blowers turned on, the total current shall be as specified in 3.1.2.9.

4.3.5.4 Temperature Control Current. With the control heaters turned on, the current shall be 2.15±0.35 amp. With the voltage in 4.2.1.4.c increased to 32.5±0.2 vdc, the current shall be 3.25±0.50 amp.

4.3.5.5 PIPA and IRIG Temperatures. With the IMU in the operate mode, the PIPA and IRIG temperature test shall be performed as follows:

a. With a control heater duty cycle of 5±2 percent, the average PIPA temperature shall be 129.4° ±0.4°F with a maximum instability of ±0.2°F and the average IRIG temperature shall be a point within the range of 134.0° and 136.0°F with ±0.2°F maximum instability. Allow for stabilization.

b. Repeat 4.3.5.5.a with control heater duty cycles of 20±5 percent and 50±5 percent.

c. With the voltage specified in 4.2.1.4.c increased to 32.5±0.2 vdc and the voltages specified in 4.2.1.4.e and h increased to 29.4±0.2V rms, 4.3.5.5.a shall be repeated at control heater duty cycles of 5±3 percent and 30±5 percent (see 6.3).

4.3.5.6 Standby to Operate Time. With the IMU in the standby mode, set the control heater duty cycle to 50±5 percent. (The control heater duty cycle will change to a lower level in the operate mode.) Within 15 minutes after switching from standby to the operate mode, the PIPA and IRIG temperatures shall be within 0.5°F of the respective temperature control points established in 4.3.5.5.a.

4.3.5.7 Standby to Operate Temperature Change. The change in temperature of the PIPA's, when switching from standby to the operate mode, shall be as specified in 3.1.2.6.

4.3.13 Pressure. With the assembly internal pressure (P_i) at 29.5±0.1 psia of dry air or nitrogen, the pressure drop (ΔP) shall be as specified in 3.1.2.19 when tested over a 24 hour period. The pressure drop shall be corrected for changes in case temperature, and barometric pressure over the 24 hour period utilizing the following formula:

$$\Delta P_c = (P_i - P_f) \left[\frac{Ti+460}{\frac{Tf+Ti+460}{2}} \right] = \text{corrected pressure drop (psia)}$$

where: $Pi = P_G + P_{bi}$ = initial IMU absolute pressure (psia)

P_{bi} = initial barometric pressure (psi) = (inches Hg) $(0.489 \frac{psi}{in.\ HG})$

P_G = gauge pressure (psi)

$P_f = P_G + P_{bi} + (P_{bf} - P_{bi})$ = IMU absolute pressure after 24 hours (psia)

P_{bf} = final barometric pressure (psi) = (inches Hg) $(0.489 \frac{psi}{in.\ Hg})$

T_i = initial case temperature (°F).

T_f = final case temperature (°F).

4.3.14 Telemetry Signal Output. With the inputs specified in 4.2.1.4.c, g and h (26.9±1,0V rms) applied, the telemetry signals shall be as follows:

a. The blower telemetry signal voltage at pins J1-20 (Hi) and J1-12 (Lo) shall be 26.9±1.1V rms.

b. When the control heaters switch on, the control heater telemetry signal voltage at pins J2-25 (Lo) J1-2 (Hi) and J1-3 (Hi) shall be 20.0±2.0 vdc.

4.3.15 PTC Interlock. With the input specified in 4.2.1.4.c applied, the PTC Interlock signal voltage at pins J1-19 (Hi) and J1-4 (Lo) shall be 21.5±0.5V dc.

4.3.16 Insulation Resistance. The insulation resistance shall be as specified in Table VII. when measured with a megohmmeter limited to a short circuit current of one milliampere at an output voltage of 50 +0, -5V dc.

4.3.17 Verification. Test or examination data shall be examined to verify that the requirements of 3.1.2.11, 3.2.2.1 and 3.2.2.2 have been met.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES

6.1 Indicating Sensor Resistance to Degrees Conversion. Tables IX and X may be used to convert the measured PIP and IRIG indicating sensor resistance to degrees fahrenheit.

6.2 MODES OF OPERATION

6.2.1 Standby. The IMU shall be in the standby mode when power is applied as specified in 3.1.1.b and d.

6.2.2 Operate. The IMU shall be in the operate mode when power is applied as specified in 3.1.1.a through e.

6.3 IRIG TURN ON PROCEDURE. With the wheels excited with the required voltage for a minimum of three minutes, turn the wheel excitation off for a minimum of five minutes and then turn on. Repeat the turn-off procedure a minimum of three times prior to testing. The wheel voltage shall be within limits before proceeding when checked after the first turn-off. Adjust if necessary.

PART NO.	NOMENCLATURE	QTY REQ'D
~~1000021~~	~~PLATE, IDENTIFICATION~~	~~1~~
1000261	WEIGHT, BAL M.G.	A/R
1000262	WEIGHT BAL M.G	A/R
1000263	WEIGHT BAL MG&OG	A/R
1000268	WEIGHT BAL OG	A/R
1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602	OUTER AXIS ASSY	1
2018756	CLIP, RETAINER TM OA	6
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018739~~	~~HSG, BRG RSVR~~	~~1~~
2018621	BEARING DUPLEX	1
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~
2018731	CLIP, WIRE RET	2
100100-1	TERMINAL	2
2018754	SHAFT, STUB TM OA	1
2018755	HOUSING, BEARING TM OA	1
2018738	CASE CTR MACH ASSY	1
2018710	COVER CASE	1
2018766	PLATE BRG RET (TM)	1
2018625	SLIP RING ASSY	2
2018606	RESOLVER ASSY OA	1
1000122	CONNECTOR ELECT	4
2018773	VALVE, PRESS. ASSY	1
2018769	MOUNT CONN	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WR	
	A	TDRR 10903	14 JUL 64	[illegible]	WR
	B	TDRR 11068	21 Jul 64	[illegible]	WR
	C	TDRR 11445	10 AUG 64	[illegible]	WR
	D	TDRR 11885	17 AUG 64	[illegible]	WR
	E	TDRR 11991	25 AUG 64	[illegible]	WR
	F	TDRR 12641	10 SEP 64	[illegible]	DM
	G	TDRR 12693	21 SEP 64	[illegible]	WR

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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APPROVED FOR MSC	[illegible]	7/7/64
MIT/IL APPROVAL	W. [illegible]	7/7/64

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APOLLO G&N Specification
PS2018601 REV G
Original Issue Date: 16 Nov 1965
Release Authority: TDRR 24009
Class A Release
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PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INERTIAL MEASURING UNIT ASSEMBLY

DRAWING NO. 2018601

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
1/11/66	A	25177	4, 7-11, 13-17, 22-24, 26, 27 RDG/AC	WK	ACM
2/23/66	B	26573	9, 20, 24 WS/C	MGM	----
5/17/66	C	28922	10, 11 JH/AC	MGM	---
5/18/66	D	29028	2, 21 RDG/AC	MGM	---
5/24/66	E	29158	7, 8, 24, 26, 27 RDG/AC	MGM	---
7/5/66	F	30016	15, 18, 20, 21, 22, 26, 27 WS/C	MGM	---
9/22/66	G	31357	8 RDG/AC	MGM EA	---

This specification consists of page 1 to 31 inclusive.

APPROVALS	A. C. METZGER NASA/MSC	A. J. Boyce John E. Miller MIT/IL 11/15/65	W Kupfer/er 16 Nov 65	R. Temple 4/22/65 R. Pillar/JHA ACSP R. E. Winberg

TABLE IV

IRIG AND GYRO ERROR RESOLVER OUTPUTS

IRIG	STABLE MEMBER POSITION ±5°	INPUT TERMINALS		OUTPUT TERMINALS		MAGNITUDE	PHASE*
		Hi	Lo	Hi	Lo		
X	0°	J2-5	J2-34	J2-23	J2-20	Increasing	Inphase
	0°	J2-5	J2-34	J2-22	J2-20	↑	Inphase
	90° CCW	J2-5	J2-34	J2-21	J2-20		Inphase
	0°	J2-4	J2-34	J2-23	J2-20		Out-of-phase
Y	0°	J2-16	J2-34	J2-19	J2-20		Inphase
	0°	J2-15	J2-34	J2-19	J2-20		Out-of-phase
Z	0°	J2-33	J2-34	J2-24	J2-20		Inphase
	0°	J2-33	J2-34	J2-21	J2-20		Inphase
	90° CCW	J2-33	J2-34	J2-22	J2-20	↓	Out-of-phase
	0°	J2-32	J2-34	J2-24	J2-20	Increasing	Out-of-phase

*NOTES:

1. The direction of rotation is defined as viewed along the axis of rotation from the resolver end.
2. The inertial component signal generator outputs are phased with respect to the signal generator excitation at pins J2-8 (Hi) and J2-9(Lo).

3.1.2.17 Balance. The unbalance of each gimbal and stable member about their respective axes shall not exceed 0.25 oz-inch (0.50 oz-inch peak to peak).

PART NO.	NOMENCLATURE	QTY REQ'D	PART NO.	NOMENCLATURE	QTY REQ'D
~~1000021~~	~~PLATE, IDENTIFICATION~~	~~1~~			
1000261	WEIGHT, BAL M.G.	A/R			
1000262	WEIGHT BAL M.G	A/R			
1000263	WEIGHT BAL MG&OG	A/R			
1000268	WEIGHT BAL OG	A/R			
1000270	WEIGHT BAL OG	A/R			
1000135	CONNECTOR, WATER	2			
2018602	OUTER AXIS ASSY	1			
2018756	CLIP, RETAINER TM OA	6			
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~~2018739~~	~~HSG, BRG RSVR~~	~~1~~			
2018621	BEARING DUPLEX	1			
~~2018631~~	~~RESOLVER~~	~~1~~			
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~			
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~			
2018731	CLIP, WIRE RET	2			
100100-1	TERMINAL	2			
2018754	SHAFT, STUB TM OA	1			
2018755	HOUSING, BEARING TM OA	1			
2018738	CASE CTR MACH ASSY	1			
2018710	COVER CASE	1			
2018766	PLATE BRG RET (TM)	1			
2018625	SLIP RING ASSY	2			
2018606	RESOLVER ASSY OA	1			
1000122	CONNECTOR ELECT	4			
2018773	VALVE, PRESS. ASSY	1			
2018769	MOUNT CONN	1			
2018775	COVER ACCESS RSVR MOD	1			

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
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	E	TDRR 11991	25 AUG 64	GJB	WK
	F	TDRR 12641	10 SEP 64		DM
	G	TDRR 12693	21 SEP 64		WK
	H	TDRR 13656	20 OCT 64		

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MIT/IL APPROVAL		DATE 7/7/64

INERTIAL MEASUREMENT UNIT (BLOCK II)

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7/5/66	F	30016	15, 18, 20, 21, 22, 26, 27	MGM	---
9/22/66	G	31357	8	MGM EA	---
2/23/68	H	35733	2 thru 31. Specification was 31 pages; now 32 pages.	MGM EA	---

This specification consists of page 1 to 32 inclusive.

APPROVALS	A. C. METZGER	A. J. Boyce	W Kupfer 16 Nov 65	R. Temple 4/22/65	R. Pillar/JHH
	NASA/MSC	MIT/IL 11/15/65		ACSP	

a. 28.0±0.5 vdc to the PIPA and IRIG control heaters at pins J1-2 (Hi), J1-3 (Hi), J1-4 (Lo), and J1-5 (Lo).

b. 29.00±0.29V rms, 3200±32 cps to the ducosyns at pins J2-8 (Hi) and J2-9 (Lo).

c. 28.0±0.1V rms, 800±8 cps to the IRIG wheels at pins J1-22 (ϕA), J1-23 (ϕB), J1-21 (com), J1-24 (com), and J1-25 (com). The wheel voltage shall be constant within 0.1V throughout the heater control calibration (see 6.3).

d. 28.00±2.8V rms, 800±80 cps to the gimbal angle resolvers at pins J1-27 (Hi) and J1-28 (Lo).

e. 28.0±1.4 vdc to the preamplifiers at pins J2-38 (28 vdc) and J2-37 (0 vdc).

f. 28.0±0.5V rms, 800±8 cps to the blowers at pins J1-10 (ϕA), J1-11 (ϕB) and J1-12 (com).

3.2.2.2.2 Selection of Control Heater Padding Resistor (R1). The control heater padding resistor (R1) shall be selected as follows:

a. The inertial component temperatures shall be stabilized with control heater duty cycle at 5±2 percent. The average PIPA temperature shall be 129.4° ±3.0°F and the ΔT (difference between the PIPA and IRIG indicated temperatures) shall be ≥4.0°F. Duty cycle in percent $\frac{\text{time on}}{\text{time on + time off}} \times 100$

b. With the control heater duty cycle increased to 50±5 percent, the control heater padding resistor (R1) shall be selected to achieve a ΔT within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment.

NOTE: During stabilization, the PIPA and IRIG indicating sensors shall be monitored and data continuously recorded. The PIPA and IRIG temperatures are stabilized when they have not changed by more than 0.10°F over a one hour period. The measured average PIPA and IRIG indicating sensor data shall be converted to degrees Fahrenheit (see 6.1).

3.2.2.2.3 Selection of Thermostat Anticipatory Heater Padding Resistor (R4). The thermostat anticipatory heater padding resistor (R4) shall be selected as follows:

a. With the control heater duty cycle at 50±5 percent, the control thermostat anticipatory heater padding resistor (R4) shall be selected to achieve an average PIPA temperature within 0.25°F of the value obtained in 3.2.2.2.2.a. Allow for stabilization after any adjustment.

b. With the control heater duty cycle at 20±5 percent, the average PIPA temperature shall be within 0.25°F of the values obtained in 3.2.2.2.2.a and 3.2.2.2.3.a. If the requirement is not met, repeat 3.2.2.2.2.a and 3.2.2.2.3.a.

4 3 2 1

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
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	A	TDRR 10903	14 JUL 64		WK
	B	TDRR 11068	21 JUL 64		WK.
	C	TDRR 11445	10 AUG 64		WK
	D	TDRR 11885	17 AUG 64		WK
	E	TDRR 11991	25 AUG 64	AJB	WK
	F	TDRR 12641	10 SEP 64		
	G	TDRR 12693	21 SEP 64		WK.
	H	TDRR 13656	20 OCT 64		
	J	TDRR 13967	4 NOV 64		WK.

PART NO.	NOMENCLATURE	QTY REQ'D	PART NO.	NOMENCLATURE	QTY REQ'D
~~1000021~~	~~PLATE, IDENTIFICATION~~	~~1~~			
1000261	WEIGHT, BAL M.G.	A/R			
1000262	WEIGHT BAL M.G	A/R			
1000263	WEIGHT BAL MG & OG	A/R			
1000268	WEIGHT BAL OG	A/R			
1000270	WEIGHT BAL OG	A/R			
1000135	CONNECTOR, WATER	2			
2018602	OUTER AXIS ASSY	1			
2018756	CLIP, RETAINER TM OA	6			
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~			
~~2018739~~	~~HSG, BRG RSVR~~	~~1~~			
2018621	BEARING DUPLEX	1			
~~2018631~~	~~RESOLVER~~	~~1~~			
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~			
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~			
2018731	CLIP, WIRE RET	2			
100100-1	TERMINAL	2			
2018754	SHAFT, STUB TM OA	1			
2018755	HOUSING, BEARING TM OA	1			
2018738	CASE CTR MACH ASSY	1			
2018710	COVER CASE	1			
2018766	PLATE BRG RET (TM)	1			
2018625	SLIP RING ASSY	2			
2018606	RESOLVER ASSY OA	1			
1000122	CONNECTOR ELECT	4			
2018773	VALVE, PRESS. ASSY	1			
2018769	MOUNT CONN	1			
2018775	COVER ACCESS RSVR MOD	1			
2018774	MOUNT CONN O.A.	1			
1010838	ADHESIVE	A/R			
1000076-1	NUT, CLINCH	8			

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

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MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

APPROVED DATE 1 Jul 64
CHECKED
DRAWN JCF
APPROVED FOR MSC 7/7/64
MIT/IL APPROVAL DATE 7/7/64

INERTIAL
MEASUREMENT
UNIT
(BLOCK II)

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO.
2018601

SHEET OF

4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

PART NO.	NOMENCLATURE	QTY REQ'D	PART NO.	NOMENCLATURE	QTY REQ'D
~~1000021~~	~~PLATE, IDENTIFICATION~~	~~1~~			
1000261	WEIGHT, BAL M.G.	A/R			
1000262	WEIGHT BAL M.G	A/R			
1000263	WEIGHT BAL MG&OG	A/R			
1000268	WEIGHT BAL OG	A/R			
1000270	WEIGHT BAL OG	A/R			
1000135	CONNECTOR, WATER	2			
2018602	OUTER AXIS ASSY	1			
2018756	CLIP, RETAINER TM OA	6			
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~			
~~2018739~~	~~HSG, BRG RSVR~~	~~1~~			
2018621	BEARING DUPLEX	1			
~~2018631~~	~~RESOLVER~~	~~1~~			
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~			
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~			
2018731	CLIP, WIRE RET	2			
100100-1	TERMINAL	2			
2018754	SHAFT, STUB TM OA	1			
2018755	HOUSING, BEARING TM OA	1			
2018738	CASE CTR MACH ASSY	1			
2018710	COVER CASE	1			
2018766	PLATE BRG RET (TM)	1			
2018625	SLIP RING ASSY	2			
2018606	RESOLVER ASSY OA	1			
1000122	CONNECTOR ELECT	4			
2018773	VALVE, PRESS. ASSY	1			
2018769	MOUNT CONN	1			
2018775	COVER ACCESS RSVR MOD	1			
2018774	MOUNT CONN O.A.	1			
1010838	ADHESIVE	A/R			
1000076-1	NUT, CLINCH	8			
1010353-9	RELAY	1			
1010837-3	DIODE	1			
1011757-1	CONNECTOR	2			

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	RELEASE TDRR 10806	7JUL64	WK.
	A	TDRR 10903	14JUL64	WK
	B	TDRR 11068	21JUL64	WK.
	C	TDRR 11445	10AUG64	WK
	D	TDRR 11885	17AUG64	WK
	E	TDRR 11991	25AUG64	WK
	F	TDRR 12641	10SEP64	
	G	TDRR 12693	21SEP64	WK
	H	TDRR 13656	20OCT64	
	J	TDRR 13967	4NOV64	WK.
	K	TDRR 14111	12NOV64	WK.

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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NAS 9-153

		DATE
APPROVED		7Jul64
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DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		7/7/64

INERTIAL
MEASUREMENT
UNIT
(BLOCK II)

SCALE
UNIT WT.
CODE IDENT.

MIT
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LABORATORY
CAMBRIDGE, MASS.

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NASA DRAWING NO.
2018601

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INCHES
0 1 2
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PART NO.	NOMENCLATURE	-011 QTY REQ'D	PART NO.	NOMENCLATURE	-011 QTY REQD
~~1000021~~	~~PLATE, IDENTIFICATION~~	~~1~~	1010783-2	CONNECTOR	1
1000261	WEIGHT, BAL M.G.	A/R			
1000262	WEIGHT BAL M.G	A/R			
1000263	WEIGHT BAL MG&OG	A/R			
1000268	WEIGHT BAL OG	A/R			
1000270	WEIGHT BAL OG	A/R			
1000135	CONNECTOR, WATER	2			
2018602-011	OUTER AXIS ASSY	1			
2018756	CLIP, RETAINER TM OA	6			
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~			
~~2018739~~	~~HSG, BRG RSVR~~	~~1~~			
2018621	BEARING DUPLEX	1			
~~2018631~~	~~RESOLVER~~	~~1~~			
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~			
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~			
2018731	CLIP, WIRE RET	2			
100100-1	TERMINAL	2			
2018754	SHAFT, STUB TM OA	1			
2018755	HOUSING, BEARING TMOA	1			
2018738	CASE CTR MACH ASSY	1			
2018710	COVER CASE	1			
2018766	PLATE BRG RET (TM)	1			
2018625	SLIP RING ASSY	2			
2018606-011	RESOLVER ASSY OA	1			
1000122	CONNECTOR ELECT	4			
2018773	VALVE, PRESS. ASSY	1			
2018769	MOUNT CONN	1			
2018775	COVER ACCESS RSVR MOD	1			
2018774	MOUNT CONN O.A.	1			
1010838	ADHESIVE	A/R			
1000076-1	NUT, CLINCH	8			
1010353-9	RELAY	1			
1010837-3	DIODE	1			
1011757-1	CONNECTOR	2			
1010783-1	CONNECTOR	1			

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVA
	—	RELEASE TDRR 10806	7JUL64	
	A	TDRR 10903	14JUL64	
	B	TDRR 11068	21JUL64	
	C	TDRR 11445	10AUG64	
	D	TDRR 11885	17AUG64	
	E	TDRR 11991	25AUG64	
	F	TDRR 12641	10SEP64	
	G	TDRR 12693	21SEP64	
	H	TDRR 13656	20OCT64	
	J	TDRR 13967	4NOV64	
	K	TDRR 14111	12NOV64	
	L	TDRR 14781	14DEC64	

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIN NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE 7/7/64

INERTIAL
MEASUREMENT
UNIT
(BLOCK II)

SCALE	UNIT WT.	CODE IDENT.

MIT
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INCHES
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REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	RELEASE TDRR 10806	7 JUL 64	WK
	A	TDRR 10903	14 JUL 64	WK
	B	TDRR 11068	21 JUL 64	WK.
	C	TDRR 11445	10 AUG 64	WK
	D	TDRR 11885	17 AUG 64	WK
	E	TDRR 11991	25 AUG 64	GB WK
	F	TDRR 12641	10 SEP 64	DM
	G	TDRR 12693	21 SEP 64	WK
	H	TDRR 13656	20 OCT 64	
	J	TDRR 13967	4 NOV 64	WK.
	K	TDRR 14111	12 NOV 64	WK.
	L	TDRR 14781	14 DEC 64	WK
	M	TDRR 15013	21 DEC 64	WK
	N	TDRR 15339	4 JAN 65	WK

PART NO.	NOMENCLATURE	-011 QTY REQ'D	PART NO.	NOMENCLATURE	-011 QTY REQD
~~1000027~~	~~PLATE, IDENTIFICATION~~	~~1~~	1010783-2	CONNECTOR	1
1000261	WEIGHT, BAL M.G.	A/R	2018792	GUIDE, WIRE	1
1000262	WEIGHT BAL M.G	A/R	1010781-1	CONTACT	122
1000263	WEIGHT BAL MG&OG	A/R	2018795	PLATE IDENTIFICATION	1
1000268	WEIGHT BAL OG	A/R			
1000270	WEIGHT BAL OG	A/R			
1000135	CONNECTOR, WATER	2			
2018602-011	OUTER AXIS ASSY	1			
2018756	CLIP, RETAINER TM OA	6			
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~			
~~2018739~~	~~HSG, BRG RSVR~~	~~1~~			
2018621	BEARING DUPLEX	1			
~~2018631~~	~~RESOLVER~~	~~1~~			
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~			
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~			
2018731	CLIP, WIRE RET	2			
1000100-1	TERMINAL	2			
2018754	SHAFT, STUB TM OA	1			
2018755	HOUSING, BEARING TMOA	1			
2018738	CASE CTR MACH ASSY	1			
2018710	COVER CASE	1			
2018766	PLATE BRG RET (TM)	1			
2018625	SLIP RING ASSY	2			
2018606-011	RESOLVER ASSY OA	1			
1000122	CONNECTOR ELECT	4			
2018773	VALVE, PRESS. ASSY	1			
2018769	MOUNT CONN	1			
2018775	COVER ACCESS RSVR MOD	1			
2018774	MOUNT CONN O.A.	1			
1010838	ADHESIVE	A/R			
1000076-1	NUT, CLINCH	8			
1010353-9	RELAY	1			
1010837-3	DIODE	1			
1011757-1	CONNECTOR	2			
1010783-1	CONNECTOR	1			

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

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		DATE
APPROVED		7 Jul 64
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APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE
		7/7/64

INERTIAL
MEASUREMENT
UNIT
(BLOCK II)

SCALE	UNIT WT.	CODE IDENT.

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NASA DRAWING NO.
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SHEET OF

PART NO.	NOMENCLATURE	-011 QTY REQ'D
~~1000027~~	~~PLATE, IDENTIFICATION~~	~~1~~
1000261	WEIGHT, BAL M.G.	A/R
1000262	WEIGHT BAL M.G	A/R
1000263	WEIGHT BAL MG & OG	A/R
1000268	WEIGHT BAL OG	A/R
1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602-011	OUTER AXIS ASSY	1
2018756	CLIP, RETAINER TM OA	6
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018739~~	~~HSG, BRG RSVR~~	~~1~~
2018621	BEARING DUPLEX	1
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~
2018731	CLIP, WIRE RET	2
1000100-1	TERMINAL	2
2018754	SHAFT, STUB TM OA	1
2018755	HOUSING, BEARING TMOA	1
2018738-011	CASE CTR MACH ASSY	1
2018710	COVER CASE	1
2018766	PLATE BRG RET (TM)	1
2018625	SLIP RING ASSY	2
2018606-011	RESOLVER ASSY OA	1
1000122	CONNECTOR ELECT	4
2018773	VALVE, PRESS. ASSY	1
2018769	MOUNT CONN	1
2018775	COVER ACCESS RSVR MOD	1
2018774	MOUNT CONN O.A.	1
1010838	ADHESIVE	A/R
1000076-1	NUT, CLINCH	8
1010353-9	RELAY	1
1010837-3	DIODE	1
1011757-1	CONNECTOR	2
1010783-1	CONNECTOR	1

PART NO.	NOMENCLATURE	-011 QTY REQD
1010783-2	CONNECTOR	1
2018792	GUIDE, WIRE	1
1010781-1	CONTACT	122
2018795	PLATE IDENTIFICATION	1
1000022	PLATE INFO	1
2018799	CLAMP WIRE	1
1010862	SLEEVE, CRIMP	122
2018800	STRAP, WIRE	1
2018629	MOTOR TORQUE	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7JUL64	WK	
	A	TDRR 10903	14JUL64	SAH	WK
	B	TDRR 11068	21JUL64	SAH	WK
	C	TDRR 11445	10AUG64	SAH	WK
	D	TDRR 11885	17AUG64	SAH	WK
	E	TDRR 11991	25AUG64	JB	WK
	F	TDRR 12641	10SEP64	SAH	DY
	G	TDRR 12693	21SEP64	SAH	WK
	H	TDRR 13656	20OCT64	SAH	[illegible]
	J	TDRR 13967	4NOV64	SAH	WK
	K	TDRR 14111	12NOV64	SAH	WK
	L	TDRR 14781	14DEC64	SAH	WK
	M	TDRR 15013	21DEC64	SAH	WK
	N	TDRR 15339	4JAN65	SAH	WK
	P	TDRR 15707	20JAN65	SAH	WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

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MIT/IL APPROVAL		7/7/64

INERTIAL MEASUREMENT UNIT (BLOCK II)

SCALE
UNIT WT.
CODE IDENT.

MIT INSTRUMENTATION LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

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HOUSTON TEXAS

NASA DRAWING NO. 2018601

SHEET OF

PART NO.	NOMENCLATURE	-011 QTY REQ'D
~~1000021~~	~~PLATE, IDENTIFICATION~~	~~1~~
1000261	WEIGHT, BAL M.G.	A/R
1000262	WEIGHT BAL M.G	A/R
1000263	WEIGHT BAL MG&OG	A/R
1000268	WEIGHT BAL OG	A/R
1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602-011	OUTER AXIS ASSY	1
~~2018756~~	~~CLIP, RETAINER TM OA~~	~~6~~
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018739~~	~~HSG, BRG RSVR~~	~~1~~
~~2018621~~	~~BEARING DUPLEX~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~
~~2018731~~	~~CLIP, WIRE RET~~	~~2~~
~~1000100-1~~	~~TERMINAL~~	~~2~~
~~2018754~~	~~SHAFT, STUB TM OA~~	~~1~~
~~2018755~~	~~HOUSING, BEARING TM OA~~	~~1~~
2018738-011	CASE CTR MACH ASSY	1
2018710	COVER CASE	1
~~2018766~~	~~PLATE BRG RET (TM)~~	~~1~~
2018625	SLIP RING ASSY	2
2018606-011	RESOLVER ASSY OA	1
1000122	CONNECTOR ELECT	4
2018773	VALVE, PRESS. ASSY	1
2018769	MOUNT CONN	1
2018775	COVER ACCESS RSVR MOD	1
2018774	MOUNT CONN O.A.	1
1010838	ADHESIVE	A/R
1000076-1	NUT, CLINCH	8
1010353-10	RELAY	1
1010837-3	DIODE	1
1011757	CONNECTOR	2
1010783-1	CONNECTOR	1

PART NO.	NOMENCLATURE	-011 QTY REQD
~~1010783-2~~	~~CONNECTOR~~	~~1~~
2018792	GUIDE, WIRE	1
1010781-1	CONTACT	61
2018795	PLATE IDENTIFICATION	1
1000022	PLATE INFO	1
2018799	CLAMP WIRE	1
1010862	SLEEVE, CRIMP	61
2018800	STRAP, WIRE	1
~~2018629~~	~~MOTOR TORQUE~~	~~1~~
2018609-011	IGSA TM OA	1
2018616	IMU OUTLINE	REF

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7JUL64	WK	
	A	TDRR 10903	14JUL64		WK
	B	TDRR 11068	21JUL64		WK
	C	TDRR 11445	10AUG64		WK
	D	TDRR 11885	17AUG64		WK
	E	TDRR 11991	25AUG64		WK
	F	TDRR 12641	10SEP64		
	G	TDRR 12693	21SEP64		WK
	H	TDRR 13656	20OCT64		
	J	TDRR 13967	4NOV64		WK
	K	TDRR 14111	12NOV64		WK
	L	TDRR 14781	14DEC64		WK
	M	TDRR 15013	21DEC64		WK
	N	TDRR 15339	4JAN65		WK
	P	TDRR 15707	20JAN65		WK
	R	TDRR 16814	24FEB65		

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE
		7/7/64

INERTIAL MEASUREMENT UNIT (BLOCK II)

SCALE
UNIT WT.
CODE IDENT.

MIT INSTRUMENTATION LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO.
2018601

SHEET OF

PART NO.	NOMENCLATURE	-011 QTY REQ'D
~~1000021~~	~~PLATE, IDENTIFICATION~~	~~1~~
1000261	WEIGHT, BAL M.G.	A/R
1000262	WEIGHT BAL M.G	A/R
1000263	WEIGHT BAL MG & OG	A/R
1000268	WEIGHT BAL OG	A/R
1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602-011	OUTER AXIS ASSY	1
~~2018756~~	~~CLIP, RETAINER TM OA~~	~~6~~
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018739~~	~~HSG, BRG RSVR~~	~~1~~
~~2018621~~	~~BEARING DUPLEX~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET~~	~~1~~
~~2018733~~	~~PLATE, BEARING RET~~	~~1~~
~~2018731~~	~~CLIP, WIRE RET~~	~~2~~
~~1000100-1~~	~~TERMINAL~~	~~2~~
~~2018754~~	~~SHAFT, STUB TM OA~~	~~1~~
~~2018755~~	~~HOUSING, BEARING TMOA~~	~~1~~
2018738-011	CASE CTR MACH ASSY	1
2018710	COVER CASE	1
~~2018766~~	~~PLATE BRG RET (TM)~~	~~1~~
~~2018625~~	~~SLIP RING ASSY~~	~~1~~
~~2018606-011~~	~~RESOLVER ASSY OA~~	~~1~~
~~1000122~~	~~CONNECTOR ELECT~~	~~2~~
2018773	VALVE, PRESS. ASSY	1
2018769	MOUNT CONN	1
2018775	COVER ACCESS RSVR MOD	1
2018774	MOUNT CONN O.A.	1
1010838	ADHESIVE	A/R
1000076-1	NUT, CLINCH	8
~~1010353-10~~	~~RELAY~~	~~1~~
~~1010837-3~~	~~DIODE~~	~~1~~
~~1011757~~	~~CONNECTOR~~	~~2~~
~~1010783-1~~	~~CONNECTOR~~	~~1~~

PART NO.	NOMENCLATURE	-011 QTY REQD
~~1010783-2~~	~~CONNECTOR~~	~~1~~
~~2018792~~	~~GUIDE, WIRE~~	~~1~~
~~1010781-1~~	~~CONTACT~~	~~61~~
2018795	PLATE IDENTIFICATION	1
1000022	PLATE INFO	1
~~2018799~~	~~CLAMP WIRE~~	~~1~~
~~1010862~~	~~SLEEVE, CRIMP~~	~~61~~
2018800	STRAP, WIRE	1
~~2018629~~	~~MOTOR TORQUE~~	~~1~~
2018609-011	IGSA TM OA	1
2018616	IMU OUTLINE	REF
2018612-011	IGSA RSVR OA	1
2018805	INSUL. CASE RH	1
2018806	INSUL CASE LH	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	RELEASE TDRR 10806	7JUL64	WK
	A	TDRR 10903	14 JUL 64	WK
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	C	TDRR 11445	10 AUG 64	WK
	D	TDRR 11885	17 AUG 64	WK
	E	TDRR 11991	25 AUG 64	WK
	F	TDRR 12641	10 SEP 64	
	G	TDRR 12693	21 SEP 64	WK
	H	TDRR 13656	20 OCT 64	
	J	TDRR 13967	4 NOV 64	WK
	K	TDRR 14111	12 NOV 64	WK
	L	TDRR 14781	14 DEC 64	WK
	M	TDRR 15013	21 DEC 64	WK
	N	TDRR 15339	4 Jan 65	WK
	P	TDRR 15707	20 JAN 65	WK
	R	TDRR 16814	24 FEB 65	
	S	TDRR 17159	9 MAR 65	WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153
APPROVED 1 Jul 64
CHECKED
DRAWN UCF
APPROVED FOR MSC 7/7/64
MIT/IL APPROVAL DATE 7/7/64

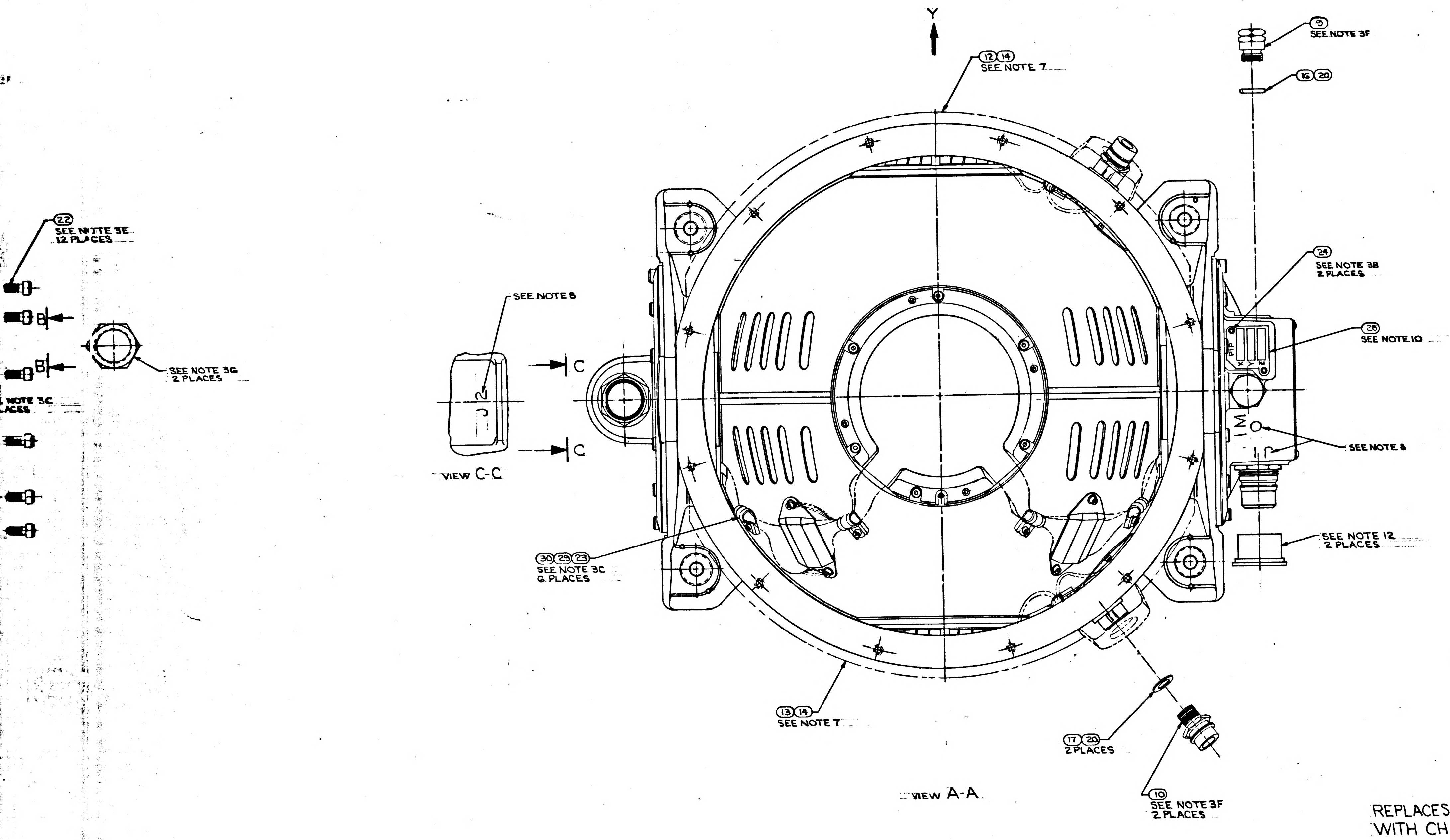
INERTIAL
MEASUREMENT
UNIT
(BLOCK II)

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018601
SHEET OF

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65		WR.



REPLACES REV T
WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	2018807-SEE NOTE 5	WEIGHT, BALANCE S/M	40
A/R	1000260-SEE NOTE 5	WEIGHT, BALANCE S/M	39
A/R	1000270-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	38
A/R	1000268-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	37
A/R	1000263-SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	1000262-SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	1000261-SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
A/R	1001489-SEE NOTE 6	SCREW, HEX. SOC HEAD	33
A/R	1001488-SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
8	1000076-1 SEE NOTE 6	NUT, CLINCH, FLUSH MOUNTED	31
6	1000223	WASHER, CABLE CLAMP	30
6	1000220-SEE NOTE 4	CLAMP, CABLE	29
1	1000022	PLATE, INFORMATION	28
1	2018795	PLATE, IDENTIFICATION	27
2	1006783-18	SCREW, BUTTON HD, HEX. SOC	26
4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	1001489-2	SCREW, HEX SOC HEAD	23
36	1001489-46	SCREW, HEX SOC HEAD	22
12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1000159-17	PACKING, PREFORMED "O" RING	18
2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	1010838	ADHESIVE	14
1	2018806	INSULATION CASE HEAT EXCH. (L. H)	13
1	2018805	INSULATION CASE HEAT EXCH. (R. H.)	12
1	2018775	COVER ACCESS RSVR MODULE	11
2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	2018773	VALVE, PRESSURE ASSEMBLY	9
1	2018800	STRAP, WIRE OUTER AXIS	8
1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
1	2018612-011	I.G.S.A, RESOLVER OUTER AXIS	4
1	2018710	CASE COVER	3
1	2018602-011	OUTER AXIS ASSEMBLY	2
1	2018738-011	CASE CENTER, MACHINING ASS'Y	1

011 LIST OF MATERIALS

U 2018601

NEXT ASSY	USED ON
G007001	G015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL W. J. Bakers 3-23-65
MIT APPROVAL W. Cupp 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

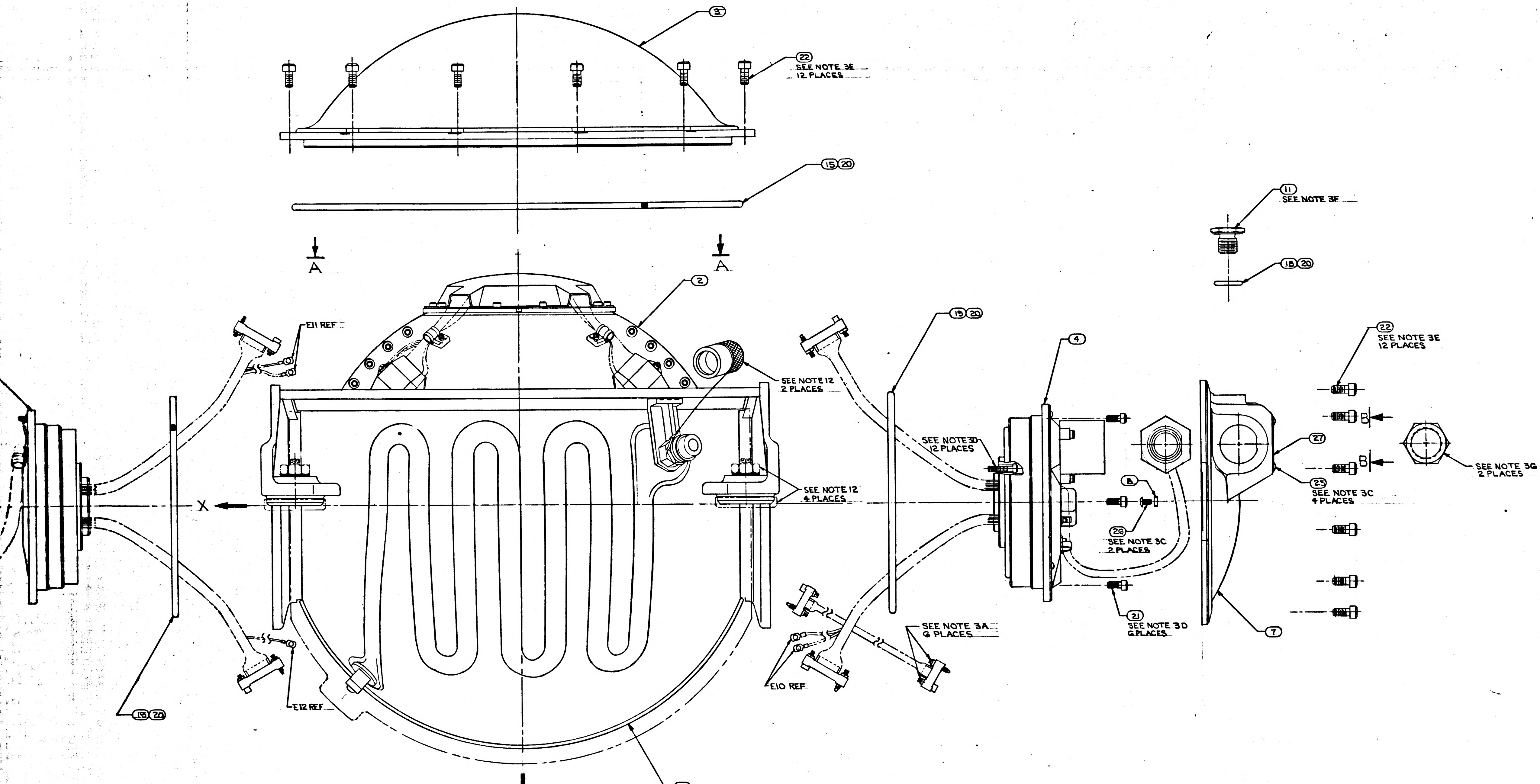
INERTIAL
MEASURING UNIT
ASSEMBLY (BLOCK II)

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

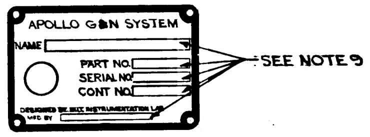
MASTER

2018601	J	1

F-3

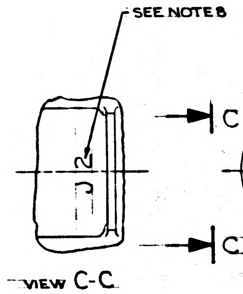


③
㉒
SEE NOTE 3E
12 PLACES
⑮⑳
A
A
⑪
SEE NOTE 3F
⑱⑳
②
E11 REF
SEE NOTE 12
2 PLACES
⑲⑳
④
㉒
SEE NOTE 3E
12 PLACES
SEE NOTE 3D
12 PLACES
B
B
SEE NOTE 3G
2 PLACES
X
SEE NOTE 12
4 PLACES
㉗
㉕
SEE NOTE 3C
4 PLACES
⑧
㉖
SEE NOTE 3C
2 PLACES
㉑
SEE NOTE 3D
6 PLACES
⑦
SEE NOTE 3A
6 PLACES
E10 REF
E12 REF
⑲⑳
①
Z



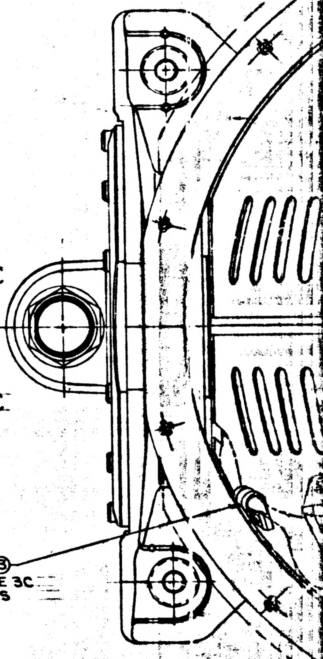
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY MIT INSTRUMENTATION LAB
MFD BY
SEE NOTE 9

VIEW B-B



SEE NOTE 8
J2
C
C

VIEW C-C



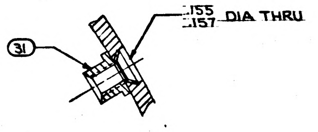
㉚㉙㉓
SEE NOTE 3C
6 PLACES

TABLE II

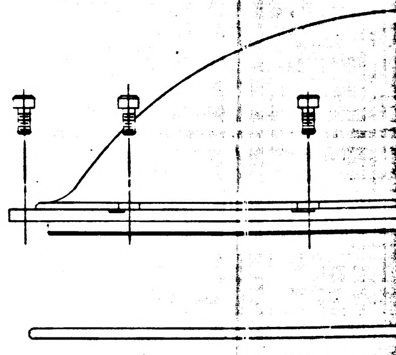
SCREW SELECTION CHART (32) & (33)	
PART NO.	USED ON
1001489-2	MIDDLE AND OUTER GIMBAL
-3	
-4	
-5	
-6	
1001488-1	STABLE MEMBER
-2	
-3	
-4	
-5	
-6	
-10	

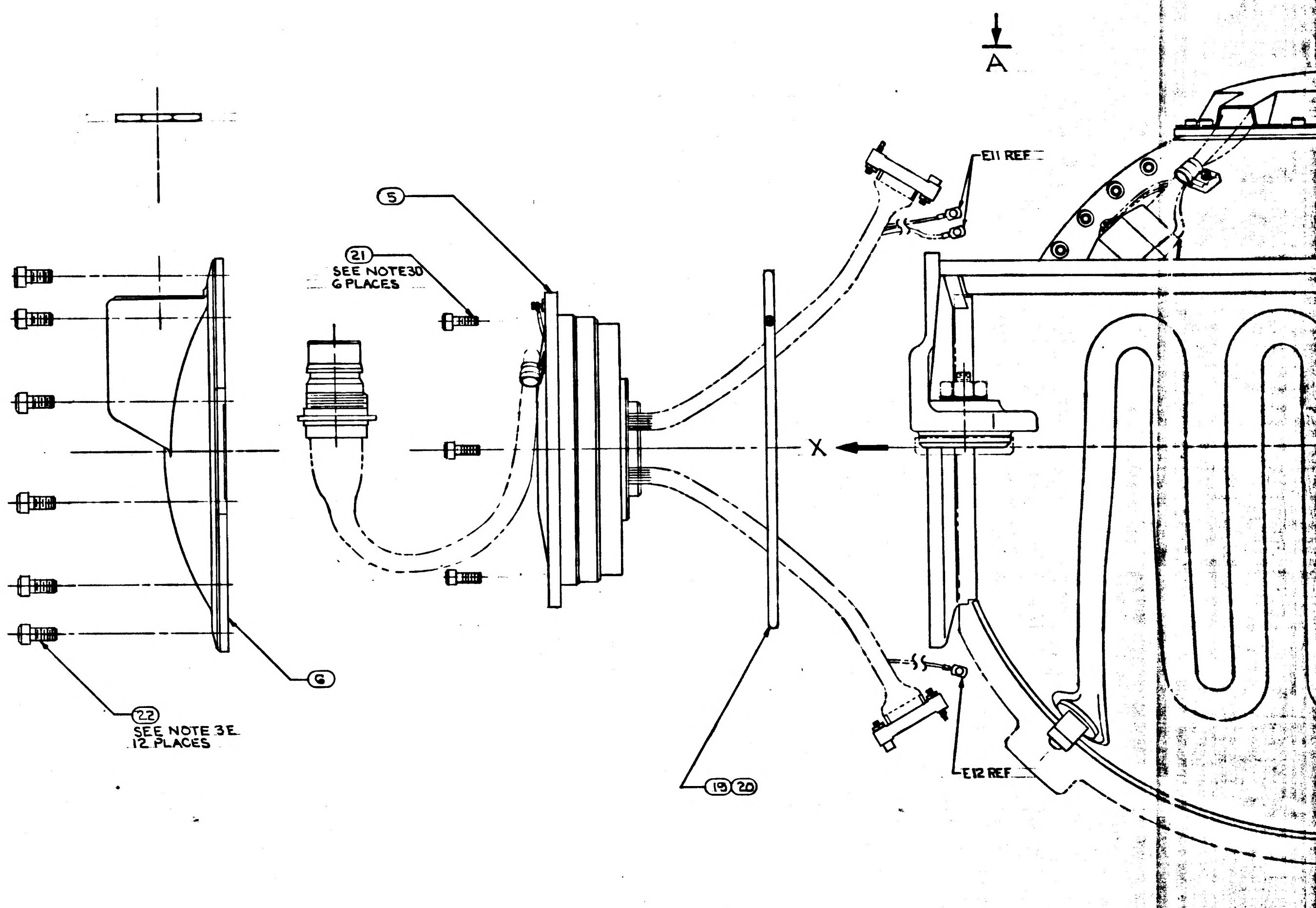
TABLE I

CABLE CLAMP (29)	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6





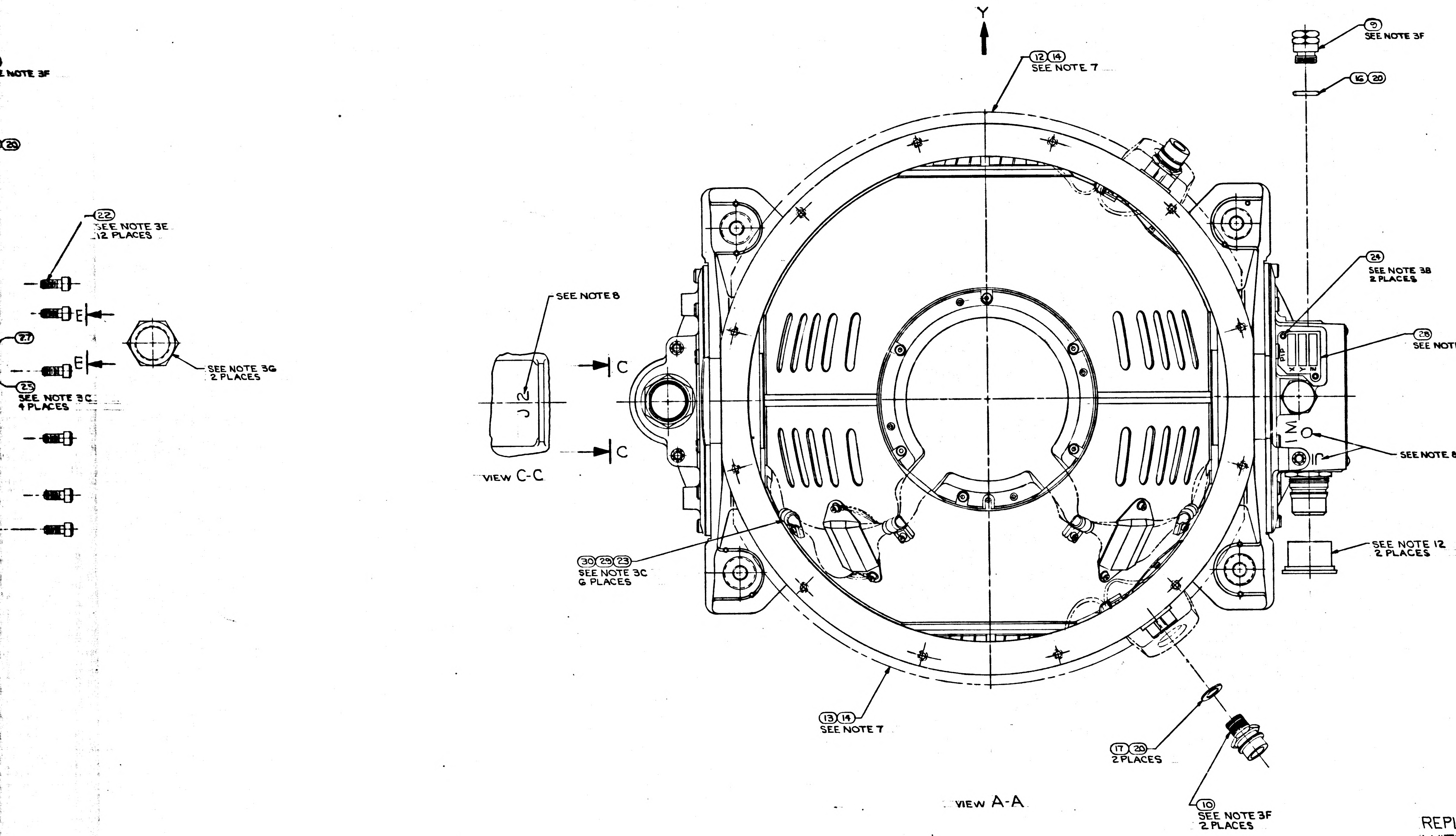
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE AND TEST PER THE REQUIREMENTS OF PS 2007023
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED
     1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM (29) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED PER PS2007023. ITEM (39) NASA DWG. NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY. SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS (34) THRU (40) TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM (31) AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM (31) IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS (12) AND (13) TO ITEM (1) USING ITEM (14). COAT MATING SURFACES OF ITEMS (12), (13) AND (1) WITH ITEM (14) BEFORE ASSEMBLING.
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS (10), (17) AND (20) ARE ASSEMBLED TO CASE, ITEM (1)
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD COVER AND NUT, NASA DRAWING NOS. 2018762 AND 2018763 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 140°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.

3/4

	REV	SHEET
2018601	U	1

SYM	DESCRIPTION	DATE	APPROVAL	
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65		WK
V	REVISED TDRR 19275	2 Jun 65		WK


Y
(12)(14) SEE NOTE 7
(9) SEE NOTE 3F
(16)(20)
SEE NOTE 3F
(20)
(22) SEE NOTE 3E 12 PLACES
E
(27)
E
SEE NOTE 3G 2 PLACES
(25) SEE NOTE 3C 4 PLACES
SEE NOTE 8
J2
C
C
VIEW C-C
(24) SEE NOTE 38 2 PLACES
(28) SEE NOTE 10
SEE NOTE 8
IMU
SEE NOTE 12 2 PLACES
(30)(29)(23) SEE NOTE 3C 6 PLACES
(13)(14) SEE NOTE 7
(17)(20) 2 PLACES
(10) SEE NOTE 3F 2 PLACES
VIEW A-A

REPLACES REV T
WITH CHANGES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	2018807-SEE NOTE 5	WEIGHT, BALANCE S/M	40
A/R	A/R	1000260-SEE NOTE 5	WEIGHT, BALANCE S/M	39
A/R	A/R	1000270-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	38
A/R	A/R	1000268-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	37
A/R	A/R	1000263-SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	1000262-SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	1000261-SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
A/R	A/R	1001489-SEE NOTE 6	SCREW, HEX. SOC HEAD	33
A/R	A/R	1001488-SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
8	8	1000076-1 SEE NOTE 6	NUT, CLINCH, FLUSH MOUNTED	31
6	6	1000223	WASHER, CABLE CLAMP	30
6	6	1000220-SEE NOTE 4	CLAMP, CABLE	29
1	1	1000022	PLATE, INFORMATION	28
1	1	2018795	PLATE, IDENTIFICATION	27
4	4	1006783-18	SCREW. BUTTON HD, HEX. SOC	26
4	4	1010891-12	SCREW, BUTTON HD. SELF-LKG, SOC, SPLINE	25
2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	1001489-2	SCREW, HEX SOC HEAD	23
36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	1010838	ADHESIVE	14
1	1	2018806	INSULATION CASE HEAT EXCH. (L.H)	13
1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2018800	STRAP, WIRE OUTER AXIS	8
1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
1	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
1	1	2018612-011	I.G.S.A, RESOLVER OUTER AXIS	4
1	1	2018710	CASE COVER	3
—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
021	011	LIST OF MATERIALS		

V
2018601
34

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL W.J. 3-23-65
MIT APPROVAL W. Cupper 23-3-65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

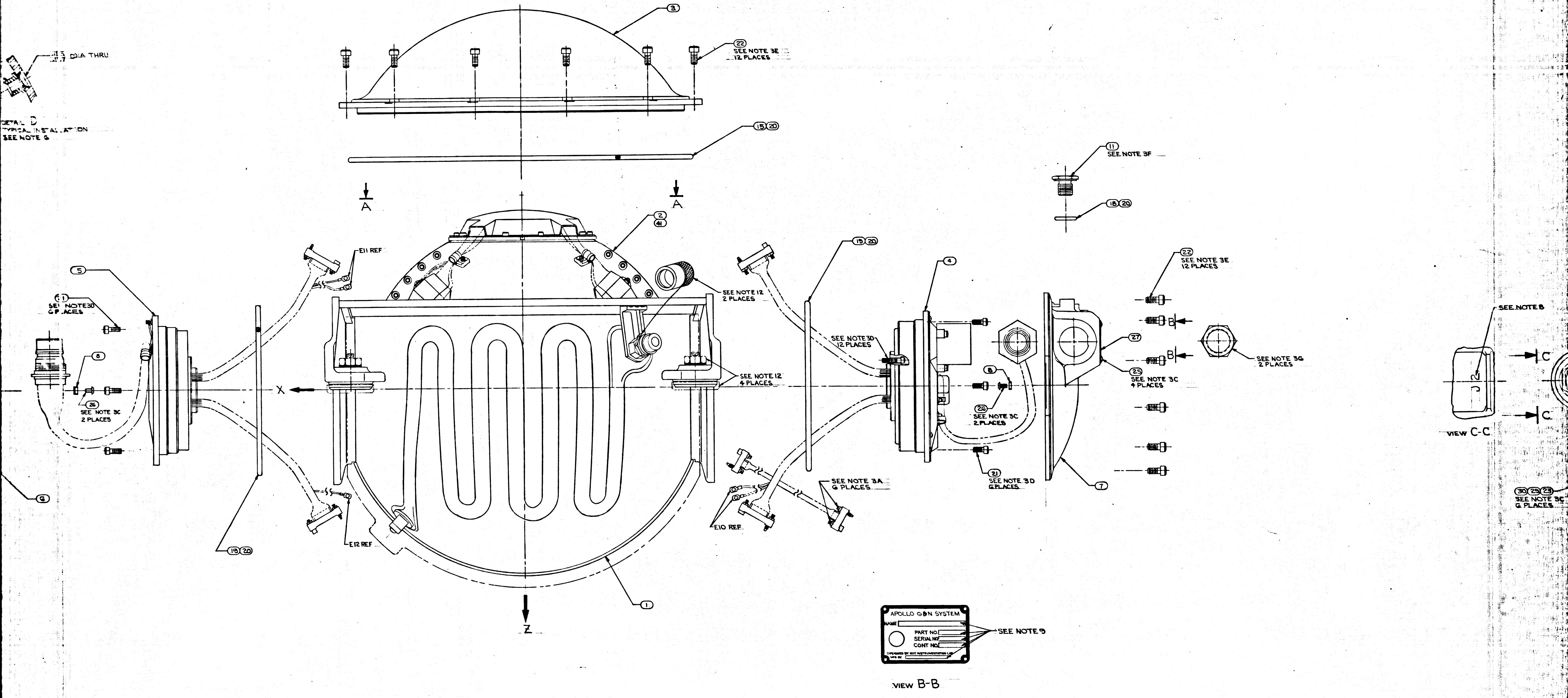
INERTIAL MEASURING UNIT ASSEMBLY (BLOCK II)

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

MASTER

2018601 REV V SHEET 1

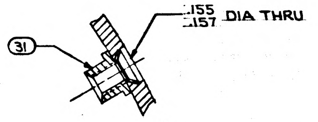
F3


DIA THRU
DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6
③
㉒ SEE NOTE 3E
12 PLACES
⑮⑳
A
A
② ㊶
E11 REF
SEE NOTE 12
2 PLACES
⑤
㉑ SEE NOTE 3D
6 PLACES
⑧
㉖ SEE NOTE 3C
2 PLACES
X
SEE NOTE 12
4 PLACES
⑥
⑲⑳
E12 REF
①
Z
⑲⑳
SEE NOTE 3D
12 PLACES
E10 REF
SEE NOTE 3A
6 PLACES
⑪ SEE NOTE 3F
⑱⑳
④
⑧
㉖ SEE NOTE 3C
2 PLACES
㉑ SEE NOTE 3D
6 PLACES
㉒ SEE NOTE 3E
12 PLACES
B
B
㉗
㉕ SEE NOTE 3C
4 PLACES
⑦
SEE NOTE 3G
2 PLACES
SEE NOTE 8
C
C
J2
VIEW C-C
㉚㉙㉓ SEE NOTE 3C
6 PLACES
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY MIT INSTRUMENTATION LAB
MFD BY
SEE NOTE 9
VIEW B-B

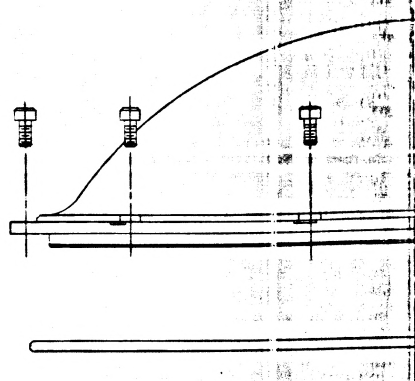
D

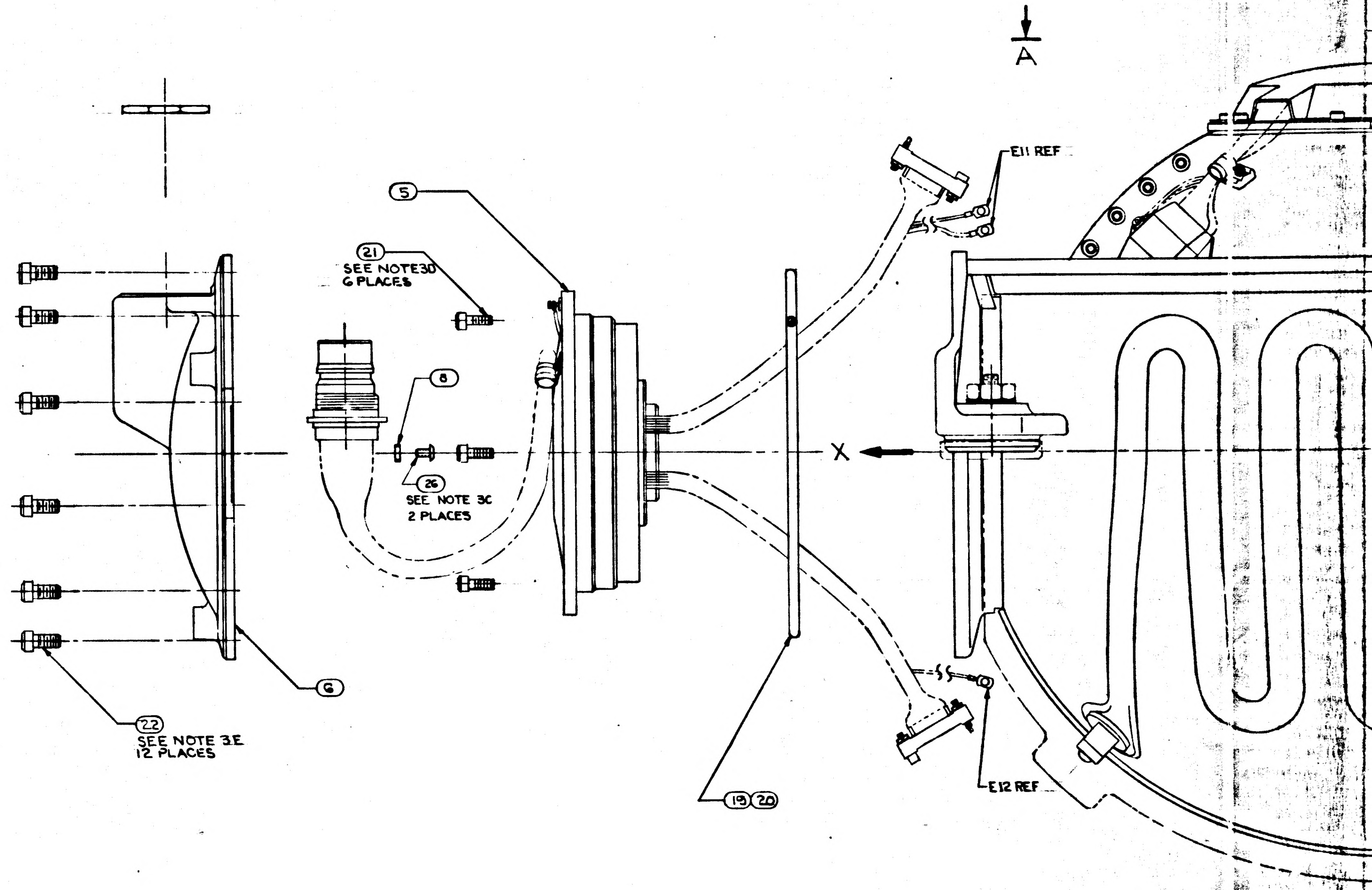
TABLE II	
SCREW SELECTION CHART ㉜ & ㉝	
PART NO.	USED ON
1001489-2	MIDDLE AND OUTER GIMBAL
-3	
-4	
-5	
-6	
1001488-1	STABLE MEMBER
-2	
-3	
-4	
-5	
-6	
-10	

TABLE I	
CABLE CLAMP ㉙	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	5/32
-6	5/16
-16	11/32
-7	3/8



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6





C

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS OF PS 2018601
3. SCREW TORQUE REQUIREMENTS ±7%
    - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
    - B. 3.5 IN-LB
    - C. 5.0 IN-LB
    - D. 10.0 IN-LB
    - E. 30.0 IN-LB
    - F. 70.0 IN-LB
    - G. 80.0 IN-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED PER PS2018601. ITEM ㊴ NASA DWG NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY. SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭. COAT MATING SURFACES OF ITEMS ⑫, ⑬ AND ① WITH ITEM ⑭ BEFORE ASSEMBLING.
8. MARK CHARACTERS $\substack{.23\\.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\substack{.10\\.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS ⑩, ⑰ AND ⑳ ARE ASSEMBLED TO CASE, ITEM ①
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD COVER AND NUT, NASA DRAWING NOS. 2018762 AND 2018763 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.

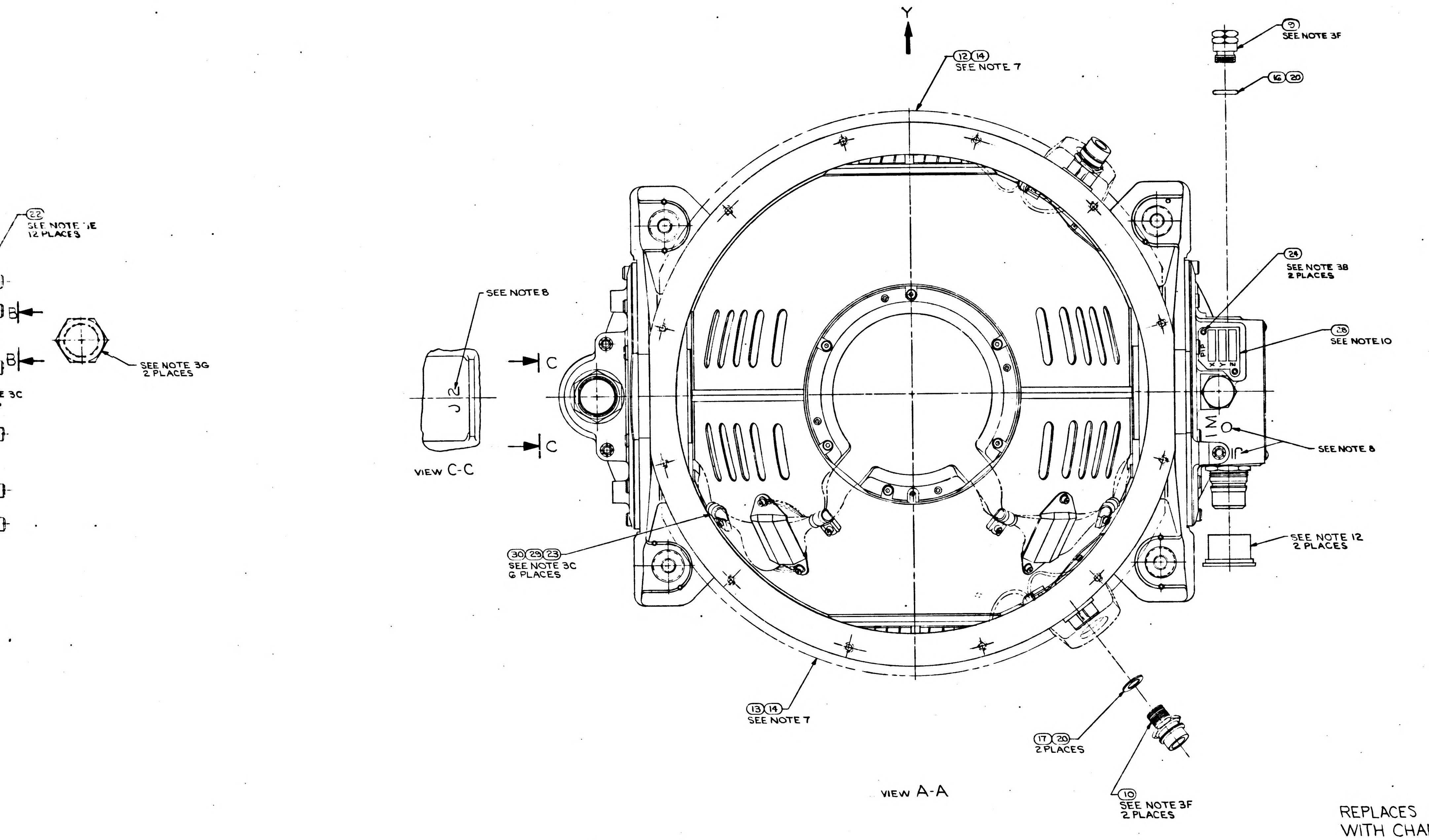
B

A

3/4

	REV	SHEET
2018601	V	1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	WK
V	REVISED TDRR 19275	2 Jun 65	WK
W	REVISED TDRR 21187	26 Jul 65	WK



REPLACES REV T
WITH CHANGES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	2018807-SEE NOTE 5	WEIGHT, BALANCE S/M	40
A/R	A/R	1000260-SEE NOTE 5	WEIGHT, BALANCE S/M	39
A/R	A/R	1000270-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	38
A/R	A/R	1000268-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	37
A/R	A/R	1000263-SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	1000262-SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	1000261-SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
A/R	A/R	1001489-SEE NOTE 6	SCREW, HEX. SOC HEAD	33
A/R	A/R	1001488-SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
8	8	1000076-1 SEE NOTE 6	NUT, CLINCH, FLUSH MOUNTED	31
6	6	1000223	WASHER, CABLE CLAMP	30
6	6	1000220-SEE NOTE 4	CLAMP, CABLE	29
1	1	1000022	PLATE, INFORMATION	28
1	1	2018795	PLATE, IDENTIFICATION	27
4	4	1006783-18	SCREW. BUTTON HD., HEX. SOC	26
4	4	1010891-12	SCREW, BUTTON HD. SELF-LKG, SOC, SPLINE	25
2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	1001489-2	SCREW, HEX SOC HEAD	23
36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	1010838	ADHESIVE	14
1	1	2018806	INSULATION CASE HEAT EXCH. (L.H.)	13
1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
1	1	2018609-011	IGSA. TORQUE MOTOR, OUTER AXIS	5
1	1	2018612-011	I.G.S.A, RESOLVER OUTER AXIS	4
1	1	2018710	CASE COVER	3
—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
021	011	LIST OF MATERIALS		

W
2018601
3A

6007001	6015000
2007203	2015000
NEXT ASSY	USED ON
APPLICATION	

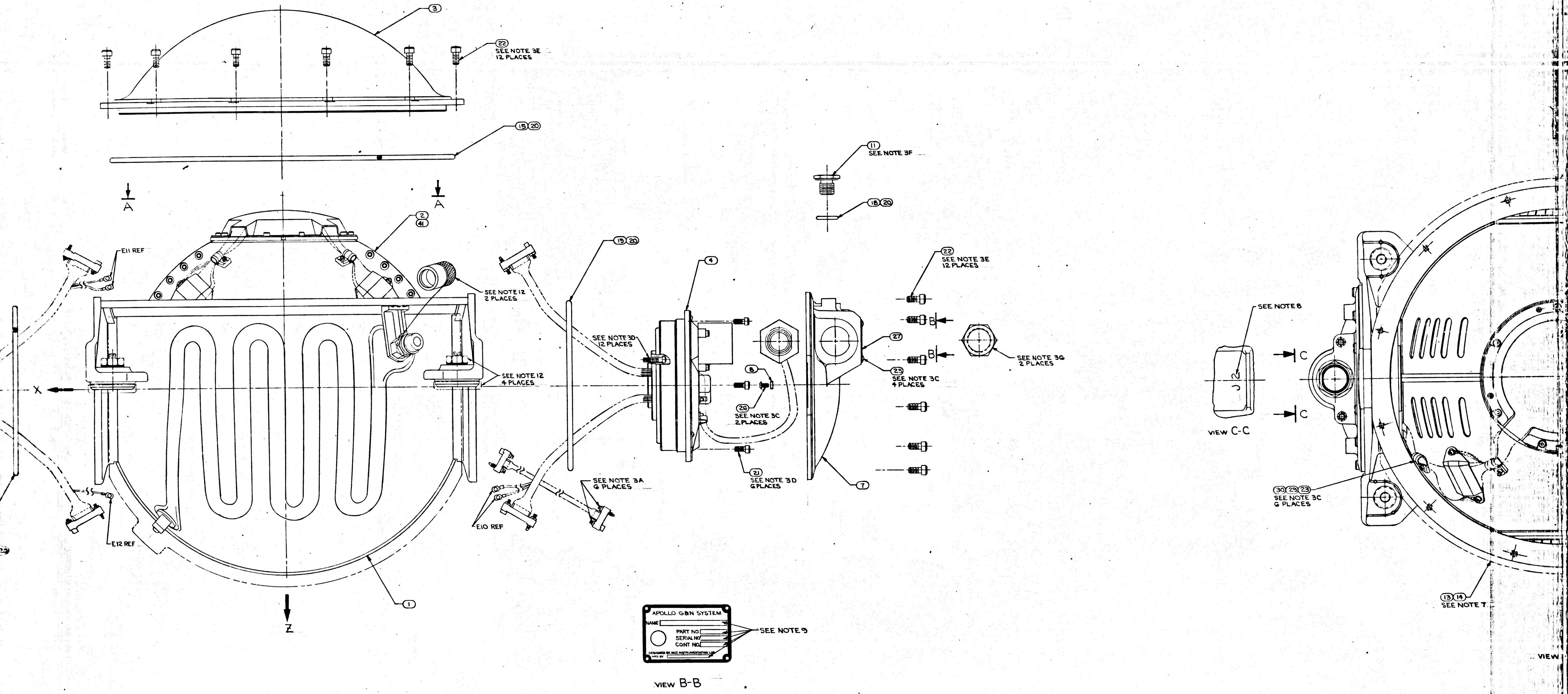
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL W Kupfer 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY (BLOCK II)

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1


3
22
SEE NOTE 3E
12 PLACES
15 20
A
A
2
41
E11 REF
SEE NOTE 12
2 PLACES
15 20
SEE NOTE 3D
12 PLACES
SEE NOTE 12
4 PLACES
X
Z
E12 REF
1
SEE NOTE 3A
6 PLACES
E10 REF
4
8
26
SEE NOTE 3C
2 PLACES
21
SEE NOTE 3D
6 PLACES
11
SEE NOTE 3F
18 20
22
SEE NOTE 3E
12 PLACES
27
25
SEE NOTE 3C
4 PLACES
B
B
7
SEE NOTE 3G
2 PLACES
SEE NOTE 8
J2
C
C
VIEW C-C
30 29 23
SEE NOTE 3C
6 PLACES
13 14
SEE NOTE 7
VIEW
APOLLO G&N SYSTEM
NAME
PART NO
SERIAL NO
CONT NO
DESIGNED BY MIT INSTRUMENTATION LAB
MFD BY
SEE NOTE 9
VIEW B-B

11 10 9 8

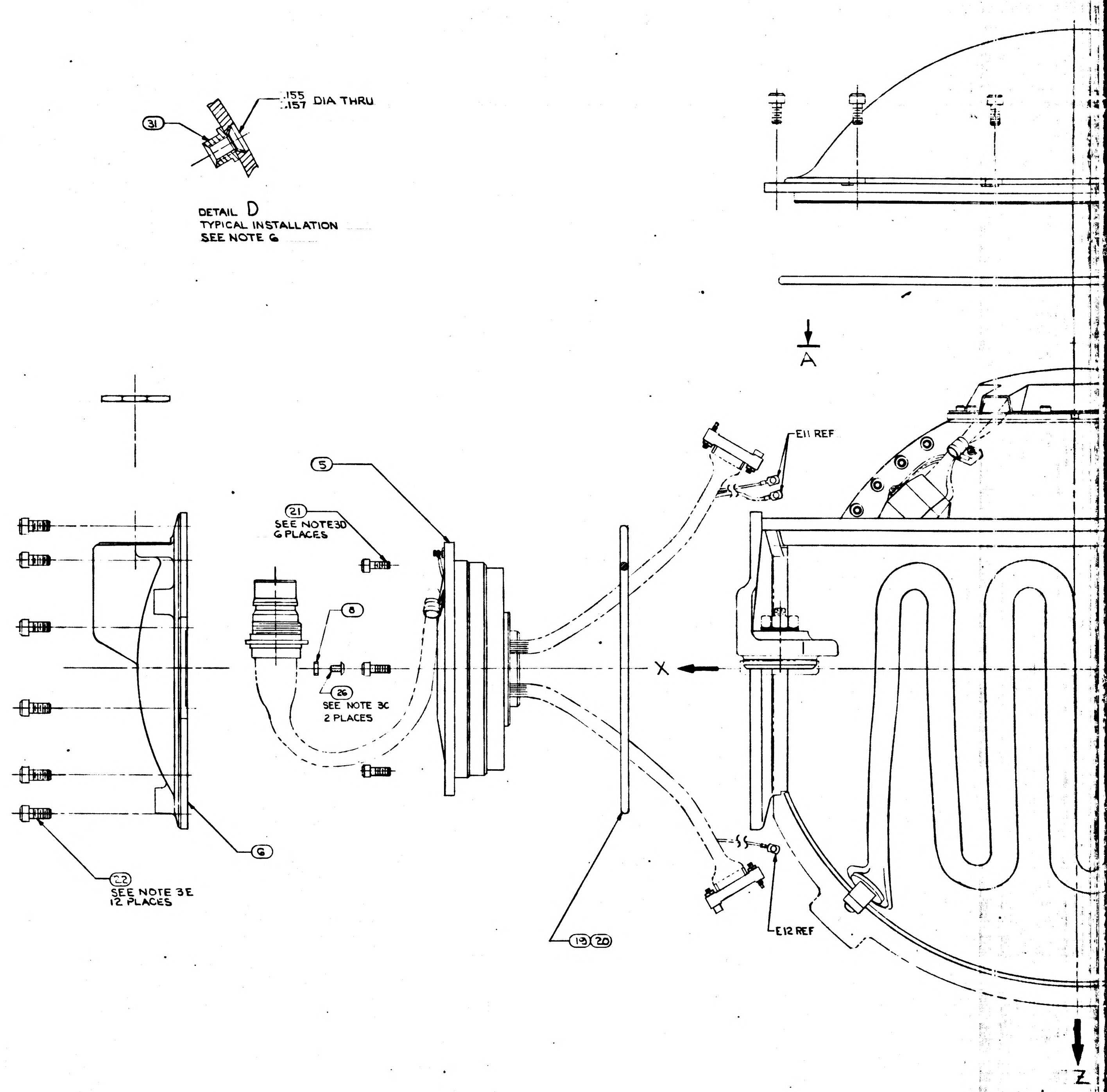
D

TABLE II

SCREW SELECTION CHART ㉜ & ㉝	
PART NO.	USED ON
1001489-2	MIDDLE AND OUTER GIMBAL
-3	
-4	
-5	
-6	
1001488-1	STABLE MEMBER
-2	
-3	
-4	
-5	
-6	
-10	

TABLE I

CABLE CLAMP ㉙	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8



C

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS OF PS 2018601
3. SCREW TORQUE REQUIREMENTS ±7%
    - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
    - B. 3.5 IN-LB
    - C. 5.0 IN-LB
    - D. 10.0 IN-LB
    - E. 30.0 IN-LB
    - F. 70.0 IN-LB
    - G. 80.0 IN-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED PER PS2018601. ITEM ㊴ NASA DWG. NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY. SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭. COAT MATING SURFACES OF ITEMS ⑫, ⑬ AND ① WITH ITEM ⑭ BEFORE ASSEMBLING.
8. MARK CHARACTERS $\substack{.23\\.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\substack{.10\\.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS ⑩, ⑰ AND ⑳ ARE ASSEMBLED TO CASE, ITEM ①
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001494, AND MOUNTING PAD COVER AND NUT, NASA DRAWING NOS. 2018762 AND 2018763 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001494 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE

B

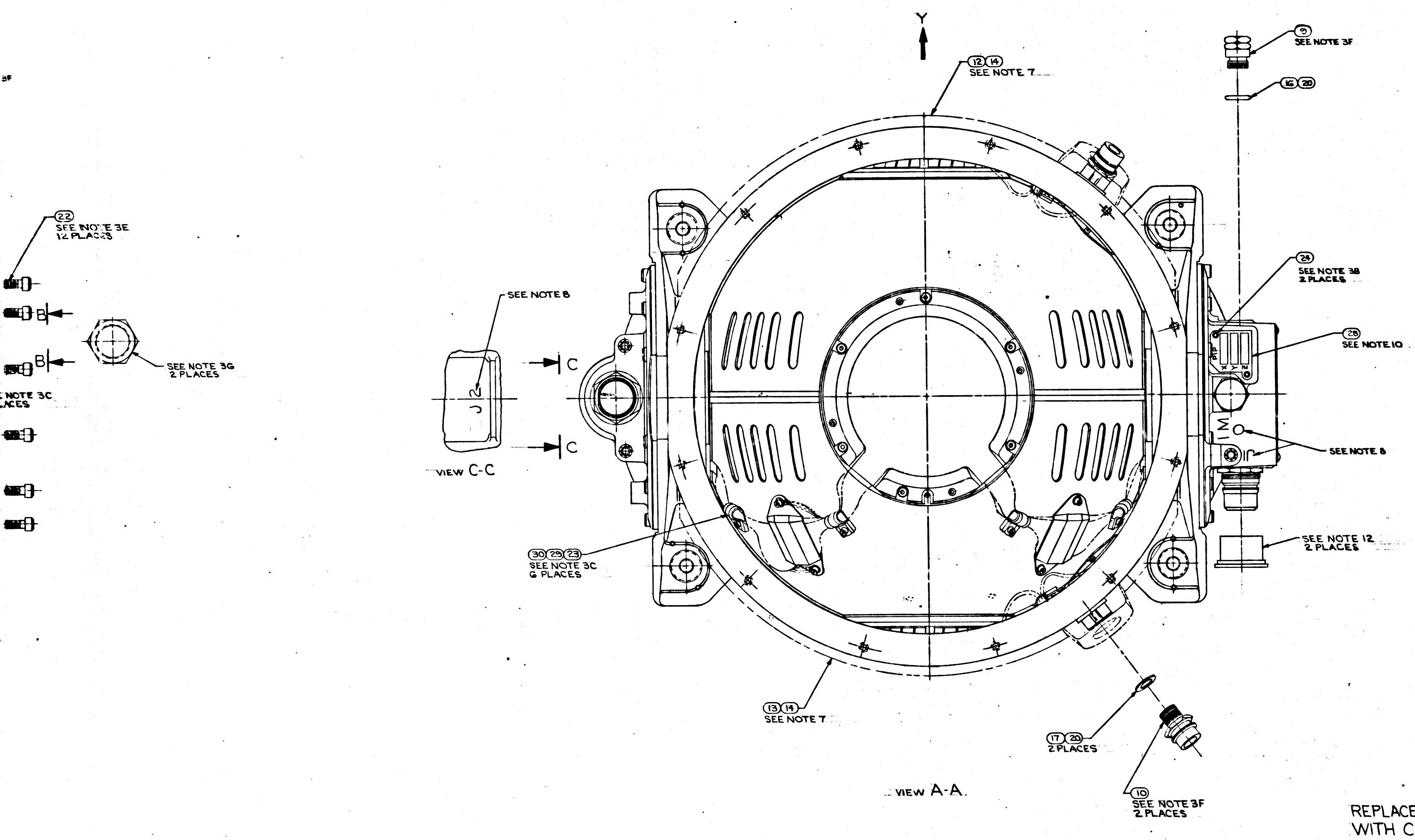
3/4

A

2018601	REV W	SHEET 1

11 10 9 8 7

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
U	REPLACES REV T WITH CHANGES PER TDRR 17747	23 Mar 65	WK
V	REVISED TDRR 19275	2 Jun 65	WK
W	REVISED TDRR 21187	26 Jul 65	WK
Y	REVISED PER TDRR 21814	8 Sep 65	



REPLACES REV T
WITH CHANGES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	—	2018602-021	OUTER AXIS ASSEMBLY	41
A/R	A/R	2018807-SEE NOTE 5	WEIGHT, BALANCE S/M	40
A/R	A/R	1000260-SEE NOTE 5	WEIGHT, BALANCE S/M	39
A/R	A/R	1000270-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	38
A/R	A/R	1000268-SEE NOTE 5	WEIGHT, BALANCE OUTER GIMBAL	37
A/R	A/R	1000263-SEE NOTE 5	WEIGHT BALANCE OUT. AND MID. GIMBAL	36
A/R	A/R	1000262-SEE NOTE 5	WEIGHT, BALANCE MID GIMBAL	35
A/R	A/R	1000261-SEE NOTE 5	WEIGHT, BALANCE MID. GIMBAL	34
A/R	A/R	1001489-SEE NOTE 6	SCREW, HEX. SOC HEAD	33
A/R	A/R	1001488-SEE NOTE 6	SCREW, HEX, SOC HEAD, SELF-LKG	32
8	8	1000076-1 SEE NOTE 6	NUT, CLINCH, FLUSH MOUNTED	31
6	6	1000223	WASHER, CABLE CLAMP	30
6	6	1000220-SEE NOTE 4	CLAMP, CABLE	29
1	1	1000022	PLATE, INFORMATION	28
1	1	2018795	PLATE, IDENTIFICATION	27
4	4	1006783-18	SCREW, BUTTON HD, HEX. SOC	26
4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	25
2	2	1010891-1	SCREW, BUTTON HD, SELF-LKG, SOC, SPLINE	24
6	6	1001489-2	SCREW, HEX SOC HEAD	23
36	36	1001489-46	SCREW, HEX SOC HEAD	22
12	12	1001489-18	SCREW, HEX SOC HEAD	21
A/R	A/R	MIL-L-4343	LUBRICANT, DOW CORNING NO 55	20
2	2	1000159-16	PACKING, PREFORMED "O" RING	19
1	1	1000159-17	PACKING, PREFORMED "O" RING	18
2	2	1000159-6	PACKING, PREFORMED "O" RING	17
1	1	1000159-5	PACKING, PREFORMED "O" RING	16
1	1	1000159-15	PACKING, PREFORMED "O" RING	15
A/R	A/R	1010838	ADHESIVE	14
1	1	2018806	INSULATION CASE HEAT EXCH. (L.H.)	13
1	1	2018805	INSULATION CASE HEAT EXCH. (R.H.)	12
1	1	2018775	COVER ACCESS RSVR MODULE	11
2	2	1000135	COUPLING, HALF, QUICK DISCONNECT	10
1	1	2018773	VALVE, PRESSURE ASSEMBLY	9
2	2	2018818	STRAP, ASS'Y OUTER AXIS	8
1	1	2018769	MOUNT, CONN., RSVR OUTER AXIS	7
1	1	2018774	MOUNT, CONN., T.M. OUTER AXIS	6
1	1	2018609-011	I.G.S.A. TORQUE MOTOR, OUTER AXIS	5
1	1	2018612-011	I.G.S.A., RESOLVER OUTER AXIS	4
1	1	2018710	CASE COVER	3
—	1	2018602-011	OUTER AXIS ASSEMBLY	2
1	1	2018738-011	CASE CENTER, MACHINING ASS'Y	1
021	011	LIST OF MATERIALS		

2018601 Y

3A

NEXT ASSY	USED ON
6007001	6015000
2007203	2015000

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN DTB DATE 3/5/65
CHECKED G. QUINN 3/11/65
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL W.J. 13-23-65
MIT APPROVAL W. Cuyler 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INERTIAL
MEASURING UNIT
ASSEMBLY (BLOCK II)

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018601
SCALE 1/1
WT
SHEET 1 OF 1

MASTER

…601 | REV Y | SHEET 1

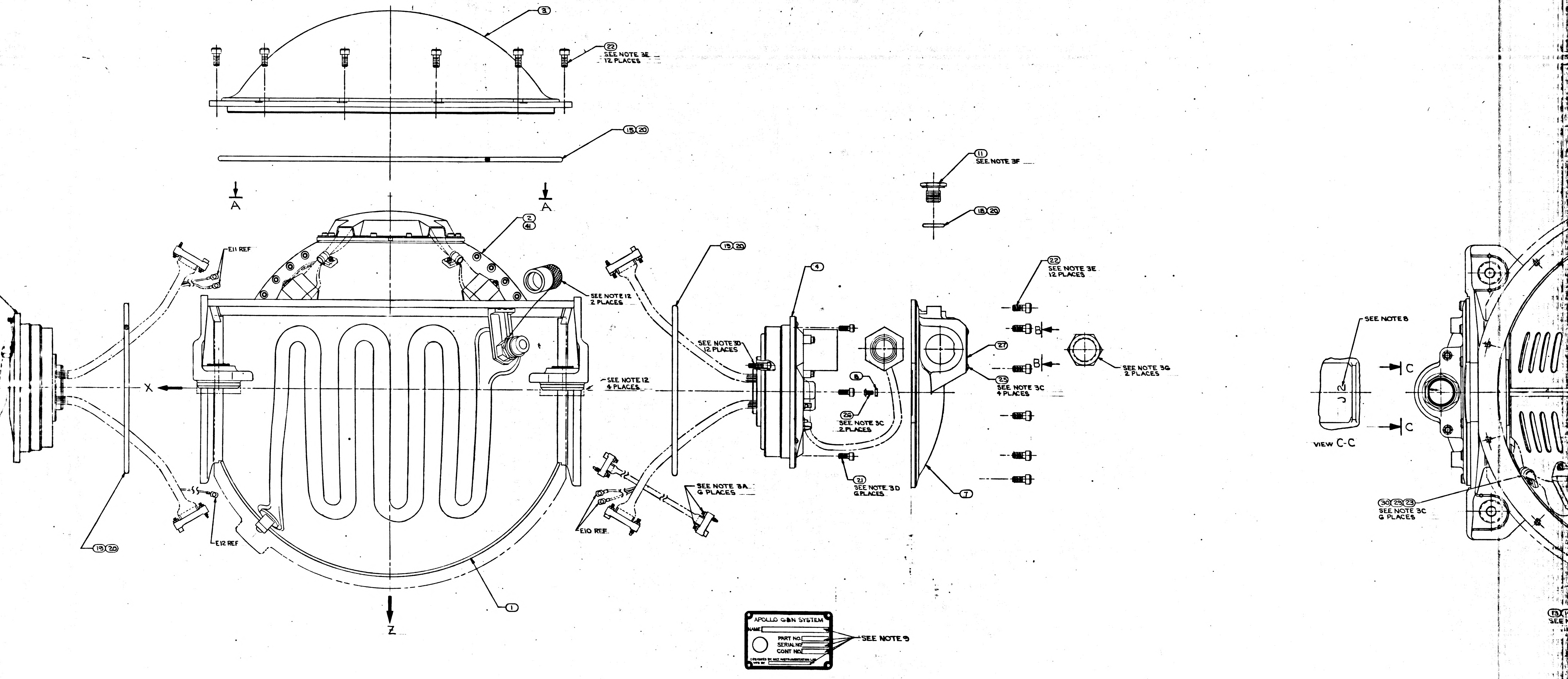
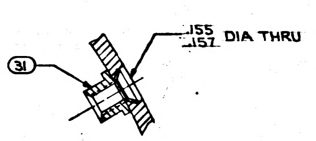
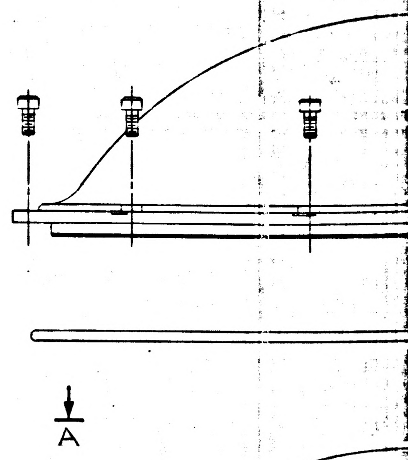

3
22
SEE NOTE 3E
12 PLACES
15 20
A
A
2
41
E11 REF
SEE NOTE 12
2 PLACES
19 20
SEE NOTE 3D
12 PLACES
4
X
SEE NOTE 12
4 PLACES
E12 REF
19 20
1
Z
E10 REF
SEE NOTE 3A
6 PLACES
11
SEE NOTE 3F
18 20
22
SEE NOTE 3E
12 PLACES
B
B
27
25
SEE NOTE 3C
4 PLACES
8
26
SEE NOTE 3C
2 PLACES
21
SEE NOTE 3D
6 PLACES
7
SEE NOTE 3G
2 PLACES
SEE NOTE 8
J2
C
C
VIEW C-C
30 29 23
SEE NOTE 3C
6 PLACES
APOLLO G&N SYSTEM
NAME
PART NO.
SERIAL NO.
CONT NO.
DESIGNED BY MIT INSTRUMENTATION LAB
MFG BY
SEE NOTE 9
VIEW B-B

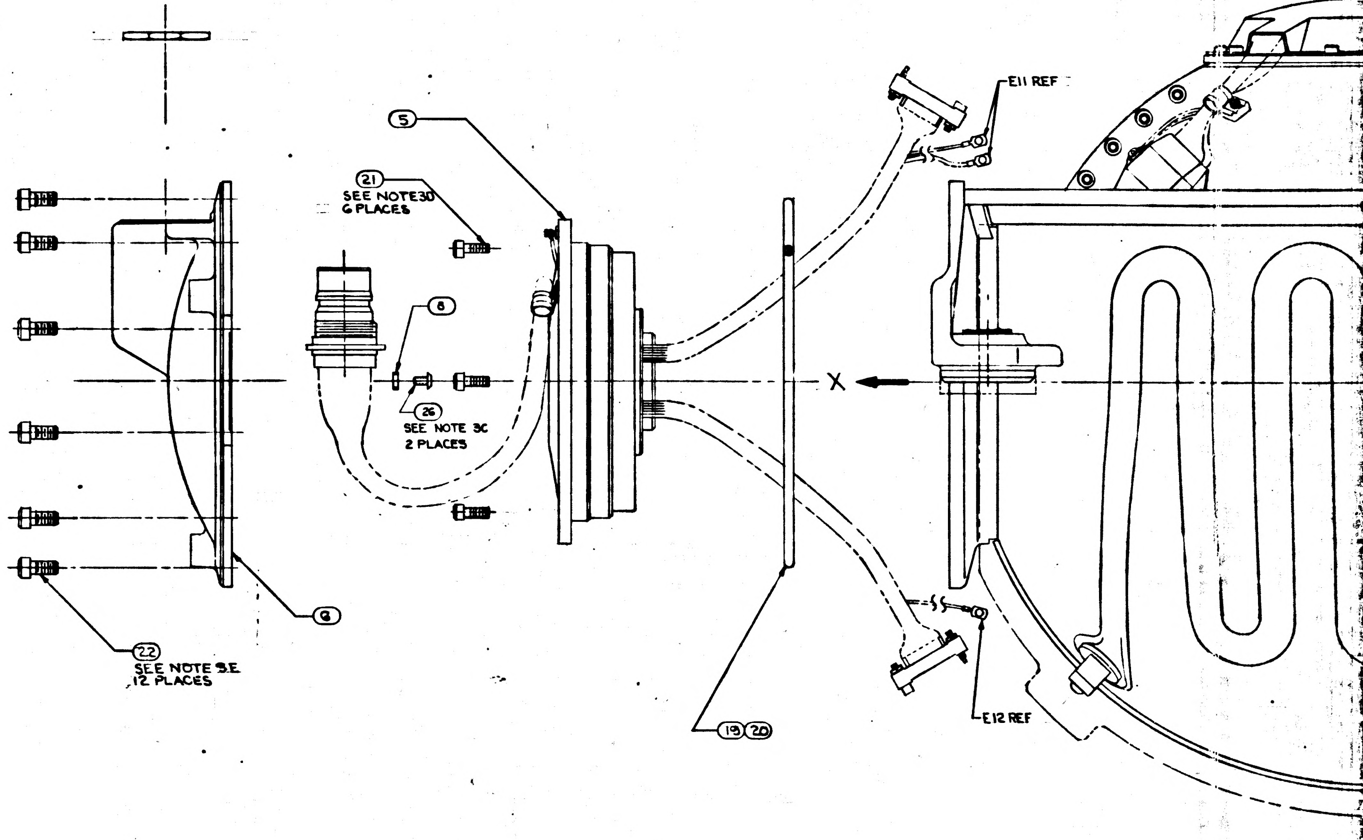
TABLE II	
SCREW SELECTION CHART ㉜ & ㉝	
PART NO.	USED ON
1001489-2	MIDDLE AND OUTER GIMBAL
-3	
-4	
-5	
-6	
1001488-1	STABLE MEMBER
-2	
-3	
-4	
-5	
-6	
-10	

TABLE I	
CABLE CLAMP ㉙	
PART NO.	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	5/32
-6	5/16
-16	11/32
-7	3/8



DETAIL D
TYPICAL INSTALLATION
SEE NOTE 6





NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH, AND SHALL MEET THE REQUIREMENTS OF PS 2018601
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - B. 3.5 IN-LB
   - C. 5.0 IN-LB
   - D. 10.0 IN-LB
   - E. 30.0 IN-LB
   - F. 70.0 IN-LB
   - G. 80.0 IN-LB
4. ITEM ㉙ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
5. BALANCE WEIGHTS TO BE SELECTED FROM APPLICABLE DRAWINGS AND INSTALLED PER PS2018601. ITEM ㊴ NASA DWG NO. 1000260 USE 1000260-1 THRU 1000260-12 ONLY. SEE NOTE 6
6. SECURE BALANCE WEIGHTS ITEMS ㉞ THRU ㊵ TO STABLE MEMBER AND GIMBALS WITH SCREWS FROM TABLE II. INSTALL ITEM ㉛ AT REQUIRED LOCATIONS ON MIDDLE AND OUTER GIMBALS. SEE DETAIL D FOR INSTALLATION DATA. CAUTION: DO NOT INSTALL ITEM ㉛ IN LOCATIONS THAT WILL PREVENT FREE ROTATION OF GIMBALS.
7. BOND ITEMS ⑫ AND ⑬ TO ITEM ① USING ITEM ⑭. COAT MATING SURFACES OF ITEMS ⑫, ⑬ AND ① WITH ITEM ⑭ BEFORE ASSEMBLING.
8. MARK CHARACTERS $\frac{.23}{.27}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. ENGRAVE CHARACTERS $\frac{.10}{.14}$ HIGH AND FILL, COLOR BLACK PER ND1002019
10. STAMP OR ENGRAVE SERIAL NUMBERS OF PIP PREALIGNED ASS'Y NASA DRAWING NO. 2018639 IN APPROPRIATE BLOCKS PER ND1002019
11. COOLANT PASSAGES SHALL MEET THE CLEANLINESS REQUIREMENTS OF ND1002223 WHEN ITEMS ⑩, ⑰ AND ⑳ ARE ASSEMBLED TO CASE, ITEM ①
12. PROTECTIVE COVER, ELECTRICAL, PART NO. NAS-820-16-16S, PROTECTIVE COVER, COOLANT, NASA DRAWING NO. 1001454, AND MOUNTING PAD CAP NASA DRAWING NO. 2018816-011 TO BE REMOVED ONLY WHEN REQUIRED DURING TEST AND INSTALLATION, OR TO PROVIDE HEATER POWER TO INERTIAL COMPONENTS, CABLE ON COVERS 1001454 NOT TO BE REMOVED UNTIL IMMEDIATELY PRIOR TO INSTALLATION.
13. TEMPERATURE OF ASSEMBLY MUST BE MAINTAINED BETWEEN 120°F AND 140°F. PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS THESE LIMITS. IRIG PREALIGNED ASSEMBLY, NASA DRAWING NO. 2021500 MUST BE RECALIBRATED IF TEMPERATURE EXCEEDS 40°F TO 160°F RANGE
14. USE NASA DRAWING NO. 2018616, GIMBAL ASSEMBLY OUTLINE FOR REFERENCE.

4 3 2 1

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	RELEASE TDRR 10806	7 JUL 64	W

PART NO.	NOMENCLATURE	QTY REQ'D
[illegible]	COVER, CASE	1
1000261	WEIGHT, BAL M.G.	A/R
1000262	WEIGHT BAL M.G	A/R
1000263	WEIGHT BAL MG & OG	A/R
1000268	WEIGHT BAL OG	A/R
1000270	WEIGHT BAL OG	A/R
1000135	CONNECTOR, WATER	2
2018602	OUTER AXIS ASSY	1
[illegible]		1
2018730	SHAFT, STUB RSVR	1
2018739	HSG, BRG RSVR	1
2018621	BEARING DUPLEX	2
2018631	RESOLVER	1
2018732	CLIP, WIRE RET	1
2018733	PLATE, BEARING RET	1
2018731	CLIP, WIRE RET	3
100100-1	TERMINAL	2

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED		1 Jul 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE
		7/7/64

INERTIAL
MEASUREMENT
UNIT
(BLOCK II)

SCALE	UNIT WT.	CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO.
2018601

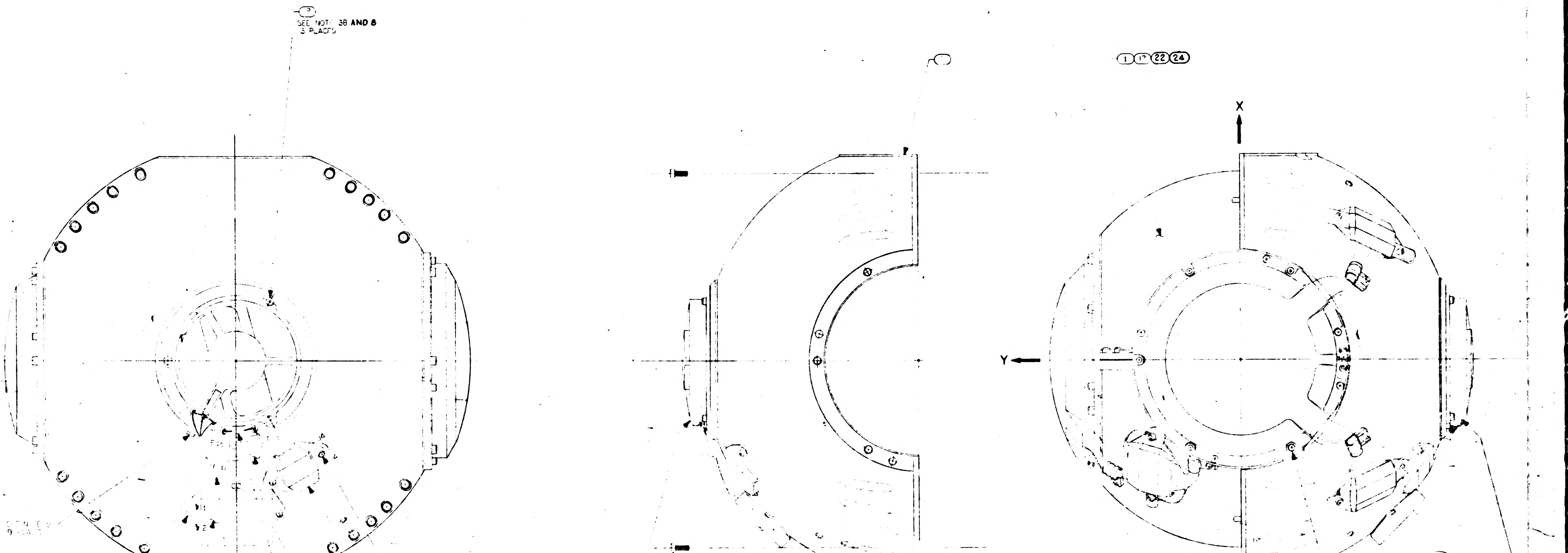
SHEET OF

4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

2018602

TABLE I	
CABLE CLAMP (2)	
PART NO	DIA REF
22 -	1/16
-2	3/32
-3	1/8
-3	5/32
-4	3/16
-14	7/32
-5	1/4
-5	9/32
-6	5/16
-6	11/32
-7	3/8


SEE NOTE 3B AND 8
5 PLACES
(1)(17)(22)(24)
X
Y
SEE NOTE 3
9 PLACES
(9)( )
SEE NOTE 3C
2 PLACES
(5) FOR 011
(12)
(7)
(16)
(14)
(19) FOR 021
(9)(2)(13)
SEE NOTE 3B
SEE NOTE 3B
2 PLACES
SEE NOTE 3A AND 9
4 PLACES
SEE NOTE 3A AND 8
12 PLACES

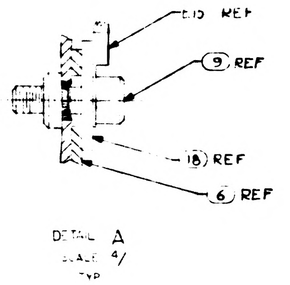
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-7032[illegible]
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 10.0 IN-LB
   B. 5.0 IN-LB
   C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS .10/.12 HIGH COLOR BLACK AT LOCATIONS SHOWN PER [illegible]
6. ITEM (2) TO BE SELECTED FROM TABLE I. ASSEMBLY CLAMP TO PREVENT CABLE MOVEMENT BUT MUST NOT PINCH WIRES.
7. TAPE (21) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
8. APPLY A UNIFORM THIN FILM OF ITEM (23) TO SCREW THREADS.
9. APPLY A UNIFORM THIN FILM OF ITEM (23) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.

3H

2018602	REV A-A	SHT 1

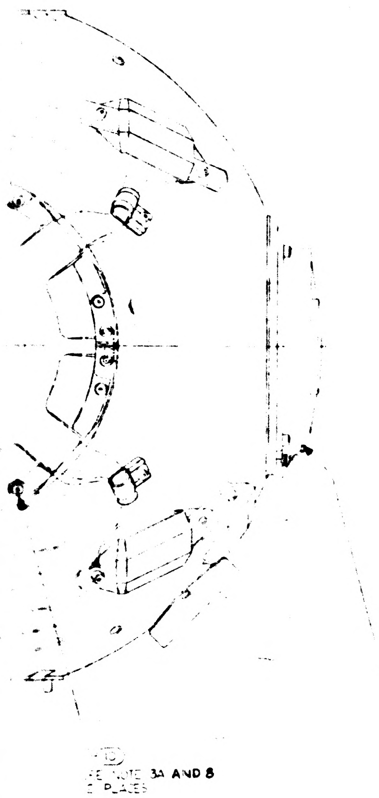
1/2018602

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES REV H WITH CHANGES PER TDRR 17157	9 MAR 65		
K	REVISED PER TDRR 18740	25 May 65		
L	REVISED PER TDRR 8909	21 May 65		
M	REVISED PER TDRR 19274	25 May 65		
N	REVISED PER TDRR 19275			
P	REVISED PER TDRR 20111	22 Jul 65		
R	REVISED PER TDRR 21188	22 Jul 65		
S	REVISED PER TDRR 22594	28 Sep 65		
T	REVISED PER TDRR 23344	19 Oct 65		
U	REVISED TDRR 25795	15 Feb 66		
V	REVISED PER TDRR 27508			
W	REVISED PER TDRR 32106	5 DEC 66		
Y	REVISED PER TDRR 33317	6 APR 67		
Z	REVISED PER TDRR 33354	6 APR 67		
AA	REVISED PER TDRR 34721	3 OCT 67	PHG	

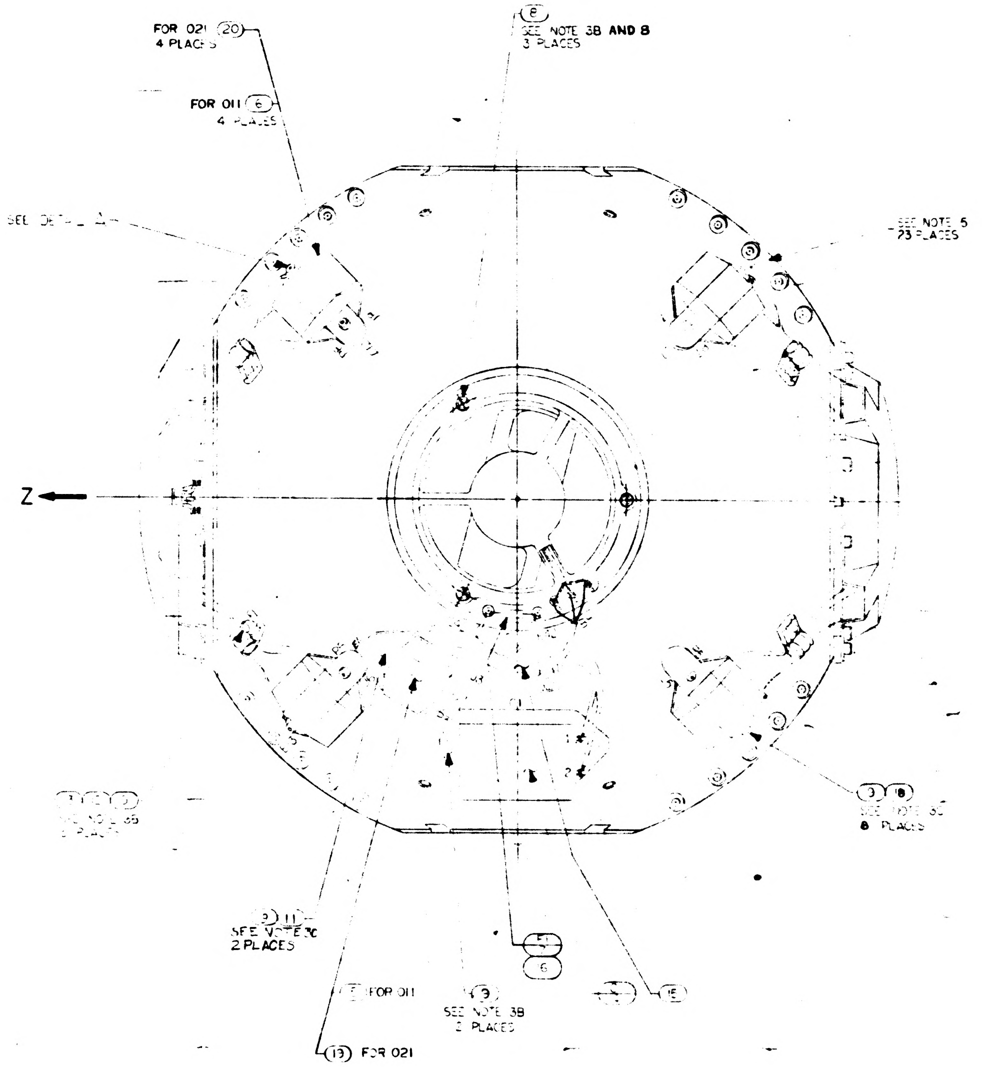


(15) REF
(9) REF
(18) REF
(6) REF

DETAIL A
SCALE 4/1
TYP



(12)
SEE NOTE 3A AND 8
2 PLACES



FOR 021 (20)
4 PLACES
FOR 011 (6)
4 PLACES
(8)
SEE NOTE 3B AND 8
3 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
SEE NOTE 3B
2 PLACES
(3)(18)
SEE NOTE 3C
8 PLACES
(9)(11)
SEE NOTE 3C
2 PLACES
(5)
(16)
FOR 011
(9)
SEE NOTE 3B
2 PLACES
(15)
(13) FOR 021

SEE NOTE 7

QTY REQD 041	QTY REQD 031	QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	—	—	—	2018603-041	MIDDLE AXIS ASSEMBLY	24
AR	A/R	A/R	A/R	1008930	GREASE MOLYBDENUM DISULFIDE	23
—	1	-	-	2018603-031	MIDDLE AXIS ASSEMBLY	22
AR	A/R	A/R	A/R	MIL-I-15126 TYPE ACT	TAPE, ADH. ELEC. PRESS, SENSITIVE	21
4	4	4	—	2018841	BRACKET, CONN	20
2	2	2	—	2018842	BRACKET, CONN	19
8	8	8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.	18
—	—	1	—	2018603 021	MIDDLE AXIS ASSEMBLY	17
2	2	2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	1	1	2018797	WIRING HARNESS "B" OA.	15
1	1	1	1	2018798	WIRING HARNESS "C" OA	14
6	6	6	6	1000223	WASHER, CABLE CLAMP	13
6	6	6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	4	4	MS15795 803	WASHER, FLAT, METAL, ROUND	11
12	12	12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	22	22	1001488-1	SCREW, HEX, SOC HD SELF-LKG	9
6	6	6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
—	-	-	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
—	-	-	2	2018793	BRACKET, CONNECTOR	5
2	2	2	2	1010799	CAPACITOR	4
2	2	2	2	2018644	BLOWER	3
1	1	1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
—	-	—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1

LIST OF MATERIALS

2018601	2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN V. ROSE DATE 2-17-65
CHECKED 3-3-65
APPROVAL
APPROVAL
NASA APPROVAL 3-6-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	J	2018602
SCALE 1/1	WT	SHEET 1 OF 1

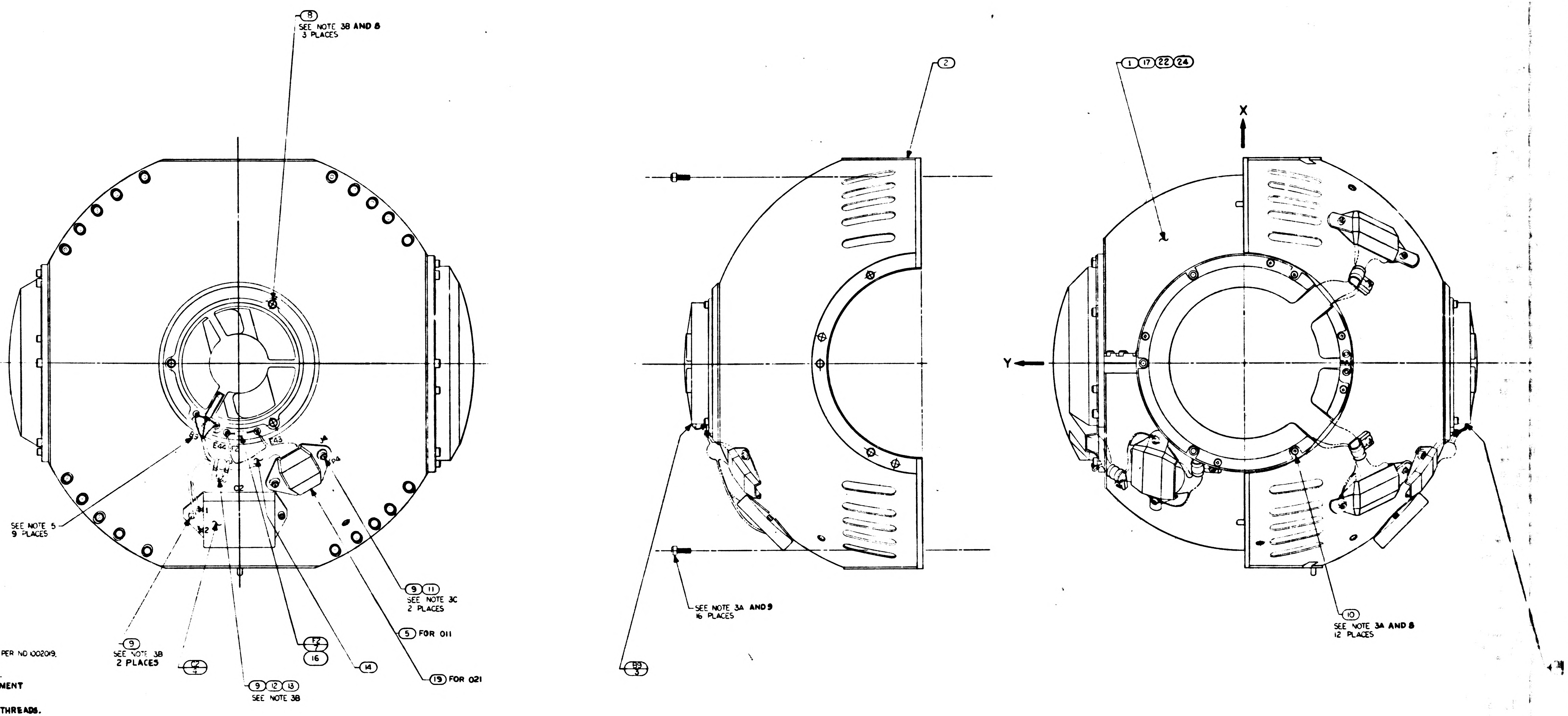
2018602 AA

2018602 R-7154 AA 1

27 2018602

3H

TABLE I	
CABLE CLAMP (12)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8

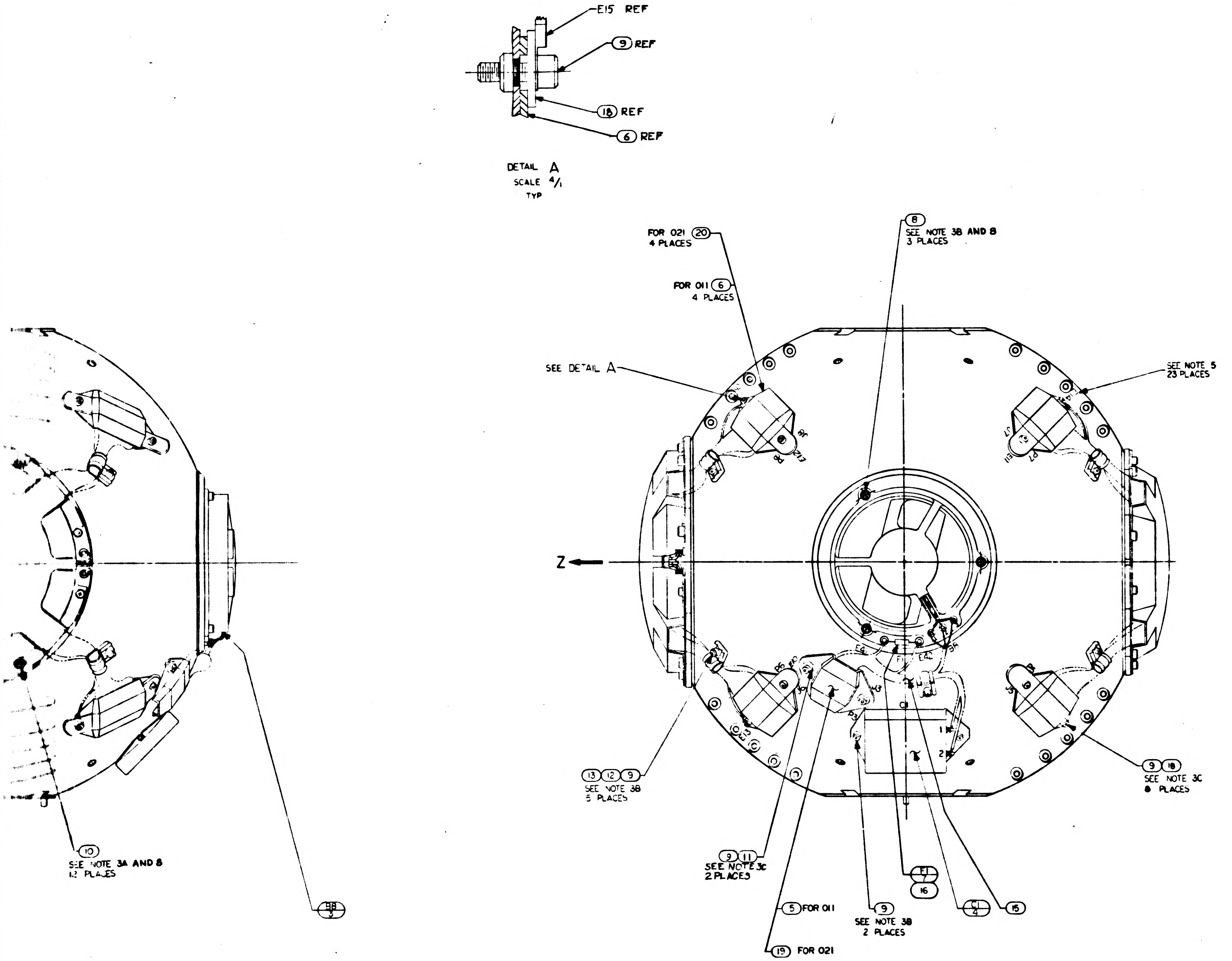


(8) SEE NOTE 3B AND 8
3 PLACES
(2)
(1)(17)(22)(24)
X
Y
B3
E44
F2
E43
J4
P4
C2
H1
H2
SEE NOTE 5
9 PLACES
(9) SEE NOTE 3B
2 PLACES
C2/4
(9)(12)(13)
SEE NOTE 3B
F2/7
(16)
(14)
(9)(11)
SEE NOTE 3C
2 PLACES
(5) FOR 011
(19) FOR 021
B3/3
SEE NOTE 3A AND 9
16 PLACES
(10)
SEE NOTE 3A AND 8
12 PLACES

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%.
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071, EXCEPT SEE NOTE 10.
5. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019.
6. ITEM (12) TO BE SELECTED FROM TABLE I ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
7. TAPE (21) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
8. APPLY A UNIFORM THIN FILM OF ITEM (23) TO SCREW THREADS.
9. APPLY A UNIFORM THIN FILM OF ITEM (23) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
10. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.

	REV	SHT
2018602	A-S	1


E15 REF
9 REF
18 REF
6 REF
DETAIL A
SCALE 4/1
TYP
FOR 021 20
4 PLACES
FOR 011 6
4 PLACES
8
SEE NOTE 3B AND 8
3 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
13 12 9
SEE NOTE 3B
5 PLACES
9 18
SEE NOTE 3C
8 PLACES
10
SEE NOTE 3A AND 8
12 PLACES
9 11
SEE NOTE 3C
2 PLACES
5 FOR 011
9
SEE NOTE 3B
2 PLACES
19 FOR 021
F1
16
C1
15
AB

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES REV H WITH CHANGES PER TDRR 17157	[illegible]		
K	REVISED PER TDRR 18740	25 May 65		
L	REVISED PER TDRR 18909	[illegible]		
M	REVISED PER TDRR 19274	25 May 65		
N	REVISED PER TDRR 19275	[illegible]		
P	REVISED PER TDRR 20111	22 Jul 65		
R	REVISED PER TDRR 21188	22 Jul 65		
S	REVISED PER TDRR 22594	28 Sep 65		
T	REVISED PER TDRR 23344	19 Oct 65		
U	REVISED TDRR 25795	15 Feb 66		
V	REVISED PER TDRR 27808	[illegible]		
W	REVISED PER TDRR 32166	5 DEC 66	EH	
Y	REVISED PER TDRR 33317	6 APR 67		
Z	REVISED PER TDRR 33354	6 APR 67		
AA	REVISED PER TDRR 34721	3 OCT 67	PHG	
AB	REVISED PER TDRR 34792	11 OCT 67	AAP	

D

C

B

A

3H

SU8.305

	QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
	1	—	—	—	2018603-041	MIDDLE AXIS ASSEMBLY	24
	AR	A/R	A/R	A/R	1008930	GREASE MOLYBDENUM DISULFIDE	23
	—	1	-	-	2018603-031	MIDDLE AXIS ASSEMBLY	22
SEE NOTE 7	AR	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH., ELEC. PRESS, SENSITIVE	21
	4	4	4	—	2018841	BRACKET, CONN	20
	2	2	2	—	2018842	BRACKET, CONN	19
	8	8	8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.	18
	—	—	1	—	2018603 021	MIDDLE AXIS ASSEMBLY	17
	2	2	2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
	1	1	1	1	2018797	WIRING HARNESS "B" OA	15
	1	1	1	1	2018798	WIRING HARNESS "C" OA	14
	6	6	6	6	1000223	WASHER, CABLE CLAMP	13
	6	6	6	6	1000220-SEE NOTE 6	CLAMP CABLE	12
	4	4	4	4	MS15795 803	WASHER, FLAT, METAL, ROUND	11
	12	12	12	12	1001489-18	SCREW, HEX, SOC HD	10
	22	22	22	22	1001488-1	SCREW, HEX, SOC HD SELF-LKG	9
	6	6	6	6	1001489-2	SCREW, HEX, SOC HD	8
	2	2	2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
	—	-	-	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
	—	-	-	2	2018793	BRACKET, CONNECTOR	5
	2	2	2	2	1010799	CAPACITOR	4
	2	2	2	2	2018644	BLOWER	3
	1	1	1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
	—	-	—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1

LIST OF MATERIALS

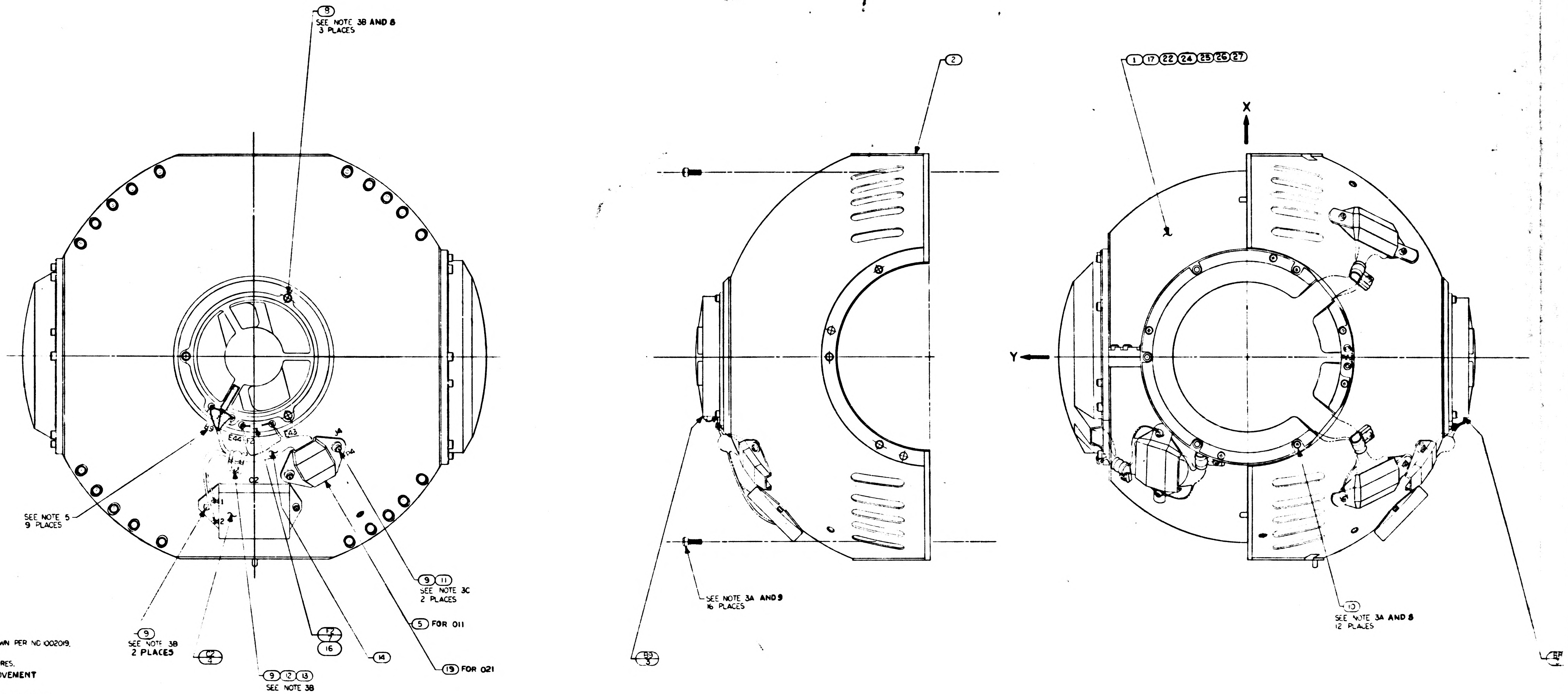
2018602 AB

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DWG NO CONTRACT DRAWN L. MORSE DATE 2-17-65 CHECKED G. QUINN 3-3-65 APPROVAL 8 Mar 65 APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS OUTER AXIS ASSEMBLY
2018601	DL2018601	HEAT TREATMENT	NASA APPROVAL 3-2-65	CODE IDENT NO. 80230 | SIZE J | NASA DRAWING NO. 2018602
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	SCALE 1/1 | WT | SHEET 1 OF 1
APPLICATION				

2018602 SH 1

2/2018602

TABLE I	
CABLE CLAMP ⑫	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8



⑧ SEE NOTE 3B AND 8 3 PLACES
SEE NOTE 5 9 PLACES
E9
E44
F2
E43
J4
P4
C2
E41
E42
⑨ SEE NOTE 3B 2 PLACES
C2 / 4
⑨ ⑫ ⑬ SEE NOTE 3B
F2 / 7
⑯
⑭
⑨ ⑪ SEE NOTE 3C 2 PLACES
⑤ FOR 011
⑲ FOR 021
②
① ⑰ ㉒ ㉔ ㉕ ㉖ ㉗
X
Y
SEE NOTE 3A AND 9 16 PLACES
B9 / 3
⑩ SEE NOTE 3A AND 8 12 PLACES
EF

NOTES

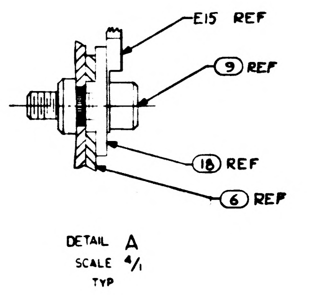
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%.
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071, EXCEPT SEE NOTE 10.
5. MARK CHARACTERS .10/.12 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
6. ITEM ⑫ TO BE SELECTED FROM TABLE I ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
7. TAPE ㉑ SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
8. APPLY A UNIFORM THIN FILM OF ITEM ㉓ TO SCREW THREADS.
9. APPLY A UNIFORM THIN FILM OF ITEM ㉓ TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
10. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.

3H

2018602	REV	SH
	A-C	1

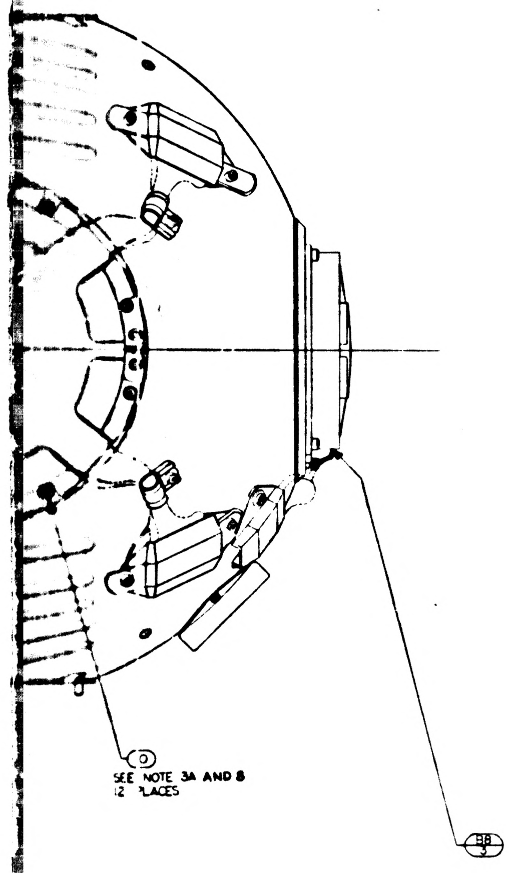
1/2018602

SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES REV H WITH CHANGES PER TDRR 17157	[illegible]	[illegible]	[illegible]
K	REVISED PER TDRR 18740	[illegible]	[illegible]	[illegible]
L	REVISED PER TDRR 18909	[illegible]	[illegible]	[illegible]
M	REVISED PER TDRR 19274	[illegible]	[illegible]	[illegible]
N	REVISED PER TDRR 19275	[illegible]	[illegible]	[illegible]
P	REVISED PER TDRR 20111	[illegible]	[illegible]	[illegible]
R	REVISED PER TDRR 21108	[illegible]	[illegible]	[illegible]
S	REVISED PER TDRR 22594	[illegible]	[illegible]	[illegible]
T	REVISED PER TDRR 23344	[illegible]	[illegible]	[illegible]
U	REVISED TDRR 25795	[illegible]	[illegible]	[illegible]
V	REVISED PER TDRR 27808	[illegible]	[illegible]	[illegible]
W	REVISED PER TDRR 32106	[illegible]	EH	[illegible]
Y	REVISED PER TDRR 33317	[illegible]	ME	VH
Z	REVISED PER TDRR 33354	[illegible]	ME	VH
AA	REVISED PER TDRR 34721	3 OCT 67	PHG	[illegible]
AB	REVISED PER TDRR 34792	11 OCT 67	AAP	[illegible]
AC	REVISED PER TDRR 35727	29 FEB 68	JJJ	[illegible]

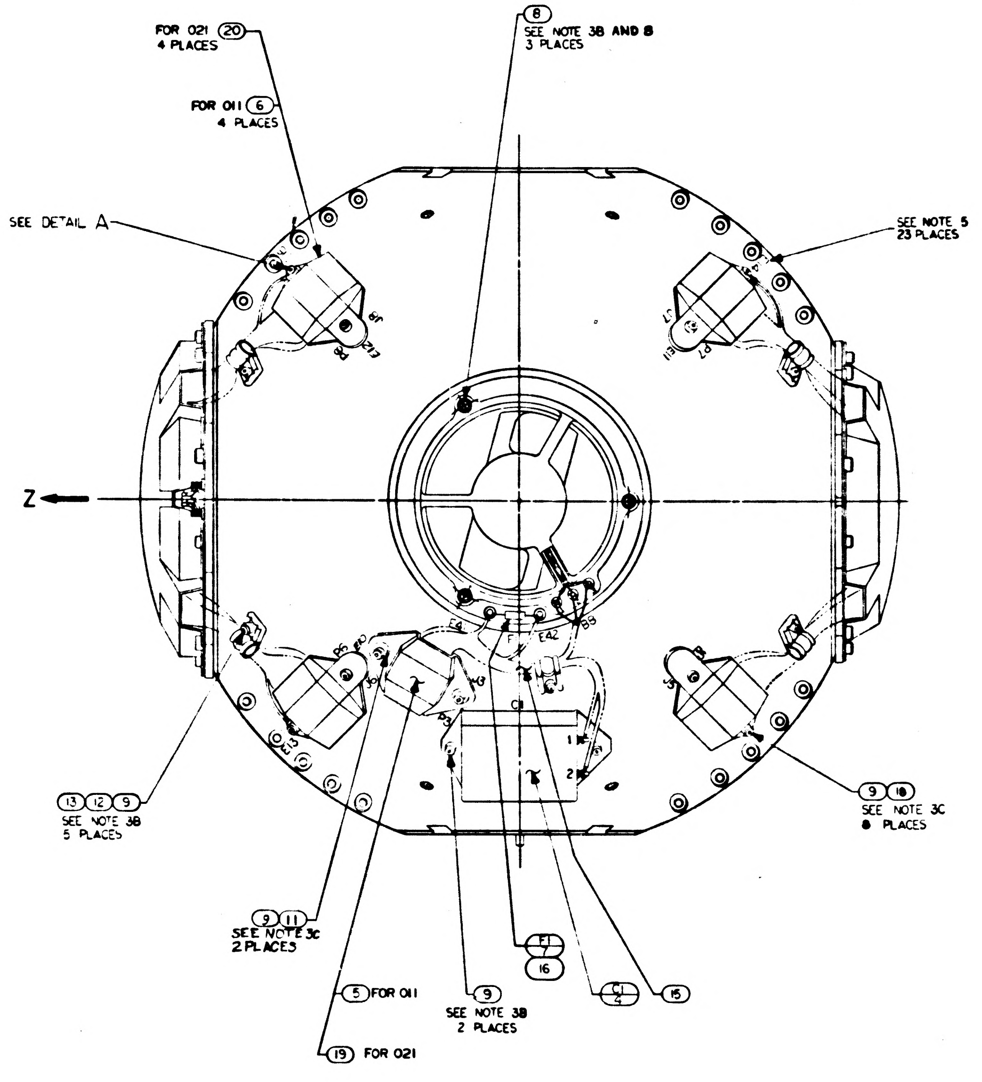


E15 REF
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP



10
SEE NOTE 3A AND 8
12 PLACES
B8
3



FOR 021 20
4 PLACES
FOR 011 6
4 PLACES
8
SEE NOTE 3B AND 8
3 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
13 12 9
SEE NOTE 3B
5 PLACES
9 18
SEE NOTE 3C
8 PLACES
9 11
SEE NOTE 3C
2 PLACES
5 FOR 011
19 FOR 021
9
SEE NOTE 3B
2 PLACES
F1
7
16
C1
4
15

SEE NOTE 7

QTY REQD 071	QTY REQD 061	QTY REQD 051	QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	–	–	–	–	–	–	2018603-071	MIDDLE AXIS ASSEMBLY	27
–	1	–	–	–	–	–	2018603-061	MIDDLE AXIS ASSEMBLY	26
–	–	1	–	–	–	–	2018603-051	MIDDLE AXIS ASSEMBLY	25
–	–	–	1	–	–	–	2018603-041	MIDDLE AXIS ASSEMBLY	24
AR	AR	AR	AR	A/R	A/R	A/R	1008930	GREASE MOLYBDENUM DISULFIDE	23
–	–	–	–	1	–	–	2018603-031	MIDDLE AXIS ASSEMBLY	22
AR	AR	AR	AR	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH., ELEC. PRESS, SENSITIVE	21
–	4	4	4	4	4	–	2018841	BRACKET, CONN	20
–	2	2	2	2	2	–	2018842	BRACKET, CONN	19
8	8	8	8	8	8	8	2018812	WASHER BRACKET, CONN M G & O.G	18
–	–	–	–	–	1	–	2018603 021	MIDDLE AXIS ASSEMBLY	17
2	2	2	2	2	2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	1	1	1	1	1	2018797	WIRING HARNESS "B" CA	15
1	1	1	1	1	1	1	2018798	WIRING HARNESS "C" CA	14
6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	13
6	6	6	6	6	6	6	1000220-SEE NOTE 6	CLAMP CABLE	12
4	4	4	4	4	4	4	MS15795 803	WASHER, FLAT, METAL, ROUND	11
12	12	12	12	12	12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	22	22	22	22	22	1001488-1	SCREW, HEX, SOC HD SELF-LKG	9
6	6	6	6	6	6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	2	2	2	2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
4	–	–	–	–	–	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
2	–	–	–	–		2	2018793	BRACKET, CONNECTOR	5
2	2	2	2	2	2	2	1010799	CAPACITOR	4
2	2	2	2	2	2	2	2018644	BLOWER	3
1	1	1	1	1	1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
–	–	–	–	–	–	1	2018603-011	MIDDLE AXIS ASSEMBLY	1

LIST OF MATERIALS

2018601	D. 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN L. MORSE DATE 2-17-65
CHECKED [illegible] 3-3 65
APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible] 3-9-65
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

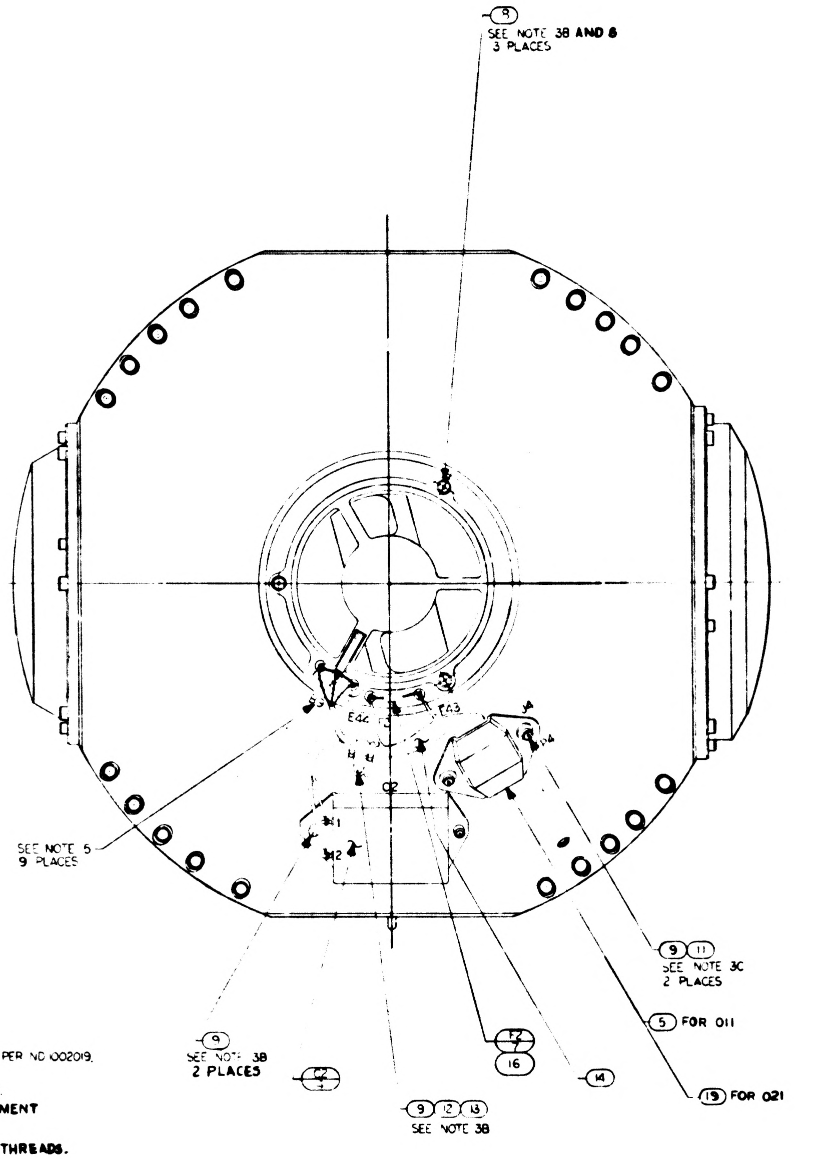
CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 2018602
SCALE 1/1
WT
SHEET 1 OF 1

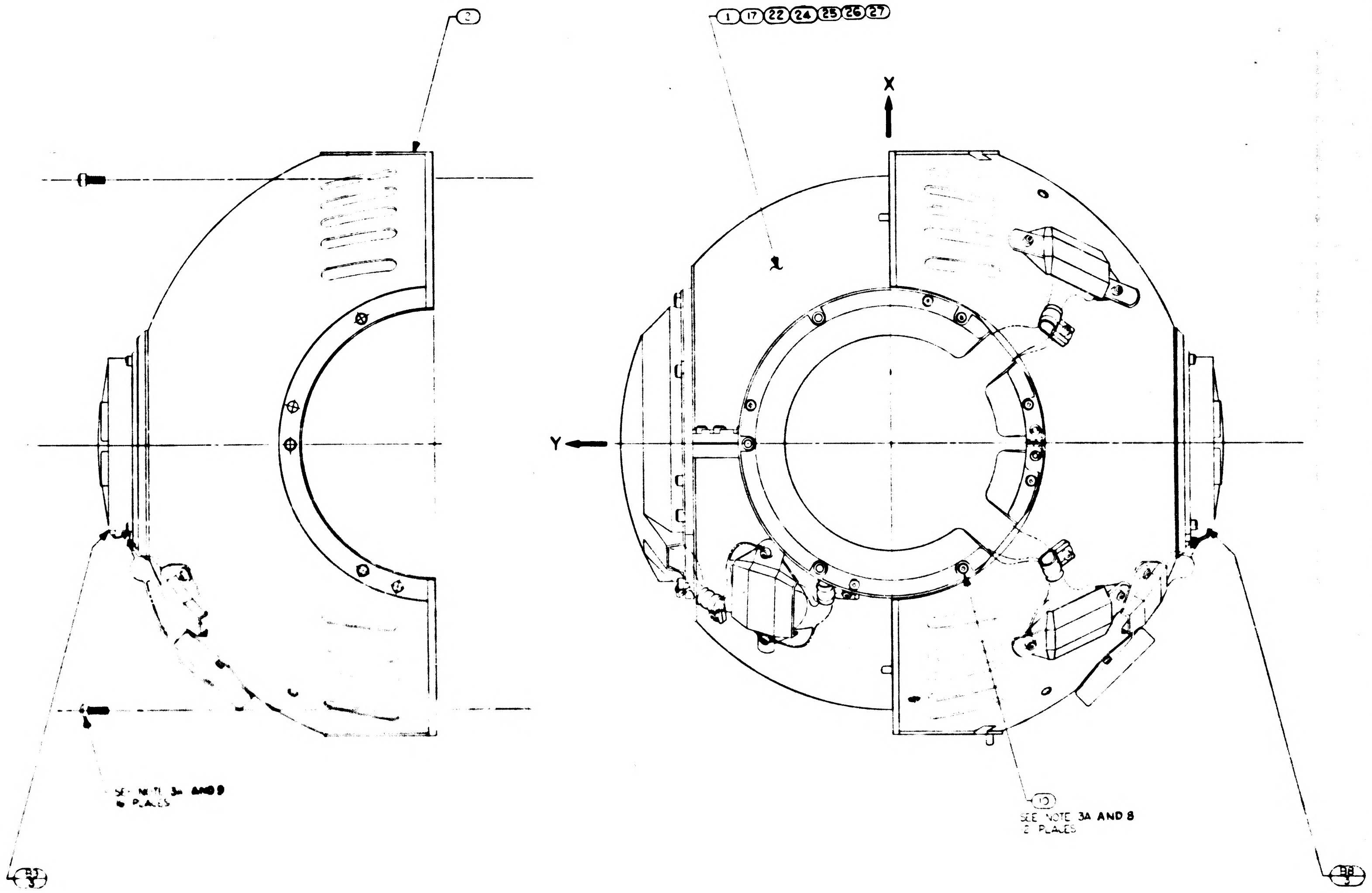
2018602 AC

3H

2/2018602

TABLE I	
CABLE CLAMP (12)	
PART NO	DIA REF
[illegible]22[illegible]-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8


(8) SEE NOTE 3B AND 8
3 PLACES
E44
E43
J4
Q2
SEE NOTE 5
9 PLACES
(9) (11) SEE NOTE 3C
2 PLACES
(5) FOR 011
(9) SEE NOTE 3B
2 PLACES
C2
(F2/7) (16)
(14)
(19) FOR 021
(9) (12) (13) SEE NOTE 3B


(2)
(1) (17) (22) (24) (25) (26) (27)
X
Y
SEE NOTE 3A AND 9
4 PLACES
(10) SEE NOTE 3A AND 8
2 PLACES
(B3/3)
(B8/3)

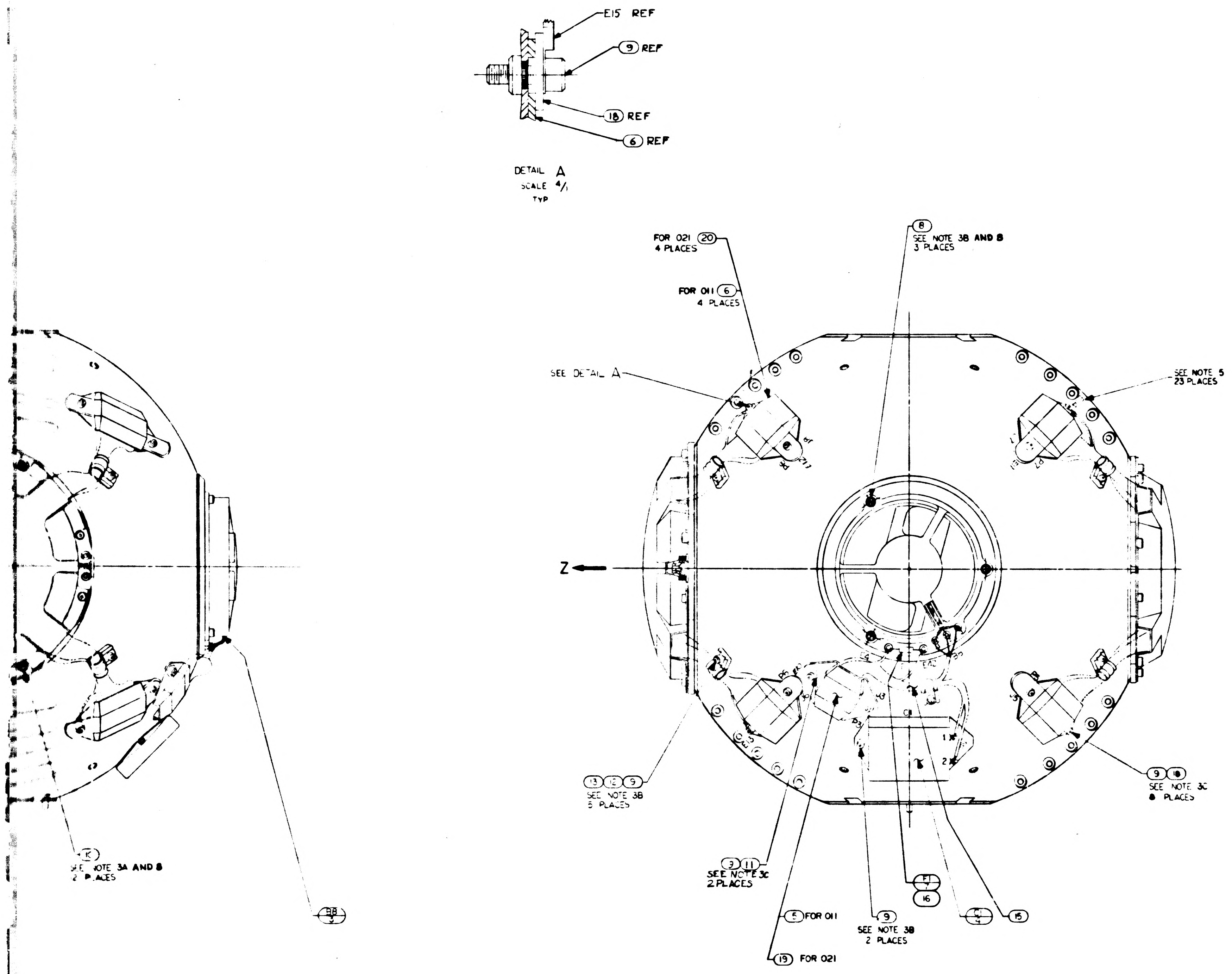
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%.
   - A. 13.0 IN-LB
   - B. 6.5 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071, EXCEPT SEE NOTE 10.
5. MARK CHARACTERS .10/.12 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019.
6. ITEM (12) TO BE SELECTED FROM TABLE I ASSEMBLY.
   CLAMP TO PREVENT CABLE MOVEMENT BUT MUST NOT PINCH WIRES.
7. TAPE (21) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
8. APPLY A UNIFORM THIN FILM OF ITEM (23) TO SCREW THREADS.
9. APPLY A UNIFORM THIN FILM OF ITEM (23) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.
10. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.

3H

2018602	A0	1

SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES REV H WITH CHANGES PER TDRR 17157	[illegible]		
K	REVISED PER TDRR 18740	[illegible]		
L	REVISED PER TDRR 18909	[illegible]		
M	REVISED PER TDRR 19274	[illegible]		
N	REVISED PER TDRR 19275	[illegible]		
P	REVISED PER TDRR 20111	[illegible]		
R	REVISED PER TDRR 21108	[illegible]		
S	REVISED PER TDRR 22594	[illegible]		
T	REVISED PER TDRR 23344	[illegible]		
U	REVISED TDRR 25795	[illegible]		
V	REVISED PER TDRR 27608	[illegible]		
W	REVISED PER TDRR 32[illegible]	[illegible]		
Y	REVISED PER TDRR 33317	[illegible]		
Z	REVISED PER TDRR 33384	6 APRIL		
AA	REVISED PER TDRR 34721	30CT 67	PHG	
AB	REVISED PER TDRR 34792	11 OCT 67	AAP	
AC	REVISED PER TDRR 35727	[illegible]	JJJ	
AD	REVISED PER TDRR 36004	2 MAR 68	DL	


E15 REF
9 REF
18 REF
6 REF
DETAIL A
SCALE 4/1
TYP
FOR 021 20
4 PLACES
FOR 011 6
4 PLACES
8
SEE NOTE 3B AND 8
3 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
13 12 9
SEE NOTE 3B
5 PLACES
9 10
SEE NOTE 3C
8 PLACES
K
SEE NOTE 3A AND 8
2 PLACES
9B
3 11
SEE NOTE 3C
2 PLACES
5 FOR 011
19 FOR 021
9
SEE NOTE 3B
2 PLACES
F1
16
C1
15

SEE NOTE 7

QTY REQD 071	QTY REQD 061	QTY REQD 051	QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
1	–	–	–	–	–	–	2018603-071	MIDDLE AXIS ASSEMBLY	27
–	1	–	–	–	–	–	2018603-061	MIDDLE AXIS ASSEMBLY	26
–	–	1	–	–	–	–	2018603-051	MIDDLE AXIS ASSEMBLY	25
–	–	–	1	–	–	–	2018603-041	MIDDLE AXIS ASSEMBLY	24
AR	AR	AR	AR	A/R	A/R	A/R	1008930	GREASE MOLYBDENUM DISULFIDE	23
–	–	–	–	1	–	–	2018603-031	MIDDLE AXIS ASSEMBLY	22
AR	AR	AR	AR	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS. SENSITIVE	21
–	4	4	4	4	4	–	2018841	BRACKET, CONN	20
–	2	2	2	2	2	–	2018842	BRACKET, CONN	19
8	8	8	8	8	8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.	18
–	–	–	–	–	1	–	2018603-021	MIDDLE AXIS ASSEMBLY	17
2	2	2	2	2	2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	1	1	1	1	1	2018797	WIRING HARNESS "B" OA	15
1	1	1	1	1	1	1	2018798	WIRING HARNESS "C" OA	14
6	6	6	6	6	6	6	1000223	WASHER, CABLE CLAMP	13
6	6	6	6	6	6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	4	4	4	4	4	MS15795 803	WASHER, FLAT, METAL, ROUND	11
12	12	12	12	12	12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	22	22	22	22	22	1001488-1	SCREW, HEX, SOC HD SELF-LKG	9
6	6	6	6	6	6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	2	2	2	2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
4	–	–	–	–		4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
2	–	–	–	–		2	2018795	BRACKET, CONNECTOR	5
2	2	2	2	2	2	2	1010799	CAPACITOR	4
2	2	2	2	2	2	2	2018644	BLOWER	3
1	1	1	1	1	1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
–	–	–	–	–	–	1	2018603-011	MIDDLE AXIS ASSEMBLY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
2018601	D-2018601

APPLICATION

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CHECKED G. [illegible] 3-3-65
APPROVAL
APPROVAL
NASA APPROVAL 3-8-65
MIT APPROVAL

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OUTER AXIS
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 2018602
SCALE 1/1
SHEET 1 OF 1

AD
2018602

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2/2018602

4 3 2 1

PART NO.	NOMENCLATURE	QTY REQ'D
2018603	MIDDLE AXIS ASSY	1
2018761	HOUSING ASSY O.G.	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WR	
	A	TDRR 11213	28 JUL 64		WR

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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CONTRACT
NAS 9-153

		DATE
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APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL	W	7/7/64

OUTER
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

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HOUSTON TEXAS

NASA DRAWING NO.
2018602

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PHOTOGRAPHIC SCALE ONLY

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PART NO.	NOMENCLATURE	QTY REQ'D
2018603	MIDDLE AXIS ASSY	1
2018761	HOUSING ASSY O.G.	1
1011741-1	CONNECTOR	2

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WR	
	A	TDRR 11213	28 JUL 64		WR
	B	TDRR 14308	17 NOV 64		WR

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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CONTRACT
NAS 9-153

		DATE
APPROVED		July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE
		7/7/64

OUTER
AXIS
ASS'Y

SCALE | UNIT WT. | CODE IDENT.

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2018602

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PART NO.	NOMENCLATURE	QTY REQ'D
2018603	MIDDLE AXIS ASSY	1
2018761	HOUSING ASSY O.G.	1
1011741-1	CONNECTOR	2
2018790	BRACKET, CONNECTOR	4

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7JUL64	WR	
	A	TDRR 11213	28JUL64		WR
	B	TDRR 14308	11NOV64		WR
	C	TDRR 14435	24NOV64		WR

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

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NAS 9-153

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OUTER
AXIS
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SCALE
UNIT WT.
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PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018603-011	MIDDLE AXIS ASSY	1
2018761	HOUSING ASSY O.G.	1
1011741-1	CONNECTOR	2
2018790	BRACKET, CONNECTOR	4

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WR	
	A	TDRR 11213	28 JUL 64	Scott	WC
	B	TDRR 14308	17 NOV 64	Scott	W
	C	TDRR 14435	24 NOV 64	Scott	W
	D	TDRR 14783	15 DEC 64	Scott	W

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

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INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED		July 64
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DRAWN	JCF	
APPROVED FOR MSC		7/7/64
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OUTER
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

MIT
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HOUSTON TEXAS

NASA DRAWING NO.
2018602

SHEET OF

4 3 2 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018603-011	MIDDLE AXIS ASSY	1
2018761	HOUSING ASSY O.G.	1
1011741-1	CONNECTOR	2
~~2018790~~	~~BRACKET, CONNECTOR~~	~~4~~
2018793	BRACKET, CONNECTOR	2
2018794	BRACKET, CONNECTOR	4

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7JUL64	WR	
	A	TDRR 11213	28JUL64		WR
	B	TDRR 14308	11NOV64		WR
	C	TDRR 14435	24NOV64		WR
	D	TDRR 14783	15DEC64		WR
	E	TDRR 15491	13JAN65		WR

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
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MIT
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CONTRACT
NAS 9-153
DATE
APPROVED July 64
CHECKED
DRAWN JCF
APPROVED FOR MSC 7/7/64
MIT/IL APPROVAL
DATE 7/7/64

OUTER
AXIS
ASS'Y

SCALE
UNIT WT.
CODE IDENT.

MIT
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2018602
SHEET OF

4 3 2 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018603-011	MIDDLE AXIS ASSY	1
2018761	HOUSING ASSY O.G.	1
1011741-1	CONNECTOR	2
~~2018790~~	~~BRACKET, CONNECTOR~~	~~4~~
2018793	BRACKET, CONNECTOR	2
2018794	BRACKET, CONNECTOR	4
2018640	BLOWER	2

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 11213	28 JUL 64		WK
	B	TDRR 14308	17 NOV 64		WK
	C	TDRR 14435	24 NOV 64		WK
	D	TDRR 14783	15 DEC 64		WK
	E	TDRR 15481	13 JAN 65	ajB	WK
	F.	TDRR 16321	9 FEB 65		WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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CONTRACT NAS 9-153

		DATE
APPROVED		July 64
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DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL	WKupfer	7/7/64

OUTER
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

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2018602

SHEET OF

4 3 2 1

4 3 2 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018603-011	MIDDLE AXIS ASSY	1
2018761	HOUSING ASSY O.G.	1
1011741	CONNECTOR	2
~~2018790~~	~~BRACKET, CONNECTOR~~	~~4~~
2018793	BRACKET, CONNECTOR	2
2018794	BRACKET, CONNECTOR	4
2018640	BLOWER	2

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7JUL64	WR	
	A	TDRR 11213	28JUL64		WR
	B	TDRR 14308	11NOV64		WR
	C	TDRR 14435	24NOV64		WR
	D	TDRR 14783	15DEC64		WR
	E	TDRR 15491	13JAN65		WR
	F	TDRR 16321	9FEB65		WR
	G	TDRR 16817	24FEB65		

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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		DATE
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MIT/IL APPROVAL		DATE
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OUTER
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

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PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018603-011	MIDDLE AXIS ASSY	1
2018761	HOUSING ASSY O.G.	1
1011741	CONNECTOR	2
~~2018790~~	~~BRACKET, CONNECTOR~~	~~4~~
2018793	BRACKET, CONNECTOR	2
2018794	BRACKET, CONNECTOR	4
2018640	BLOWER	2

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
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	A	TDRR 11213	28JUL64		WR
	B	TDRR 14308	17NOV64		WR
	C	TDRR 14435	24NOV64		WR
	D	TDRR 14783	15DEC64		WR
	E	TDRR 15491	13JAN65	ajB	WR
	F	TDRR 16321	9FEB65		WR
	G	TDRR 16817	24FEB65		
	H	REPLACED BY REV J WITH			
		CHANGES TDRR 17157	9MAR65		WR

REPLACED BY REV-J-WITH CHANGES TDRR

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
FRACTIONS DECIMALS ANGLES

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MATERIAL:

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CONTRACT
NAS 9-153

		DATE
APPROVED		July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		7/7/64

OUTER
AXIS
ASS'Y

SCALE | UNIT WT. | CODE IDENT.

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2018602

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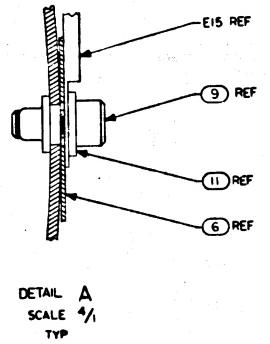
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
J	REPLACES REV H WITH CHANGES PER TDRR 17157		LW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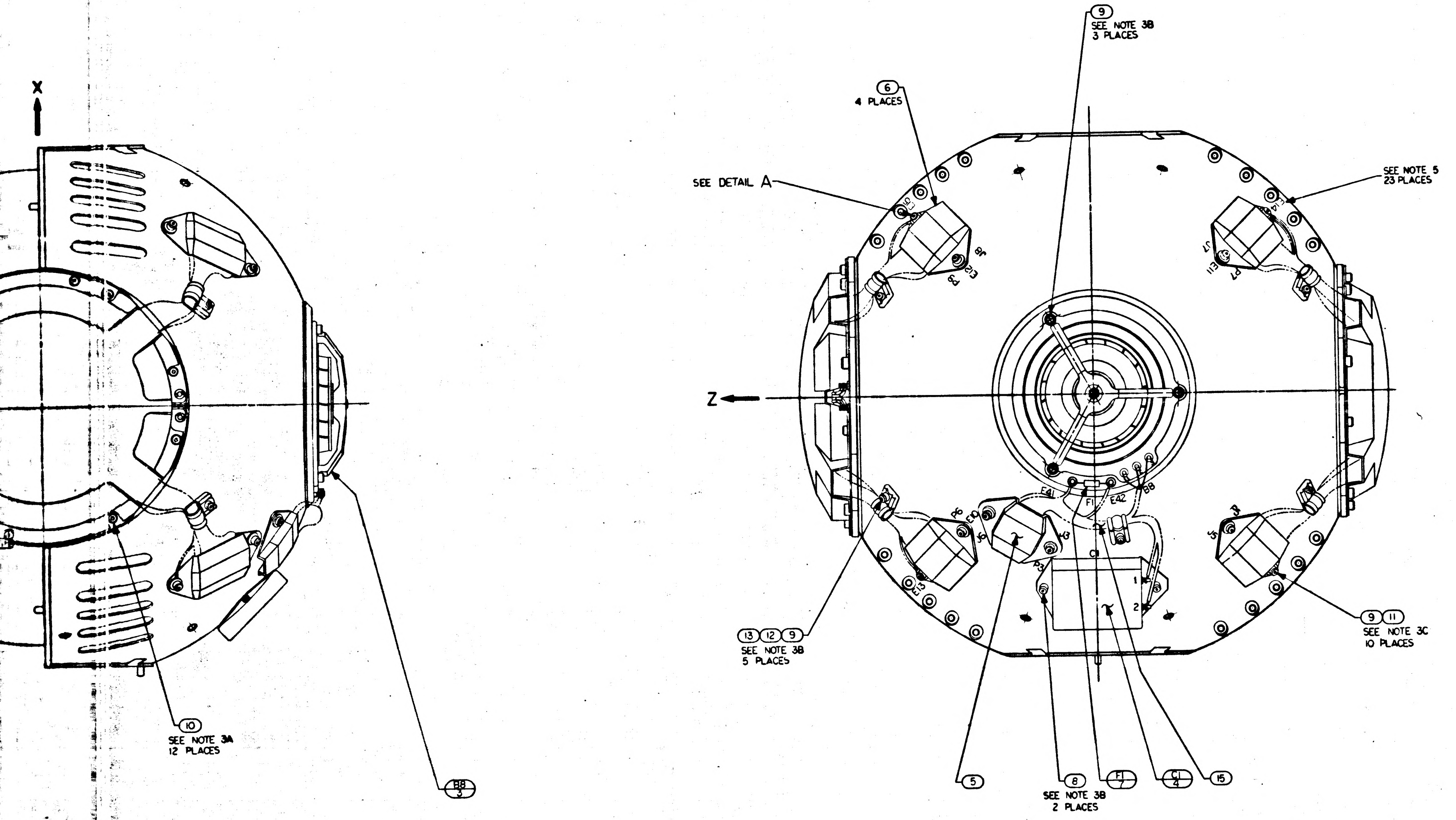
9 REF
11 REF
6 REF

DETAIL A
SCALE 4/1
TYP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SEE NOTE 3B
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SEE DETAIL A
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B8
9 11
SEE NOTE 3C
10 PLACES
13 12 9
SEE NOTE 3B
5 PLACES
10
SEE NOTE 3A
12 PLACES
B8
3
5
8
SEE NOTE 3B
2 PLACES
F1
7
C1
4
15

REPLACES REV H
WITH CHANGES

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	2018797	WIRING HARNESS "B" OA.	15
1	2018798	WIRING HARNESS "C" OA.	14
6	1000223	WASHER, CABLE CLAMP	13
6	1000220-SEE NOTE 6	CLAMP, CABLE	12
12	MS15795-303	WASHER, FLAT, METAL, ROUND	11
12	1001489-18	SCREW, HEX, SOC HD	10
24	1001489-2	SCREW HEX, SOC HD	9
4	1001489-1	SCREW, HEX, SOC HD	8
2	1000170-10	FUSE, PIGTAIL, SUBMINIATURE	7
4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
2	2018793	BRACKET, CONNECTOR	5
2	1010799	CAPACITOR	4
2	2018640	BLOWER	3
1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
1	2018603-011	MIDDLE AXIS ASSEMBLY	1
011	LIST OF MATERIALS		

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

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NASA APPROVAL 3-9-65
MIT APPROVAL

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HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018602
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SHEET 1 OF 1

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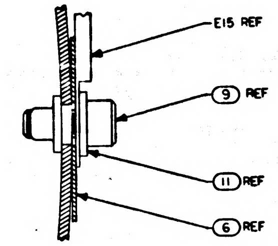
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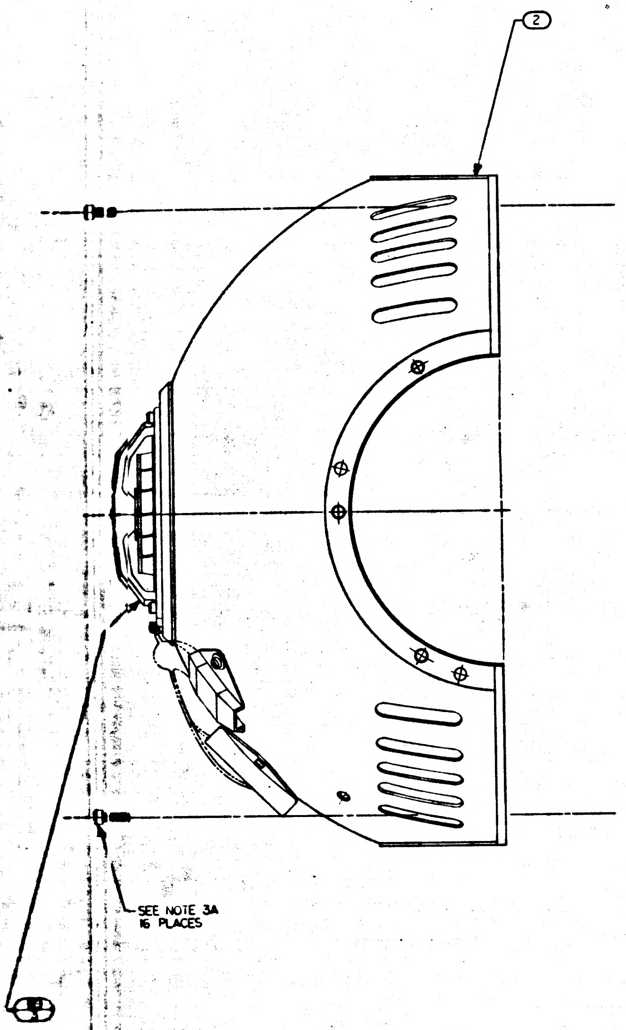
SCALE 4/1
TYP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BB
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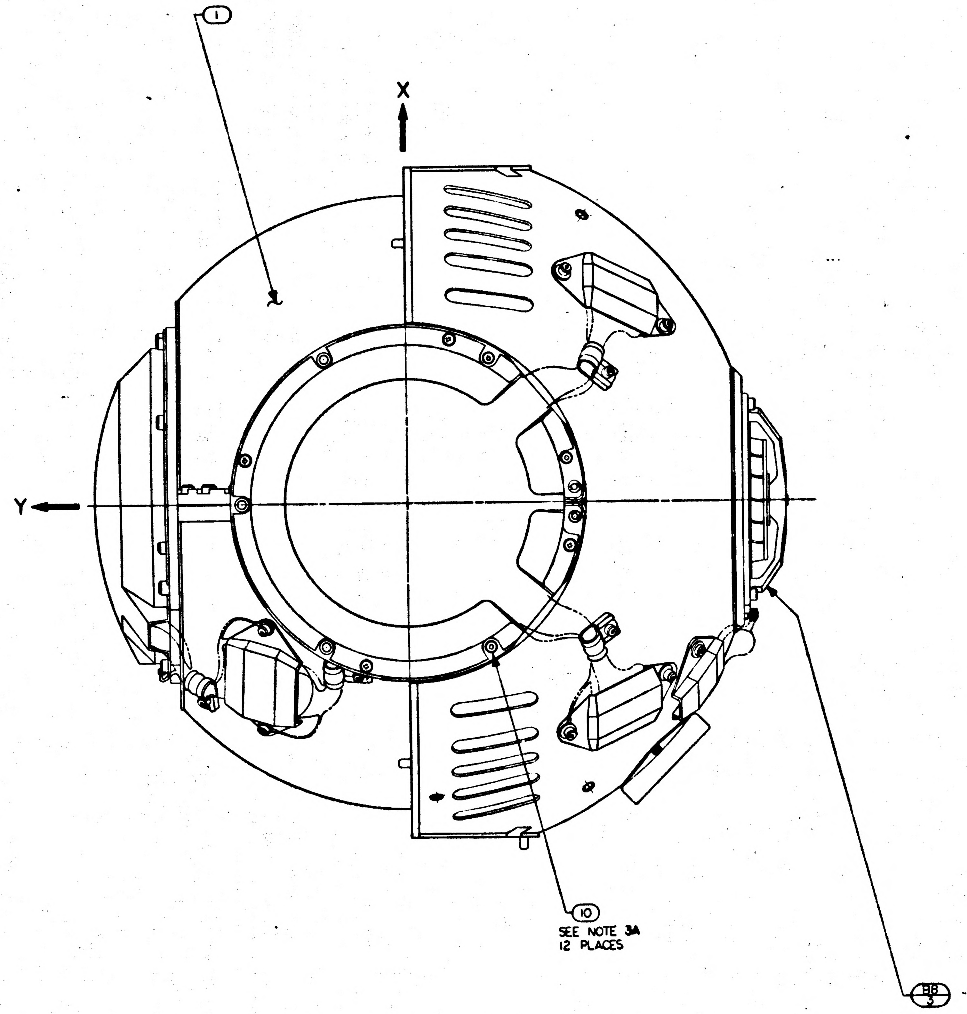
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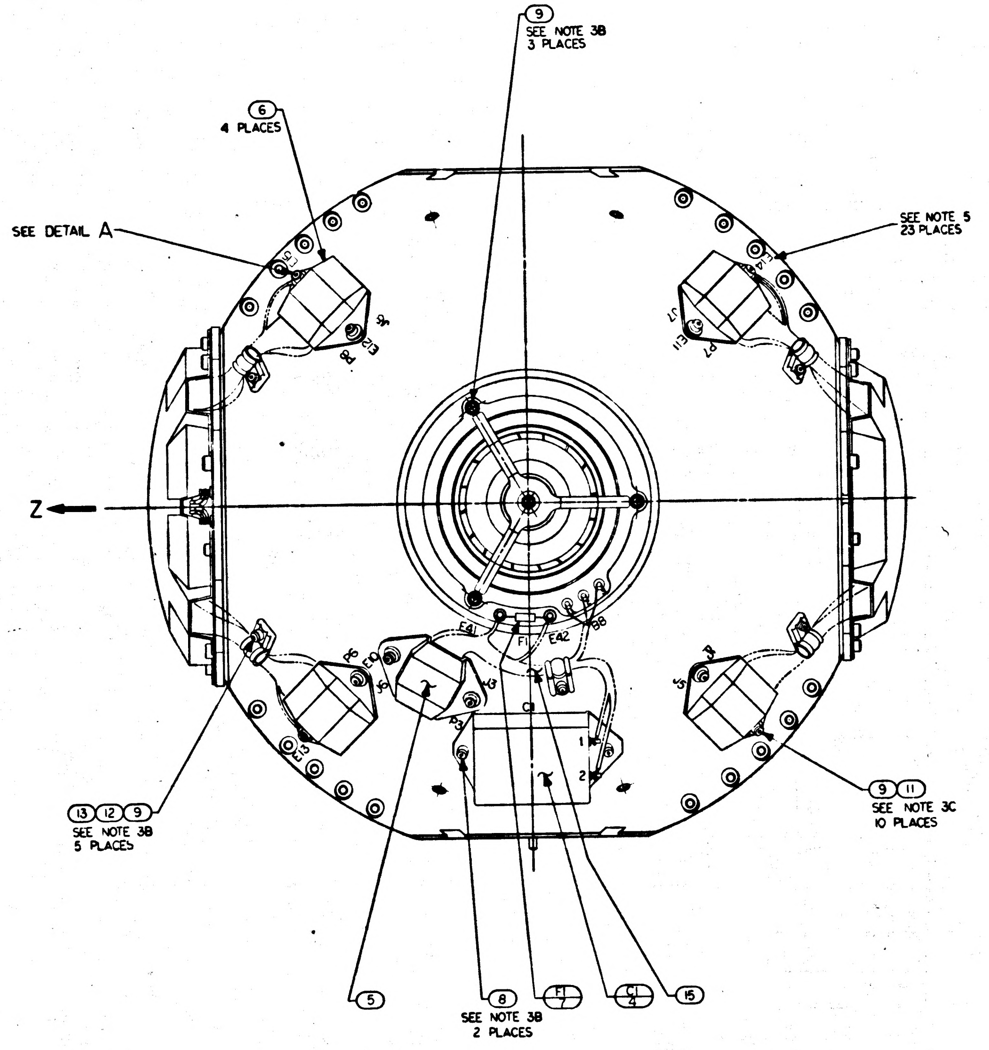
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E10
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5 PLACES
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REPLACES REV H
WITH CHANGES

MASTER

2018601

2018602	REV	SHT
	J	1

TABLE I	
CABLE CLAMP (12)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
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-6	5/16
-16	11/32
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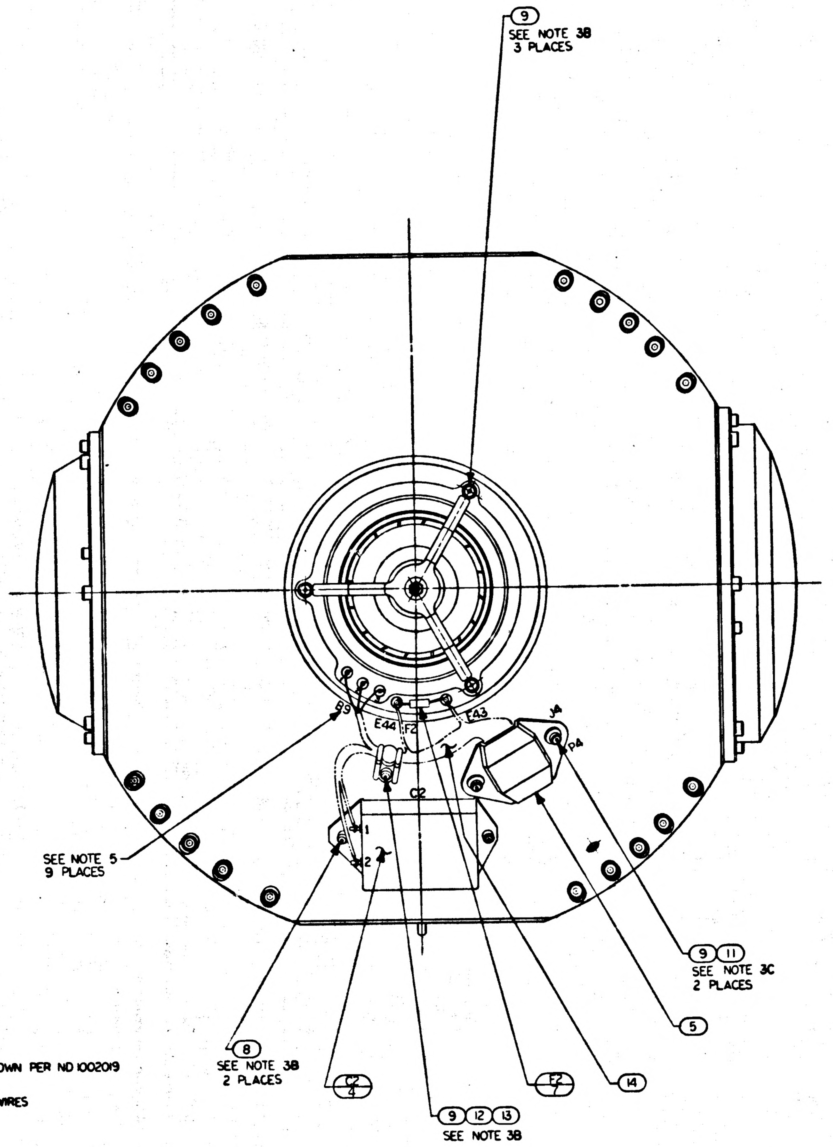

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SEE NOTE 3B
3 PLACES
B9
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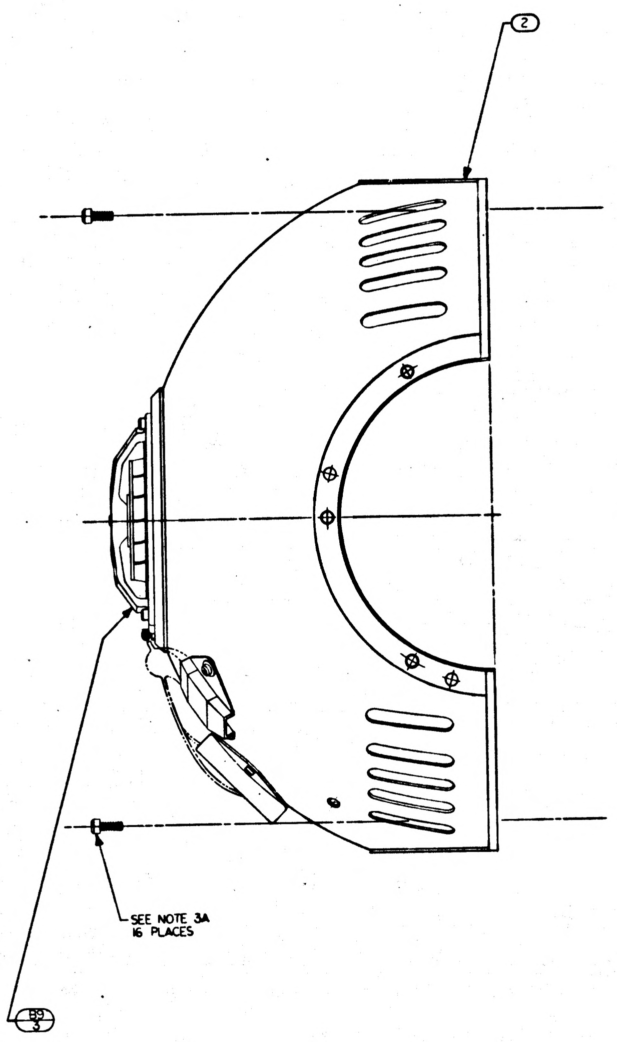
F2
E43
J4
P4
C2
1
2
SEE NOTE 5
9 PLACES
8
SEE NOTE 3B
2 PLACES
C2
4
9 12 13
SEE NOTE 3B
F2
7
14
5
9 11
SEE NOTE 3C
2 PLACES



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SEE NOTE 3A
16 PLACES
B9
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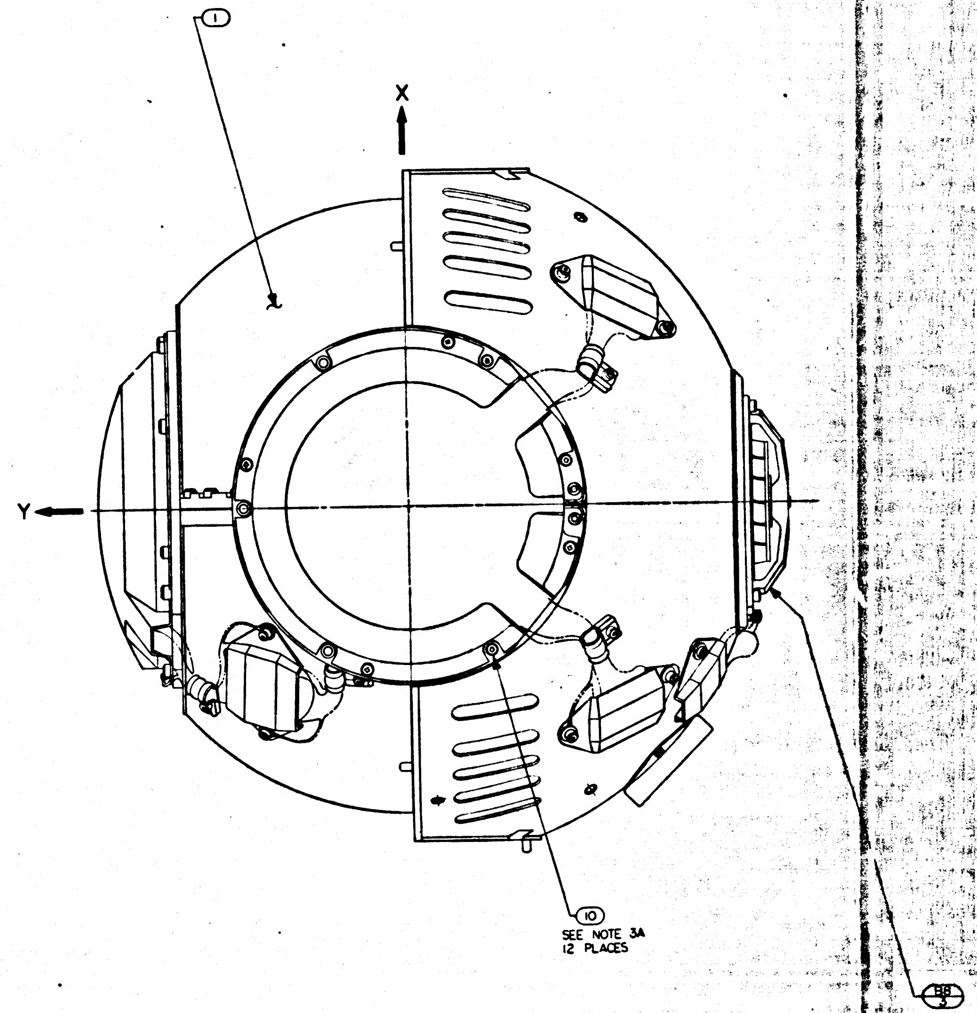

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X
Y
10
SEE NOTE 3A
12 PLACES
B9
3

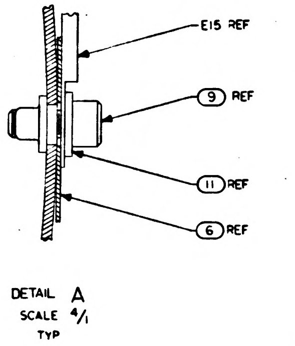
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS2007203
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
6. ITEM (12) TO BE SELECTED FROM TABLE I ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

3H

2018602	REV J	SHT 1

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES REV H WITH CHANGES PER TDRR 17157			
K	REVISED PER TDRR 18740	25 May 65		
L	REVISED PER TDRR 18909	25 May 65		
M	REVISED PER TDRR 19274	25 May 65		
N	REVISED PER TDRR 19275	26 May 65		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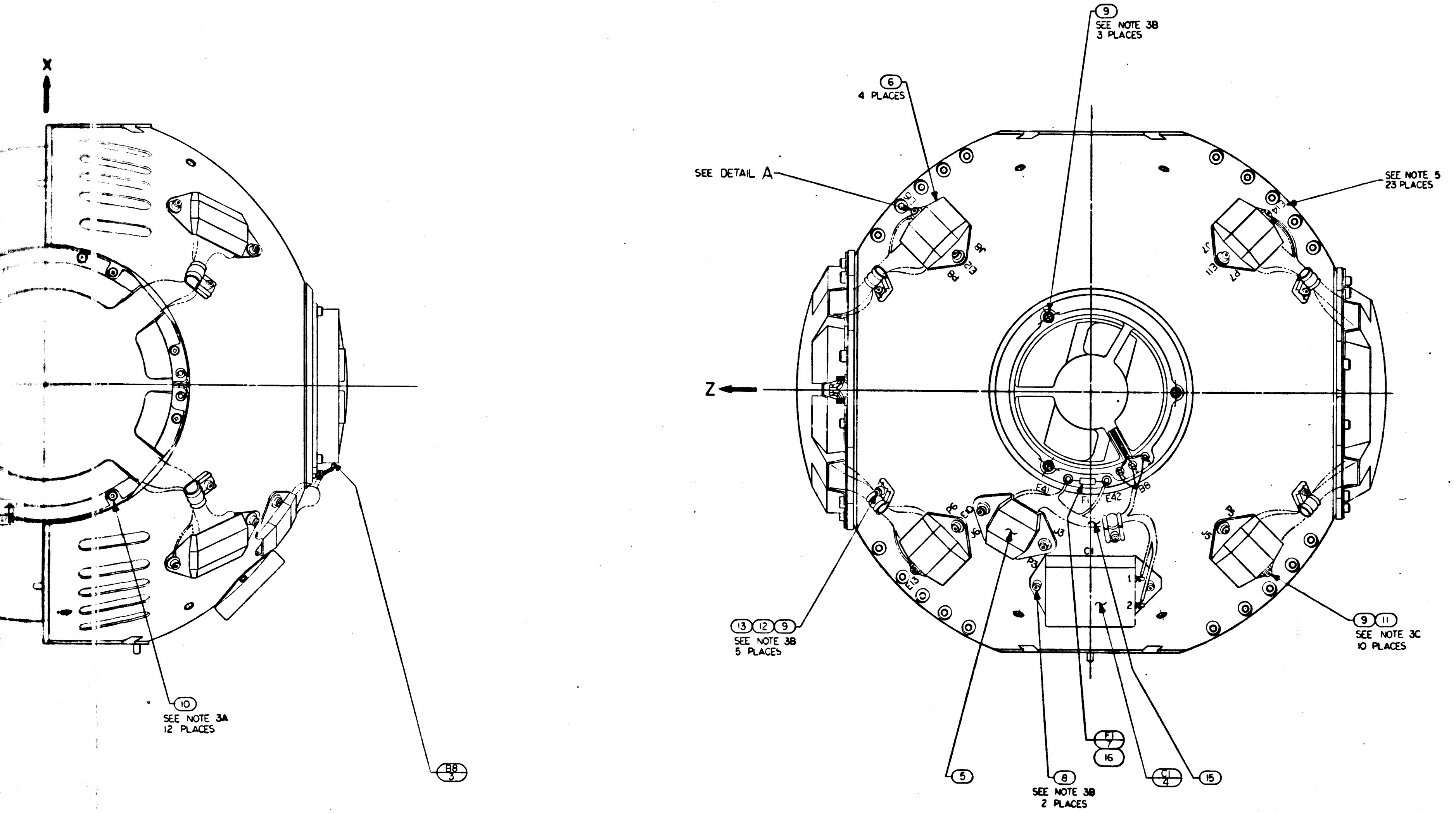
9 REF
11 REF
6 REF

DETAIL A
SCALE 4/1
TYP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Z
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SEE NOTE 3B
3 PLACES
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4 PLACES
SEE DETAIL A
SEE NOTE 5
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E42
F1
C1
13 12 9
SEE NOTE 3B
5 PLACES
9 11
SEE NOTE 3C
10 PLACES
10
SEE NOTE 3A
12 PLACES
B8
3
5
8
SEE NOTE 3B
2 PLACES
F1
7
16
C1
4
15

REPLACES REV H
WITH CHANGES

QTY REQ'D	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	—	2018603-021	MIDDLE AXIS ASSEMBLY	17
2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	2018797	WIRING HARNESS "B" OA.	15
1	1	2018798	WIRING HARNESS "C" OA.	14
6	6	1000223	WASHER, CABLE CLAMP	13
6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
12	12	MS15795-303	WASHER, FLAT, METAL, ROUND	11
12	12	1001489-18	SCREW, HEX, SOC HD	10
24	24	1001489-2	SCREW HEX, SOC HD	9
4	4	1001489-1	SCREW, HEX, SOC HD	8
2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
4	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
2	2	2018793	BRACKET, CONNECTOR	5
2	2	1010799	CAPACITOR	4
2	2	2018644	BLOWER	3
1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1
021	011	LIST OF MATERIALS		

N
2018602

3H

2018601	DL2018601	
NEXT ASSY	USED ON	
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN L. MORSE DATE 2-17-65
CHECKED G. Quinn 3-3-65
APPROVAL
APPROVAL
NASA APPROVAL W.J. Rhine 3-9-65
MIT APPROVAL

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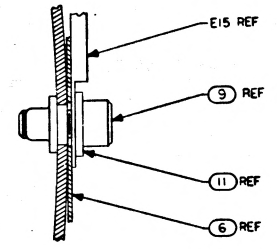
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

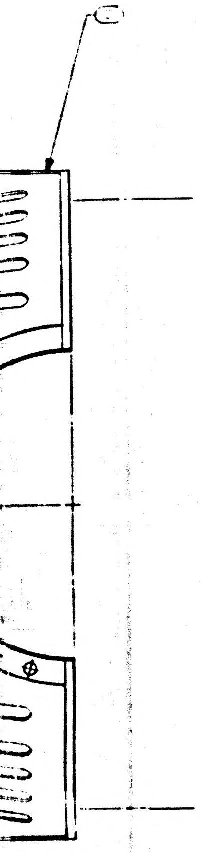
CODE IDENT NO. | SIZE J | NASA DRAWING NO. 2018602
SCALE 1/1 | WT | SHEET 1 OF 1

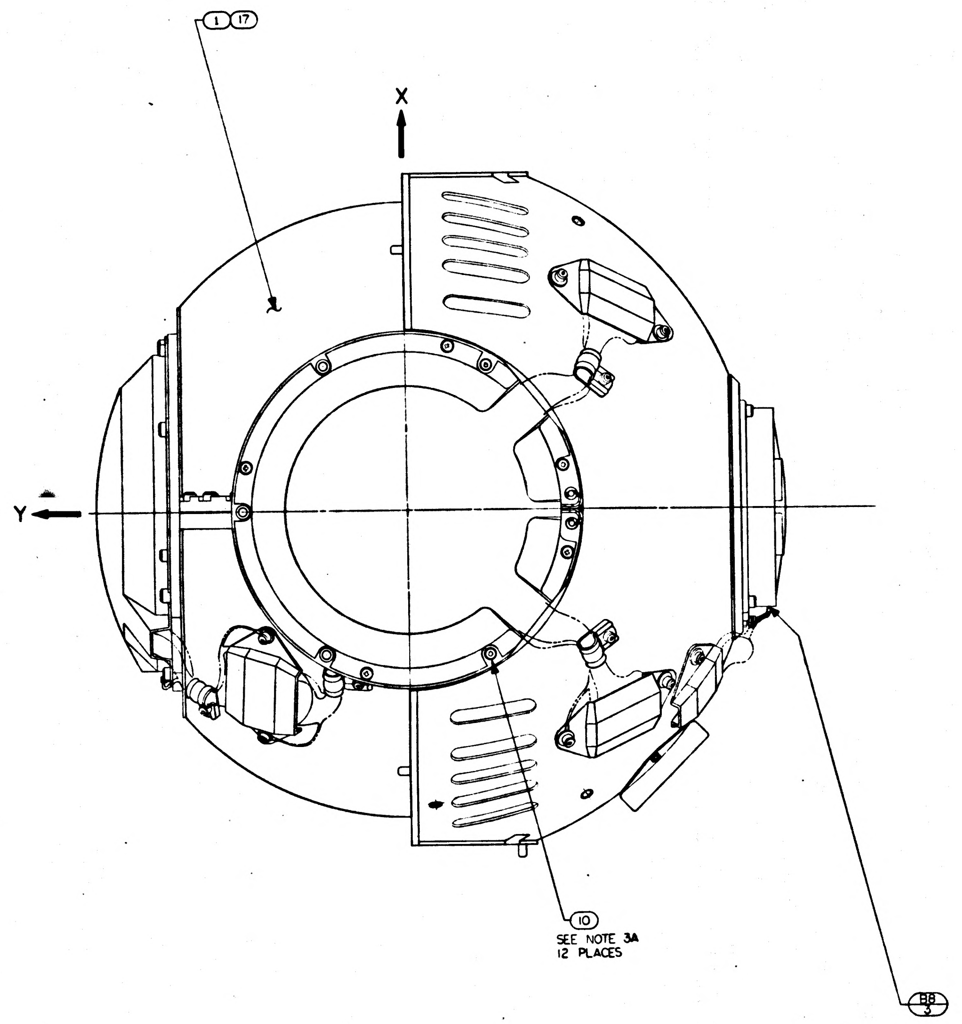
MASTER

F3


E15 REF
9 REF
11 REF
6 REF

DETAIL A
SCALE 4/1
TYP

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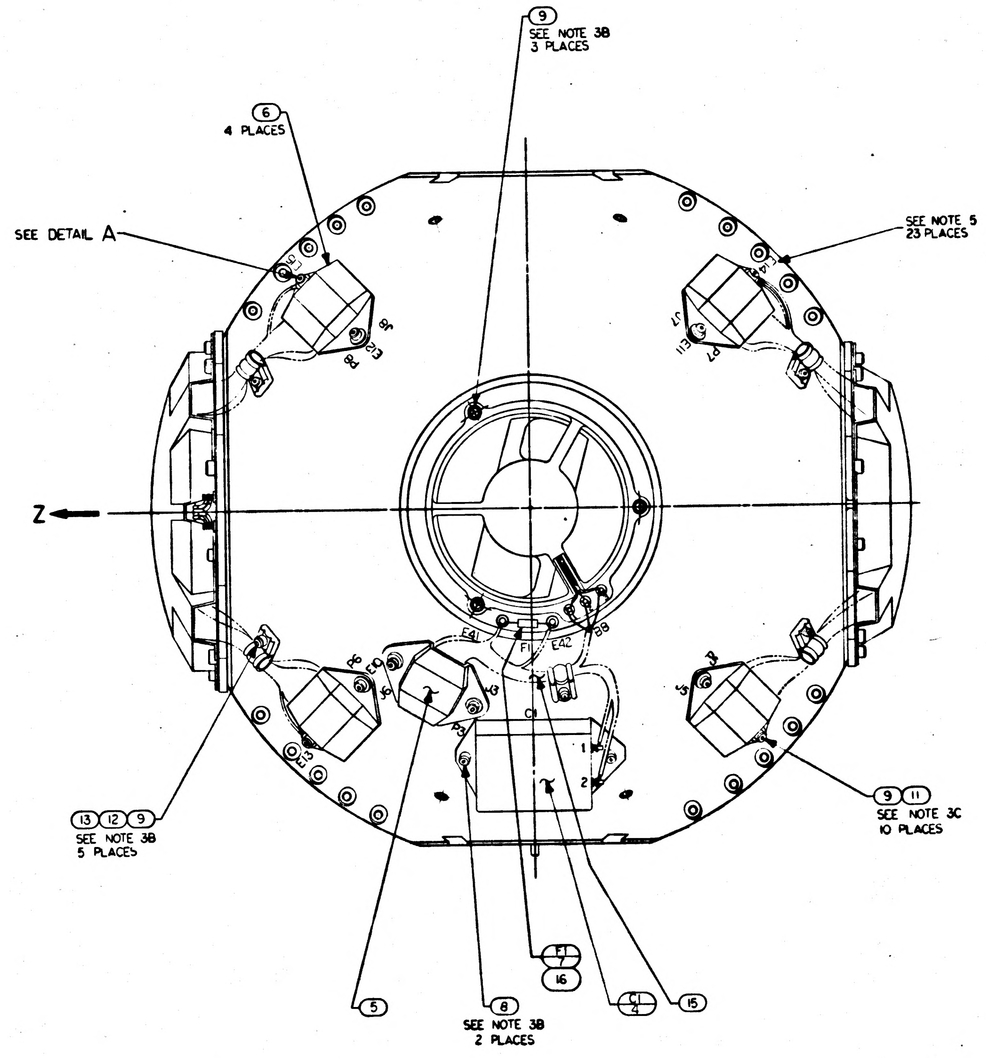
Y
10
SEE NOTE 3A
12 PLACES
BB
3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SEE NOTE 3B
3 PLACES
6
4 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
13 12 9
SEE NOTE 3B
5 PLACES
5
8
SEE NOTE 3B
2 PLACES
E1
7
16
C1
4
15
9 11
SEE NOTE 3C
10 PLACES

REPLACES REV H
WITH CHANGES

[illegible]	QTY REQD	PART OR IDENTIFYING NO.
1	—	2 18603-021
2	2	1 10490-078
1	1	2 18797
1	1	2 18798
6	6	1 00223
6	6	1 00220-SEE NOTE 6
12	12	M 15795-303
12	12	1 01489-18
24	24	1 01489-2
	4	1 01489-1
2	2	1 00170-12
4	4	2 18794
2	2	2 18793
2	2	1 10799
2	2	2 18644
1	1	2 18761
—	1	2 18603-011
[illegible]	011	

MASTER

2018601	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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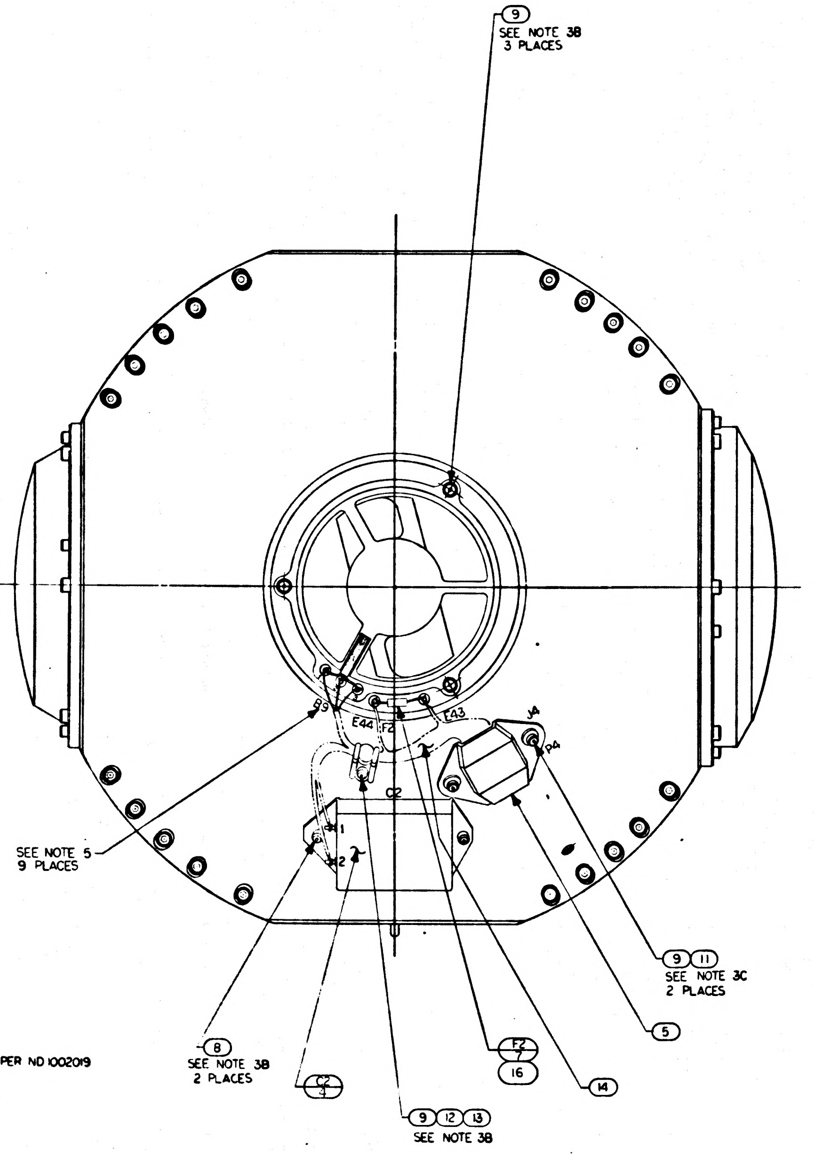
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRU ENTATION LAB
DRAWN L. ORSE DATE 2-17-6
CHECKED 3-3-65
APPROVAL
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

TABLE I	
CABLE CLAMP (12)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8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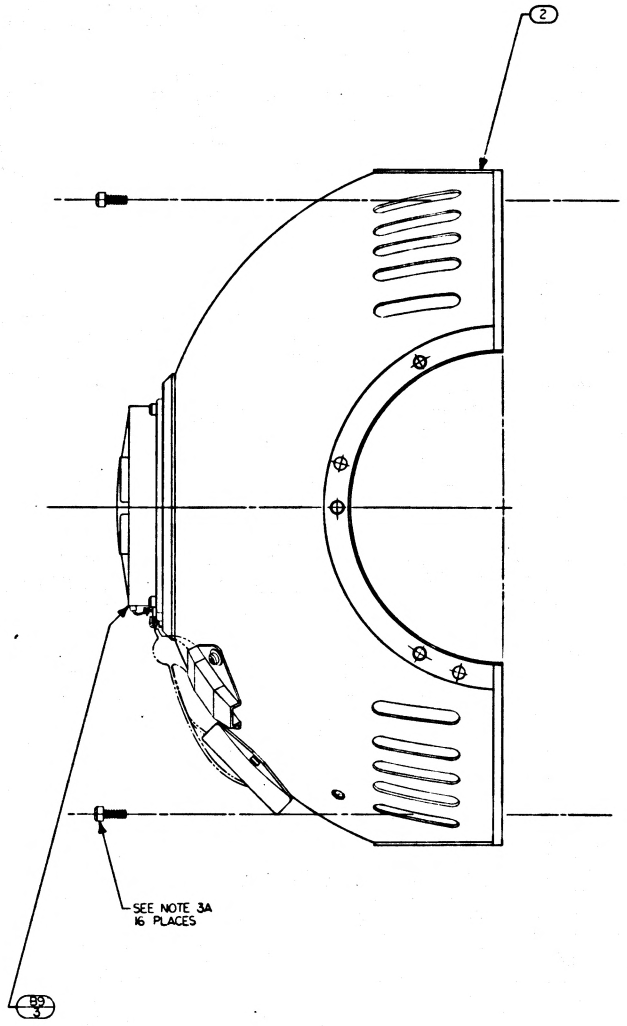
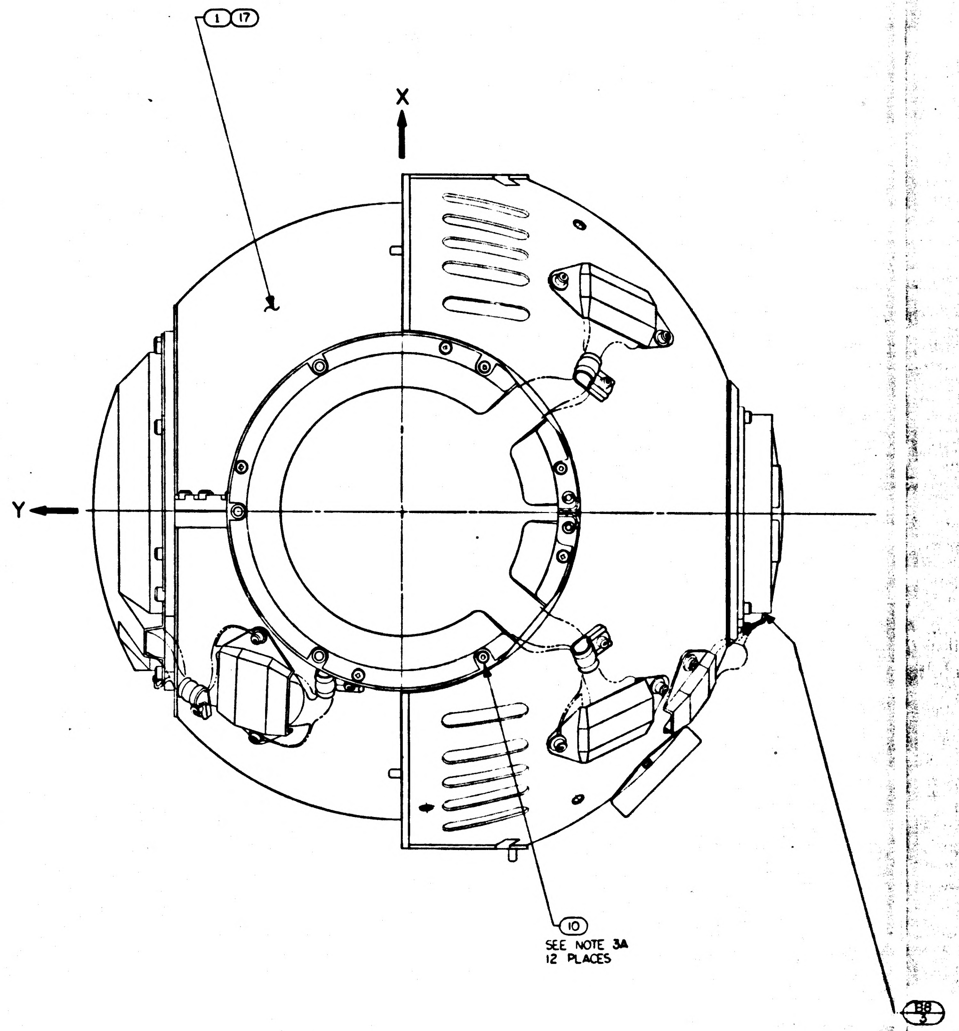
SEE NOTE 3B
3 PLACES
B9
E44
F2
E43
J4
P4
C2
1
2
SEE NOTE 5
9 PLACES
9 11
SEE NOTE 3C
2 PLACES
5
14
F2
7
16
9 12 13
SEE NOTE 3B
C2
4
8
SEE NOTE 3B
2 PLACES

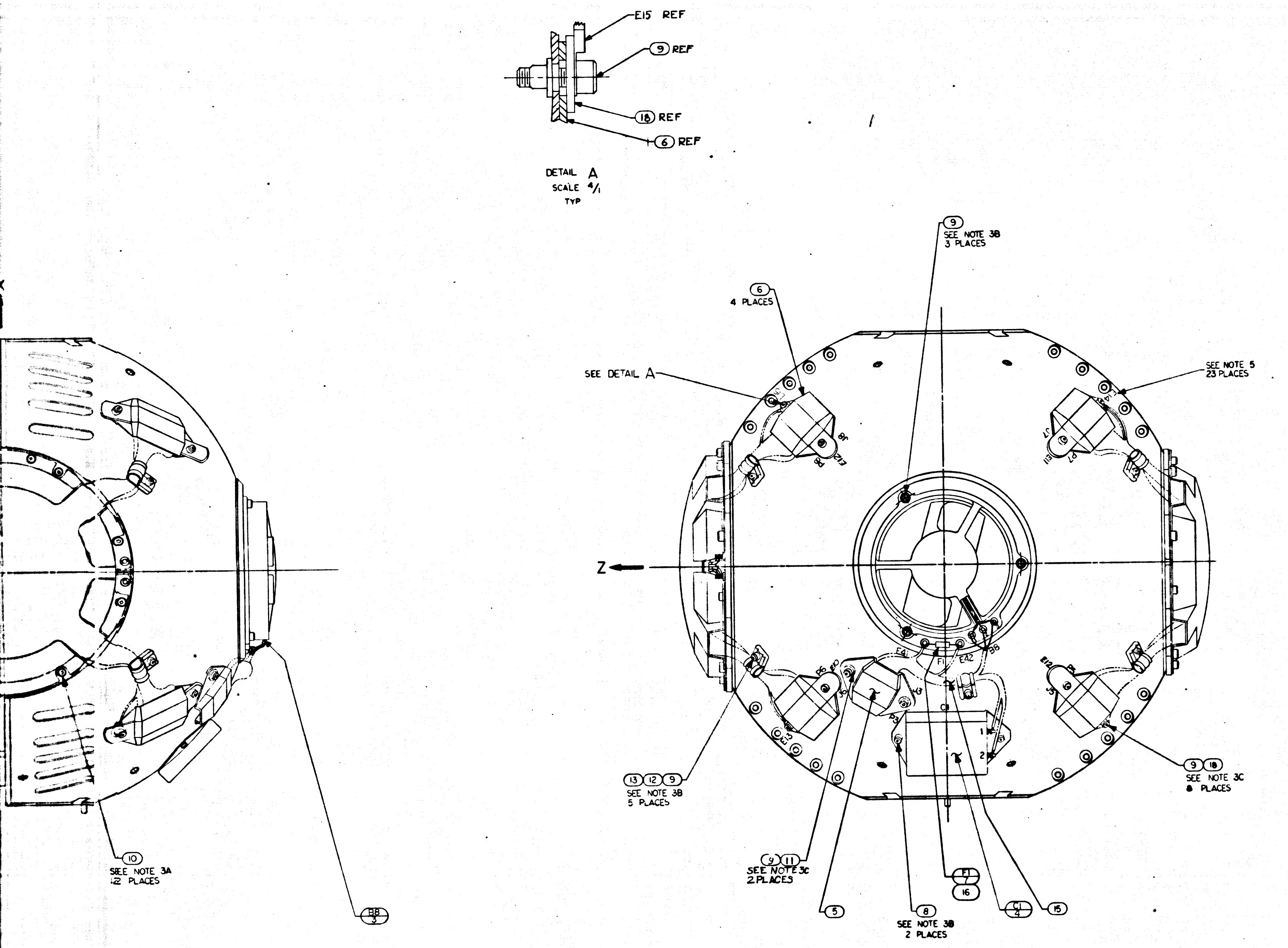
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
    - A. 10.0 IN-LB
    - B. 5.0 IN-LB
    - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
6. ITEM (12) TO BE SELECTED FROM TABLE I ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES


2
SEE NOTE 3A
16 PLACES
B9
3


1 17
X
Y
10
SEE NOTE 3A
12 PLACES
B8
3

SYM	DESCRIPTION	DATE	APPROVAL	
REVISIONS				
J	REPLACES REV H WITH CHANGES PER TDRR 17157	9 MAR 65		
K	REVISED PER TDRR 18740	25 May 65		
L	REVISED PER TDRR 18909	25 May 65		
M	REVISED PER TDRR 19274	25 May 65		
N	REVISED PER TDRR 19275	[illegible]		
P	REVISED PER TDRR 20111	22 [illegible]		
R	REVISED PER TDRR 21188	22 [illegible]		


E15 REF
9 REF
18 REF
6 REF
DETAIL A
SCALE 4/1
TYP
9
SEE NOTE 3B
3 PLACES
6
4 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
J8
P8
E12
J7
P7
E11
E14
E41
F1
E42
B8
P6
E10
J6
J3
P3
C1
E13
E12
P5
J5
1
2
13 12 9
SEE NOTE 3B
5 PLACES
9 18
SEE NOTE 3C
8 PLACES
9 11
SEE NOTE 3C
2 PLACES
5
8
SEE NOTE 3B
2 PLACES
F1
7
16
C1
4
15
10
SEE NOTE 3A
12 PLACES
B8
3

3

QTY REQ'D	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMLB	18
1	—	2018603-021	MIDDLE AXIS ASSEMBLY	17
2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	2018797	WIRING HARNESS "B" OA.	15
1	1	2018798	WIRING HARNESS "C" OA.	14
6	6	1000223	WASHER, CABLE CLAMP	13
6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	MS15795-303	WASHER, FLAT, METAL, ROUND	11
12	12	1001489-18	SCREW, HEX, SOC HD	10
24	24	1001489-2	SCREW HEX, SOC HD	9
4	4	1001489-1	SCREW, HEX, SOC HD	8
2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
4	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
2	2	2018793	BRACKET, CONNECTOR	5
2	2	1010799	CAPACITOR	4
2	2	2018644	BLOWER	3
1	1	2018761	HOUSING ASSEMBLY OUTER GIMBAL	2
—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1
021	011	LIST OF MATERIALS		

R

2018602

2018601	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN L. MORSE DATE 2-17-65
CHECKED G. QUINN 3-3-65
APPROVAL 9 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL 9 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018602
SCALE 1/1
WT
SHEET 1 OF 1

MASTER

602 REV R SHT 1

F-3

5 4 3 2

REV	
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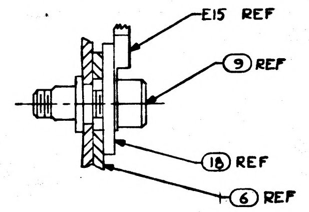
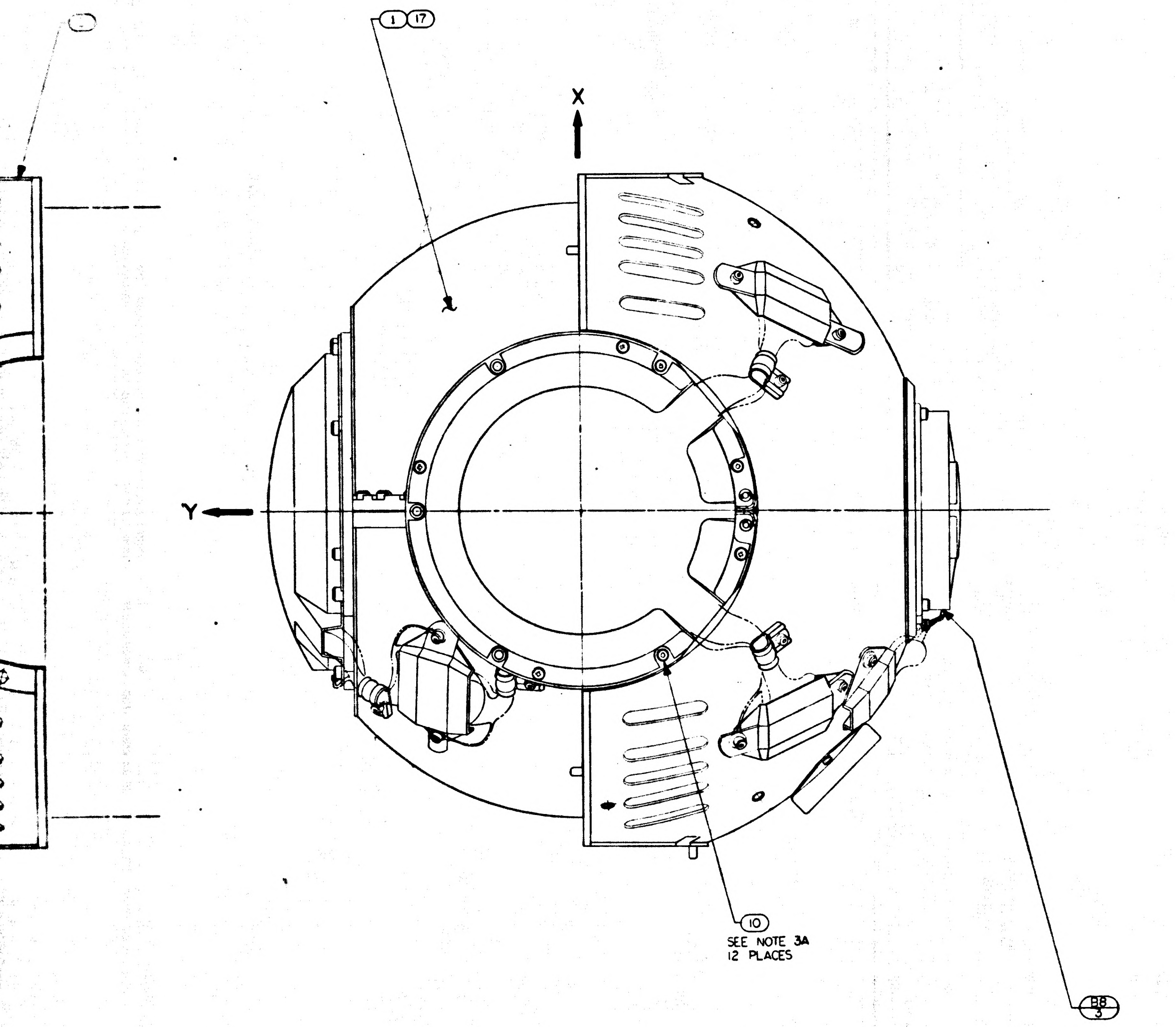
K	REVISE
L	RE
M	REVS
N	REVIS
P	REVI
R	REVISE



E15 REF
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP



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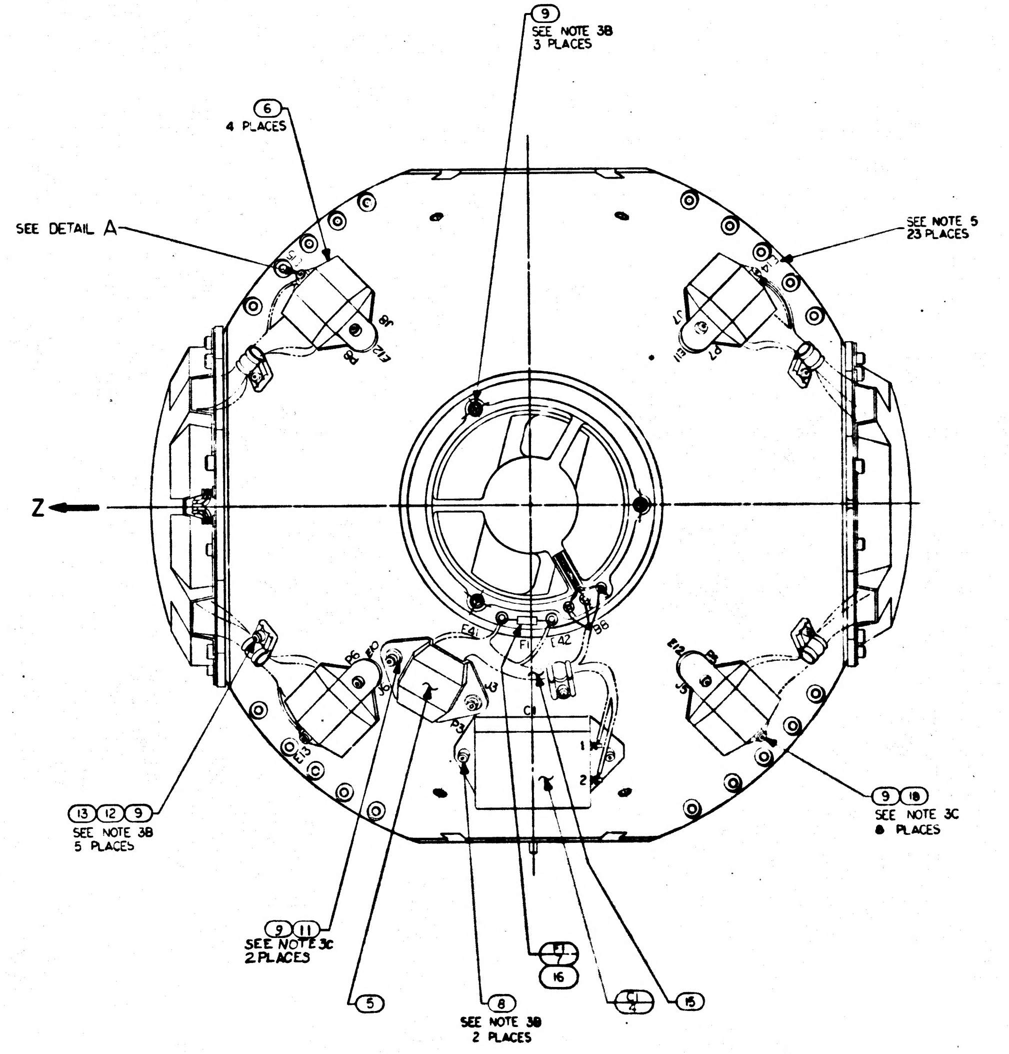
Y
10
SEE NOTE 3A
12 PLACES
B8
3



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SEE NOTE 3B
3 PLACES
6
4 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
13 12 9
SEE NOTE 3B
5 PLACES
9 18
SEE NOTE 3C
8 PLACES
9 11
SEE NOTE 3C
2 PLACES
5
8
SEE NOTE 3B
2 PLACES
E1
7
16
C1
4
15
E13

8	8	2C188 2	WASH
1	—	20 160 -021	MOD
2	2	101 349 0-078	SLEE
1	1	20 179	WIRIN
1	1	20 379	WIR
6	6	100 22	WAS
6	6	100 22 -SEE NOTE 6	CL
4	4	MS 79 -303	WA
12	12	100 48 -18	S
24	24	100 48 -2	S
4	4	100 48 -1	SC
2	2	100 17 -12	F
4	4	201 79	B
2	2	20 79	B
2	2	101C 79	CA
2	2	201 64	B
1	1	20 876	
—	1	20 160 -011	
QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	
-01	-011		LIST OF

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018601	DL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN L. MORSE DATE 2-17-65
CHECKED G. G 3-3-65
APPROVAL
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

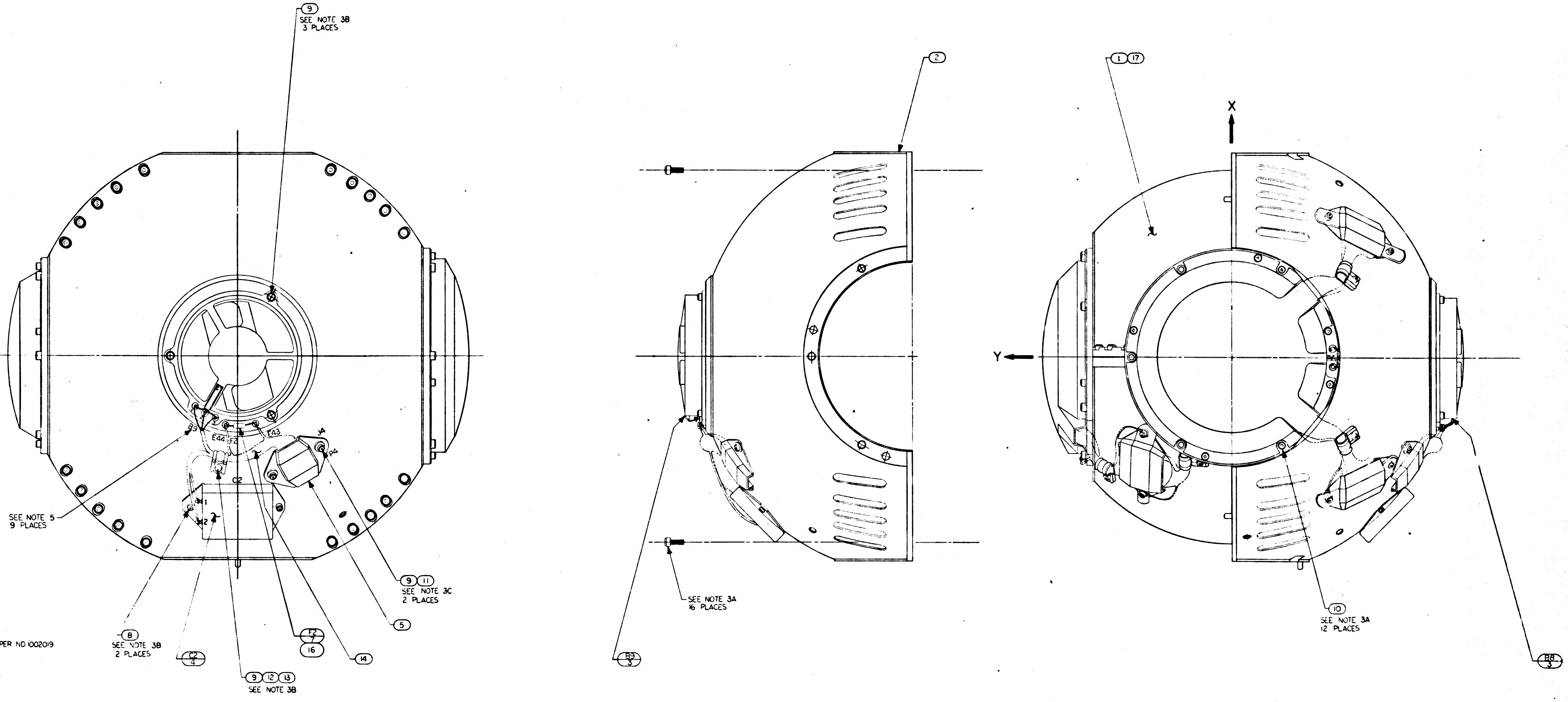
MASTER

5 4 3 2

E-2

2018602

TABLE I	
CABLE CLAMP ⑫	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8


⑨
SEE NOTE 3B
3 PLACES
②
① ⑰
X
Y
B9
E44
F2
E43
J4
P4
C2
1
2
SEE NOTE 5
9 PLACES
⑧
SEE NOTE 3B
2 PLACES
C2/4
⑨ ⑫ ⑬
SEE NOTE 3B
F2/7
⑯
⑭
⑤
⑨ ⑪
SEE NOTE 3C
2 PLACES
SEE NOTE 3A
16 PLACES
B9/3
⑩
SEE NOTE 3A
12 PLACES
B8/3

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
6. ITEM ⑫ TO BE SELECTED FROM TABLE I ASSEMBLY.
   CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

2018602	REV	SHT
	R	1

SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES REV H WITH CHANGES PER TDRR 17157	[illegible]		
K	REVISED PER TDRR 18740	25 May 65		WK
L	REVISED PER TDRR 18909	25 May 65		WK
M	REVISED PER TDRR 19274	25 May 65		WK
N	REVISED PER TDRR 19275	25 May 65		WK
P	REVISED PER TDRR 20111	22 Jul 65		WK
R	REVISED PER TDRR 21188	22 Jul 65		WK
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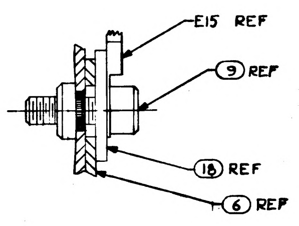
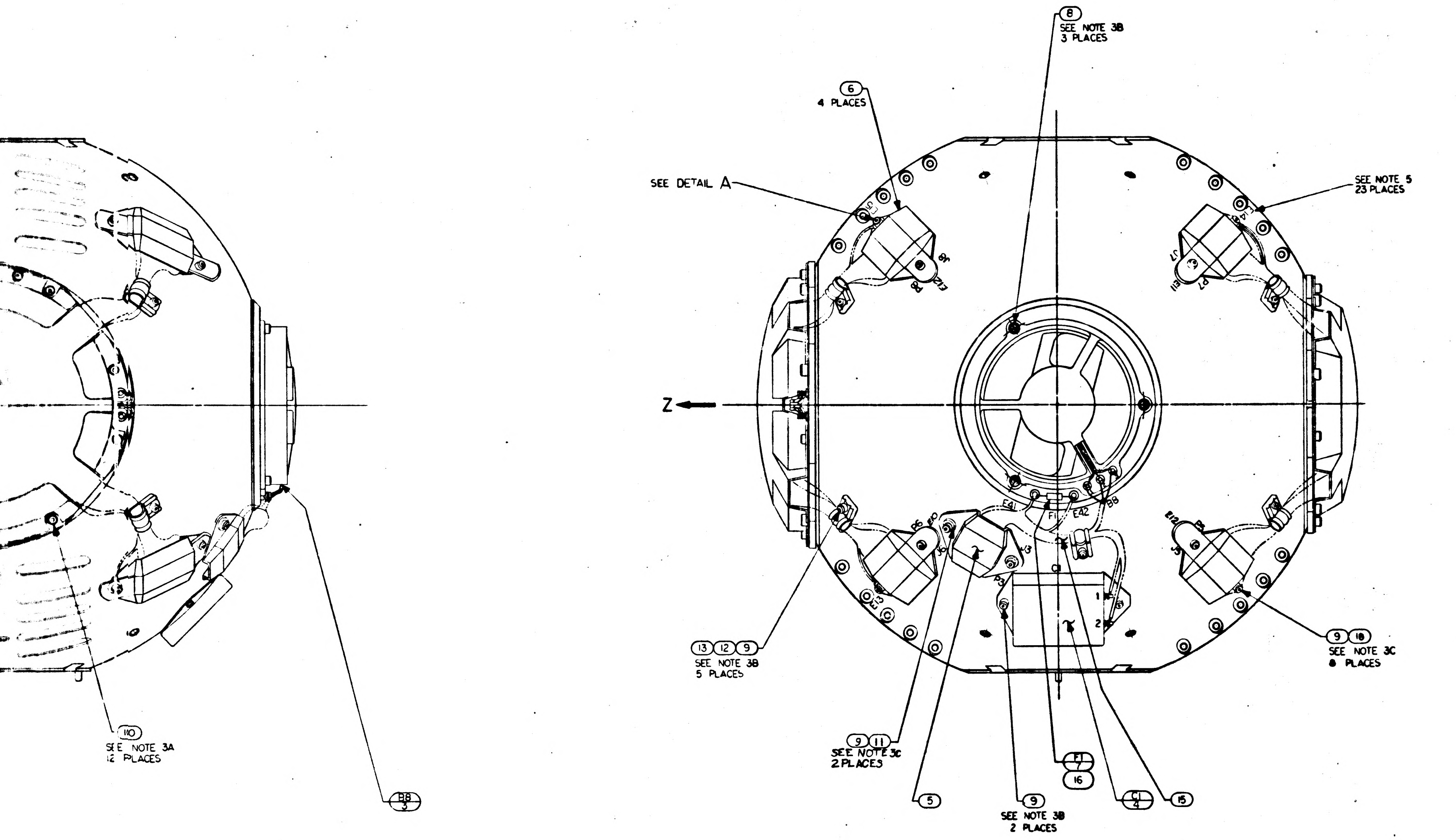

E15 REF
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP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SEE NOTE 3B
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SEE NOTE 5
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13 12 9
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5 PLACES
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SEE NOTE 3C
8 PLACES
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SEE NOTE 3A
12 PLACES
9 11
SEE NOTE 3C
2 PLACES
5
9
SEE NOTE 3B
2 PLACES
F1
7
16
C1
4
15
BB
3

8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMLB	18
1	—	2018603-021	MIDDLE AXIS ASSEMBLY	17
2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	2018797	WIRING HARNESS "B" OA.	15
1	1	2018798	WIRING HARNESS "C" OA.	14
6	6	1000223	WASHER, CABLE CLAMP	13
6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	MS15795-3C3	WASHER, FLAT, METAL, ROUND	11
12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	1001486-1	SCREW HEX, SOC HD	9
6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
4	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
2	2	2018793	BRACKET, CONNECTOR	5
2	2	1010799	CAPACITOR	4
2	2	2018644	BLOWER	3
1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1
QTY REQ'D	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN L. MORSE DATE 2-17-65
CHECKED G. QUINN 3-3-65
APPROVAL
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS ASSEMBLY

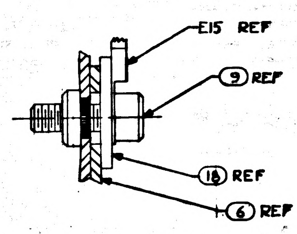
CODE IDENT NO 80230 SIZE J NASA DRAWING NO. 2018602
SCALE 1/1 WT SHEET 1 OF 1

2018602 S

MASTER

37

J	
K	
L	REVISED
M	REVISED
N	REVISED
P	REVISED
R	REVISED
S	REVISED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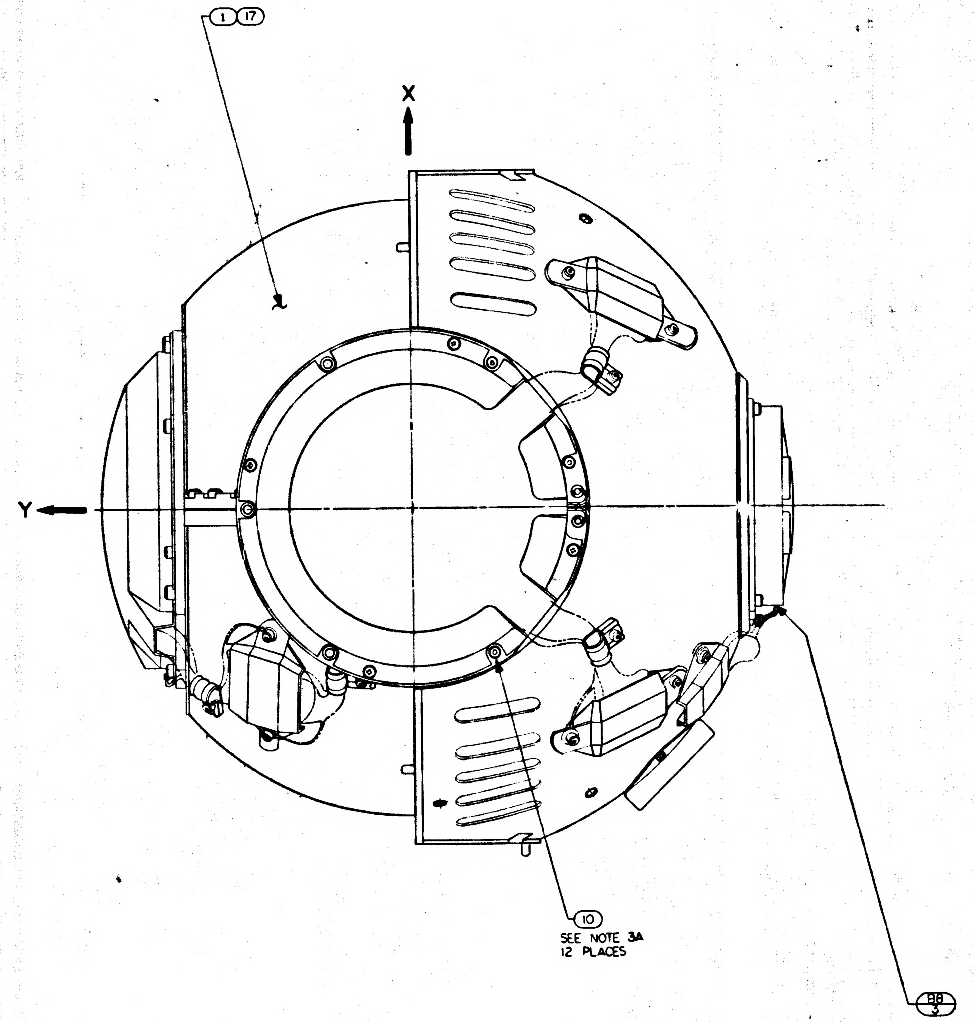
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP


C
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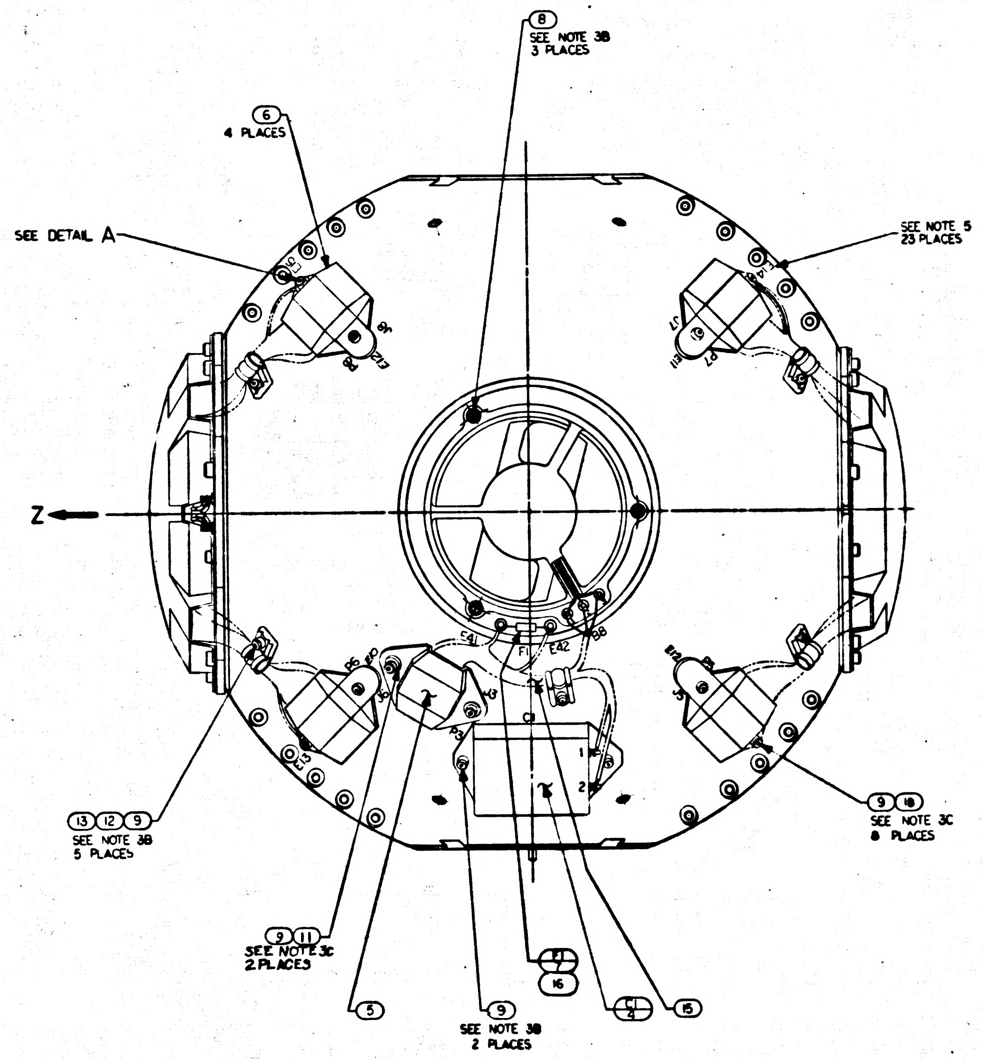
X
Y
10
SEE NOTE 3A
12 PLACES
B8
3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SEE NOTE 3B
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6
4 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
E41
F1
E42
B8
P6
E10
J6
J3
P3
C1
E13
E12
P5
J5
1
2
13 12 9
SEE NOTE 3B
5 PLACES
9 11
SEE NOTE 3C
2 PLACES
5
9
SEE NOTE 3B
2 PLACES
F1
7
16
C1
4
15
9 10
SEE NOTE 3C
8 PLACES

8	8	2018812		WASHER
1	—	2018603-02		MIDDLE
2	2	1010490-07		SLEEVING,
1	1	2018797		WIRING
1	1	2018798		WIRING
6	6	1000223		WASHER,
6	6	1000220-SEE	NOTE 6	CLAMP
4	4	MS15795-303		WASHER
12	12	1001489-18		SCREW
22	22	1001488-1		SCREW
6	6	1001489-2		SCREW
2	2	1000170-12		FUSE
4	4	2018794		BRACKET
2	2	2018793		BRACKET
2	2	1010799		CAPACITOR
2	2	2018644		BLOWER
1	1	2018761		HOUSING
—	1	2018603-011		MIDDLE
QTY REQD	QTY REQD	PART OR IDENTIFYING NO.		
-02	-011			LIST OF

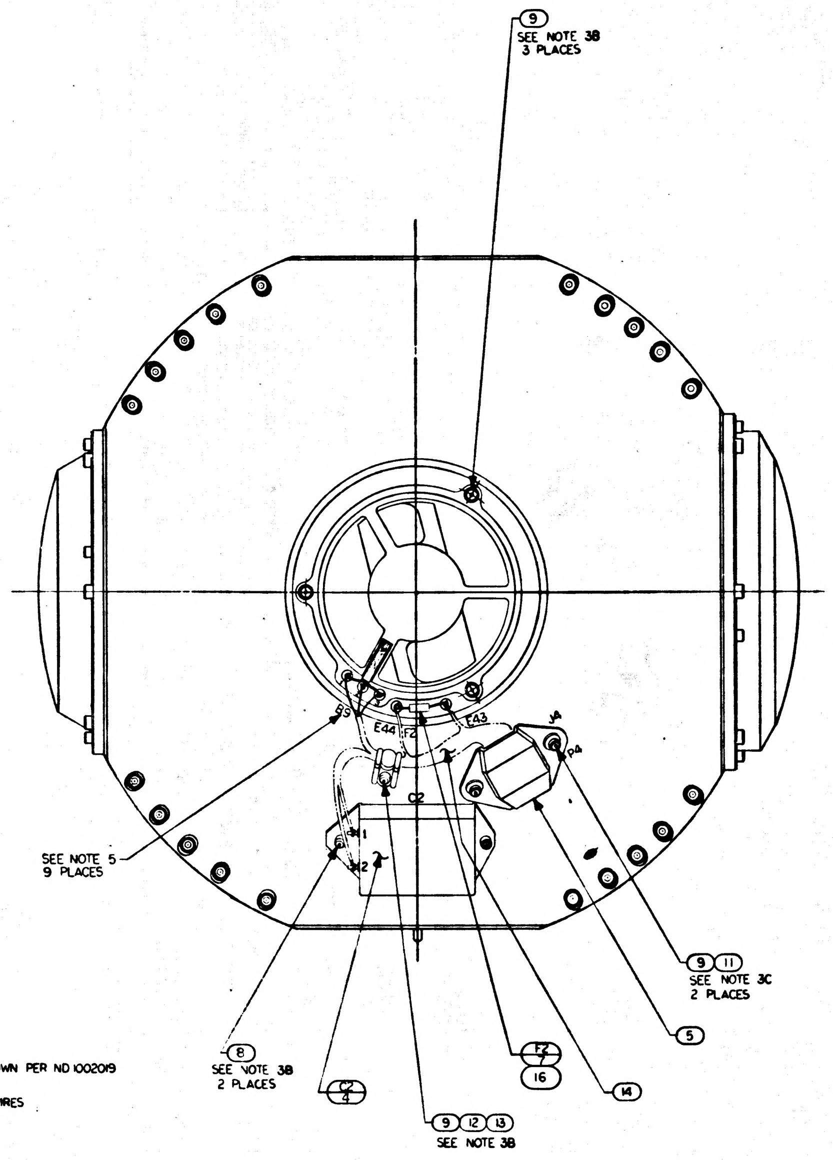
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DRAWN L. MORSE DAT 2-17-65 CHECKED G. Quinn 3-65 APPROVAL 3/65 APPROVAL	
		MATERIAL		
2018601	DL2018601	HEAT TREATMENT	NASA APPROVAL 3-2-65	CODE 80230
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL 3/65	SCALE 1/1
APPLICATION				

MASTER

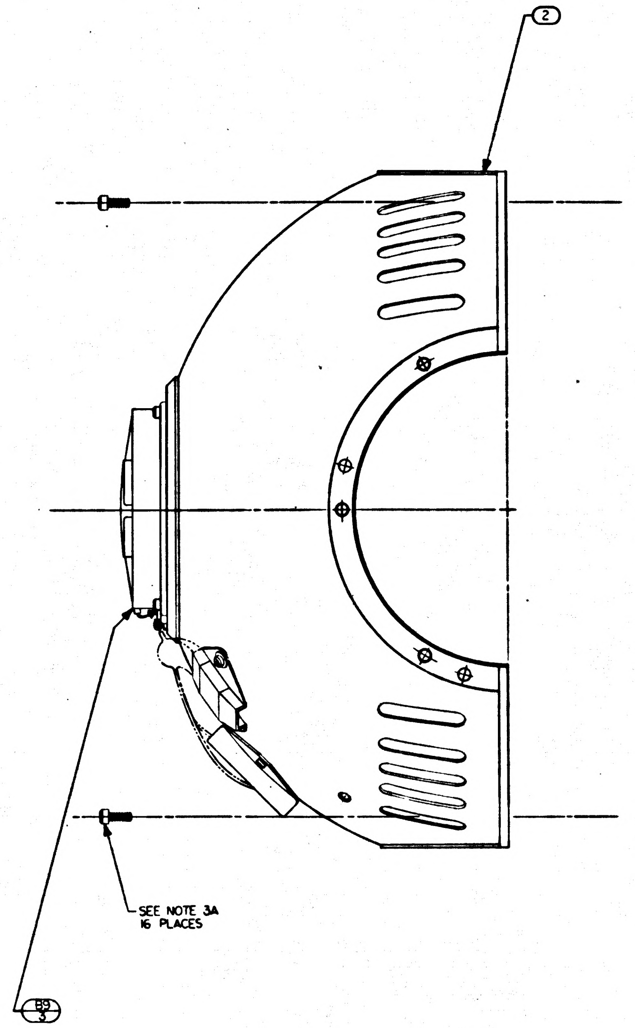
2018602	REV S	SHT 1

F-2

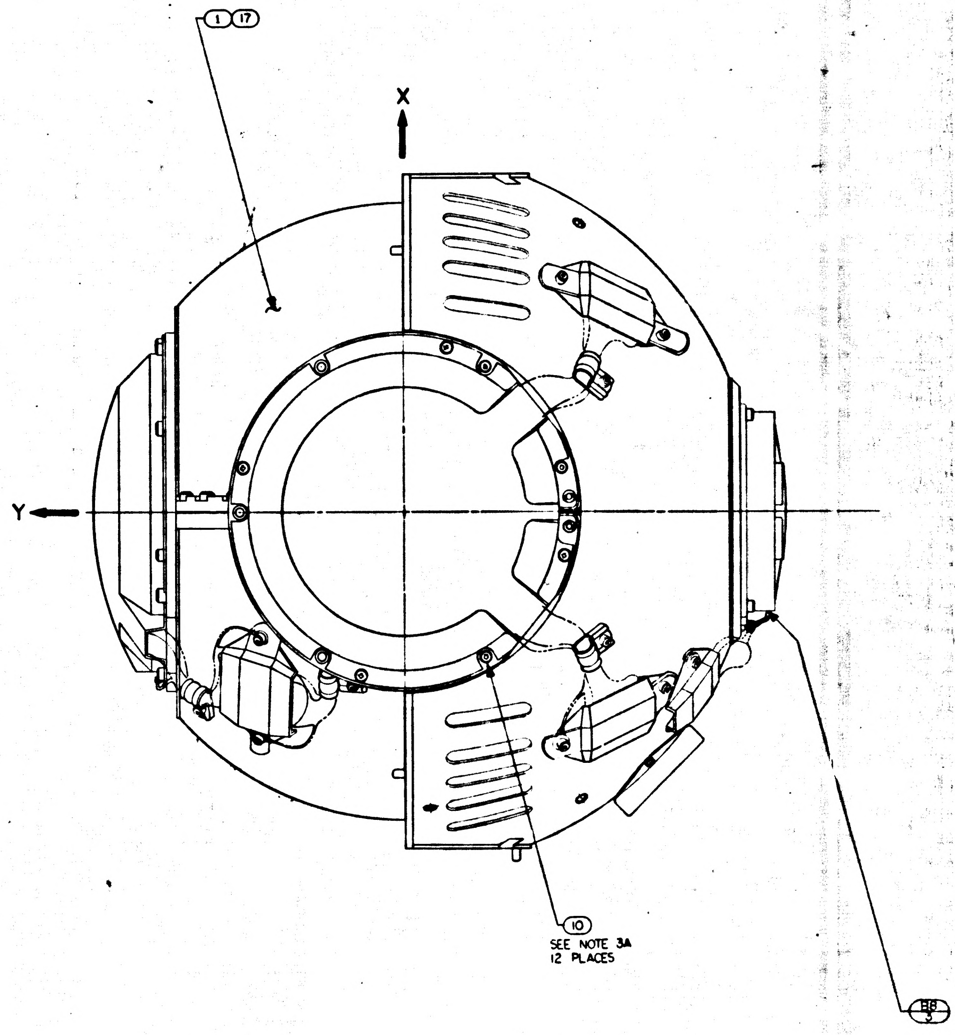
TABLE I	
CABLE CLAMP (12)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8



(9) SEE NOTE 3B 3 PLACES
B9
E44
F2
E43
J4
P4
C2
1
2
SEE NOTE 5 9 PLACES
(8) SEE NOTE 3B 2 PLACES
C2/4
(9)(12)(13) SEE NOTE 3B
F2/7
(16)
(14)
(5)
(9)(11) SEE NOTE 3C 2 PLACES



(2)
SEE NOTE 3A 16 PLACES
B9/3

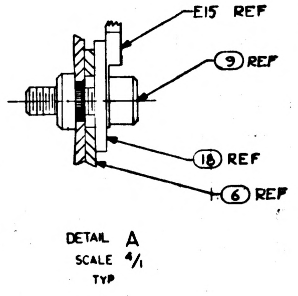


(1)(17)
X
Y
(10) SEE NOTE 3A 12 PLACES
B8/3

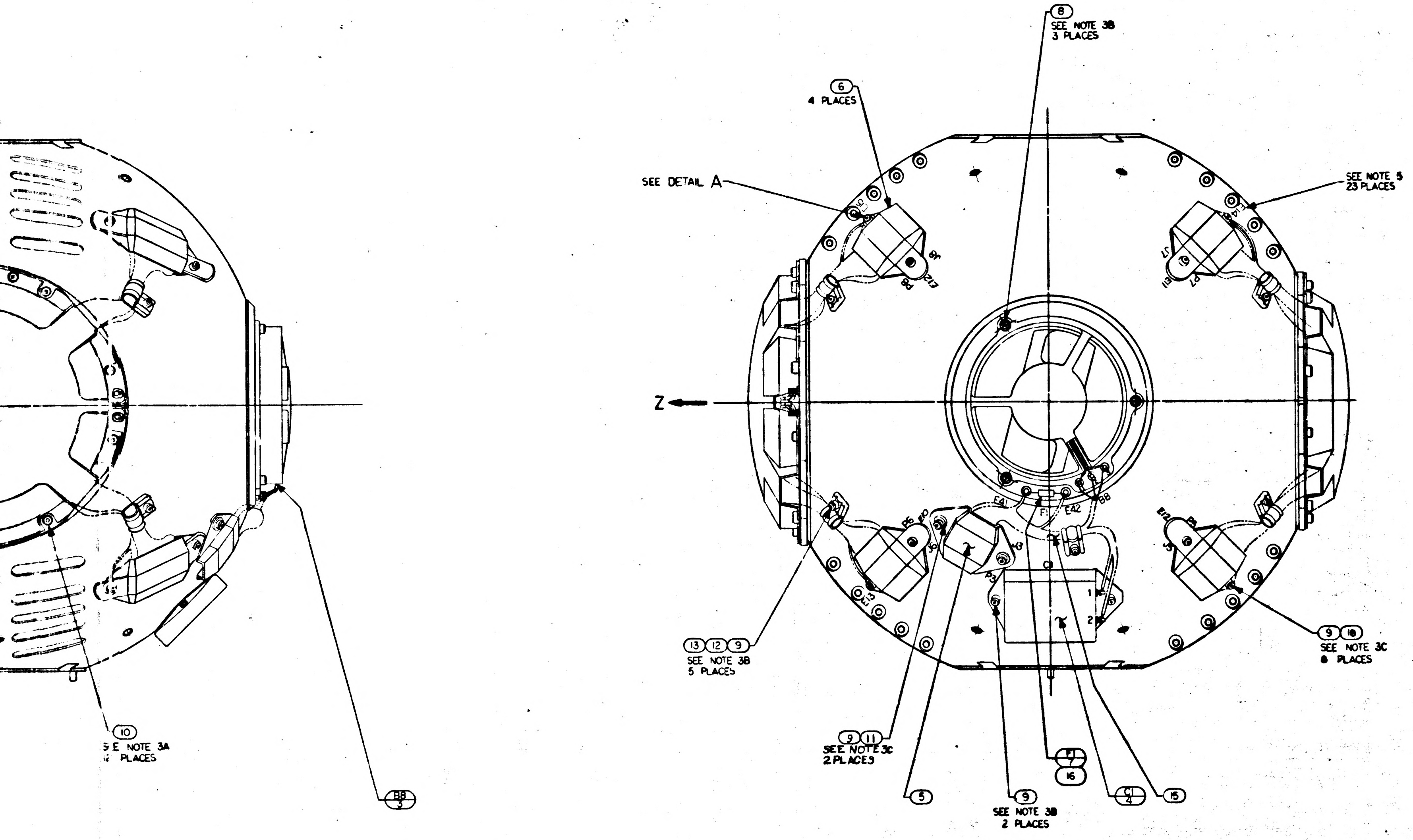
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
6. ITEM (12) TO BE SELECTED FROM TABLE I ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES / H WITH CHANGES J TDRR 17157	[illegible]	[illegible]	[illegible]
K	REVISED PER TDRR 18740	[illegible] May 65	[illegible]	WK
L	REVISED PER TDRR 18909	25 May 65	[illegible]	WK
M	REVISED PER TDRR 19274	25 May 65	[illegible]	WK
N	REVISED PER TDRR 19275	25 May 65	[illegible]	WK
P	REVISED PER TDRR 20111	22 Jul 65	[illegible]	WK
R	REVISED PER TDRR 21108	22 Jul 65	[illegible]	WK
S	REVISED PER TDRR 22594	28 Sep 65	[illegible]	WK
T	REVISED PER TDRR 23344	19 Oct 65	[illegible]	WK


E15 REF
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP


8
SEE NOTE 3B
3 PLACES
6
4 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
E41
E42
F1
13 12 9
SEE NOTE 3B
5 PLACES
9 18
SEE NOTE 3C
8 PLACES
10
SEE NOTE 3A
2 PLACES
9 11
SEE NOTE 3C
2 PLACES
3
9
SEE NOTE 3B
2 PLACES
17
7
16
C1
4
15
BB
3

3H

8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.	18
1	—	2018603-021	MIDDLE AXIS ASSEMBLY	17
2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	2018797	WIRING HARNESS "B" OA.	15
1	1	2018798	WIRING HARNESS "C" OA.	14
6	6	1000223	WASHER, CABLE CLAMP	13
6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	MS15795-303	WASHER, FLAT, METAL, ROUND	11
12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	1001488-1	SCREW HEX, SOC HD SELF-LKG	9
6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
4	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
2	2	2018793	BRACKET, CONNECTOR	5
2	2	1010799	CAPACITOR	4
2	2	2018644	BLOWER	3
1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1
QTY REQ'D	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

2018602 T

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN L. MORSE DATE 2-17-65
CHECKED G. Quinn 3-3-65
APPROVAL
APPROVAL
NASA APPROVAL
3-4-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

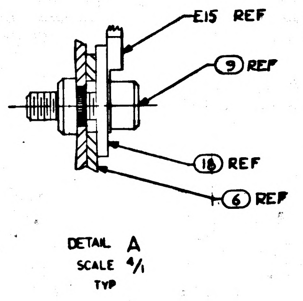
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018602
SCALE 1/1
WT
SHEET 1 OF 1

MASTER

2 | REV T | SHT 1

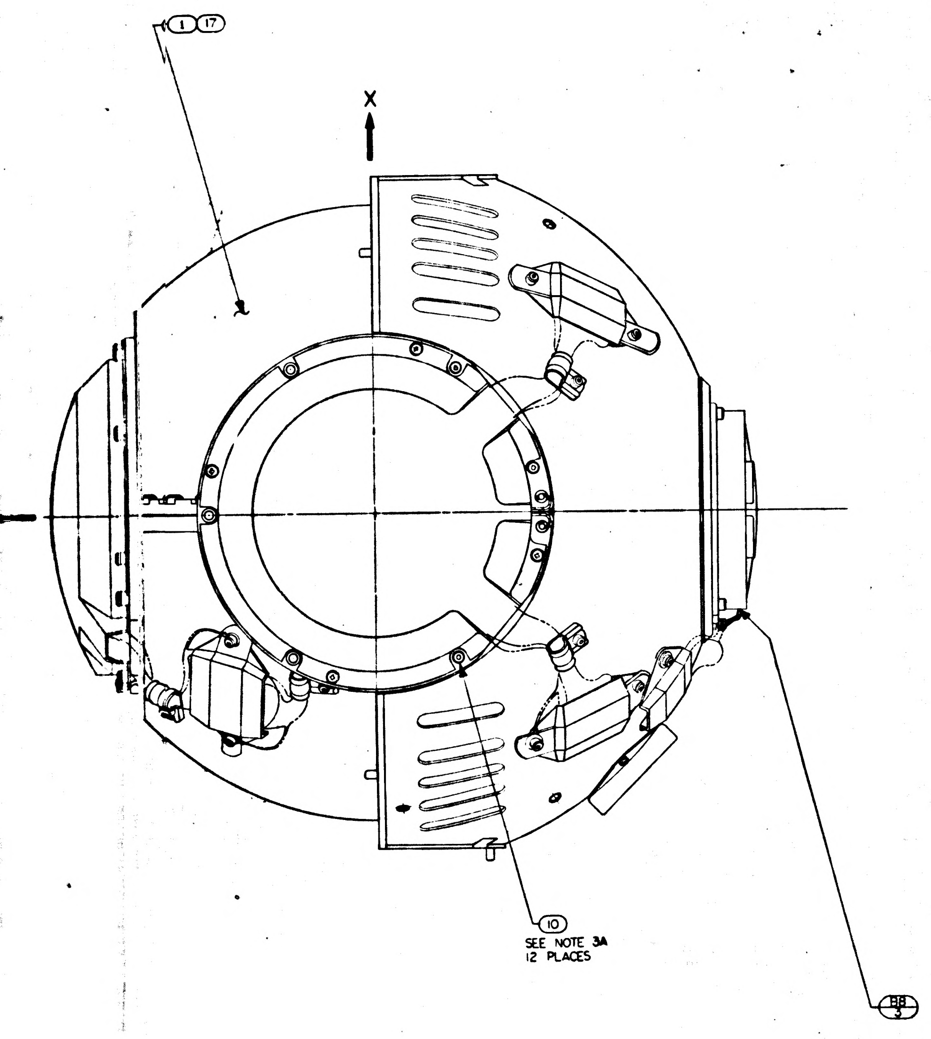
E-3

	DESCRIPTION
J	REPLACES REV H WITH CHANGES PER TDRR 1 157
K	REVISED PER TDRR 1740
L	REVISED PER TDRR 1909
M	REVISED PER TDRR 1274
N	REVISED PER TDRR 9275
P	REVISED PER TDRR 20111
R	REVISED PER TDRR 21182
S	REVISED PER TDRR 22594
T	REVISED PER TDRR 23344

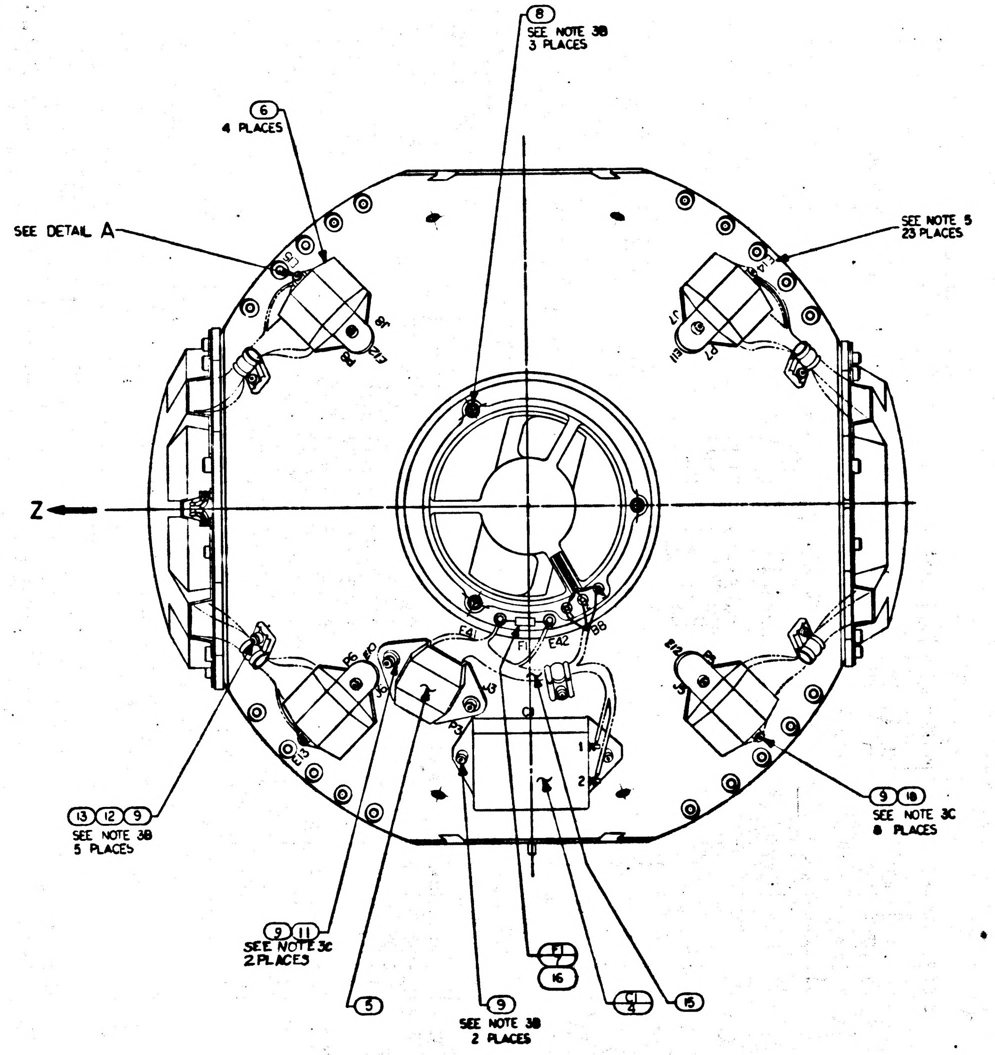


E15 REF
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP



1 17
X
10
SEE NOTE 3A
12 PLACES
B8
3



8
SEE NOTE 3B
3 PLACES
6
4 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
E41
E42
J8
J7
J6
J5
J3
P3
E13
C1
1
2
13 12 9
SEE NOTE 3B
5 PLACES
9 11
SEE NOTE 3C
2 PLACES
5
9
SEE NOTE 3B
2 PLACES
F1
7
16
C1
4
15
9 10
SEE NOTE 3C
8 PLACES

QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.
1	—	2018603-021	MIDDLE AXIS ASSEMBLY
2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK
1	1	2018797	WIRING HARNESS "B" OA.
1	1	2018798	WIRING HARNESS "C" OA.
6	6	1000223	WASHER, CABLE CLAMP
6	6	1000220-SEE NOTE 6	CLAMP, CABLE
4	4	MS15795-303	WASHER, FLAT, METAL, ROUND
12	12	1001489-18	SCREW, HEX, SOC HD
22	22	1001488-1	SCREW HEX, SOC HD SELF-LKG
6	6	1001489-2	SCREW, HEX, SOC HD
2	2	1000170-12	FUSE, PIGTAIL SUBMINIATURE
4	4	2018794	BRACKET CONNECTOR OUTER GIMBAL
2	2	2018793	BRACKET CONNECTOR
2	2	1010799	CAPACITOR
2	2	2018644	BLOWER
1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL
—	1	2018603-011	MIDDLE AXIS ASSEMBLY
021	011	LIST OF MATERIALS	

NEXT ASSY	USED ON
2018601	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
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TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
Cambridge, Mass.

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CHECKED G. Quinn 3-3-65
APPROVAL 3-8-65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

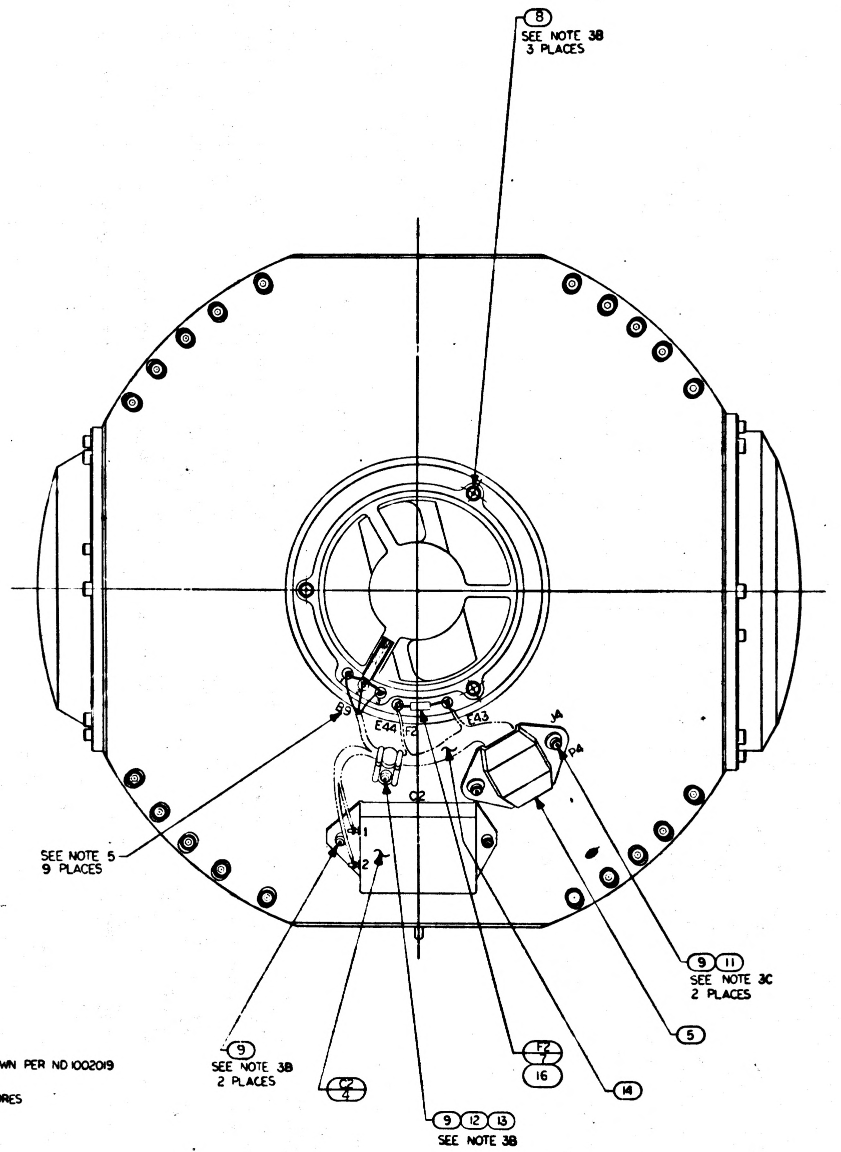
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

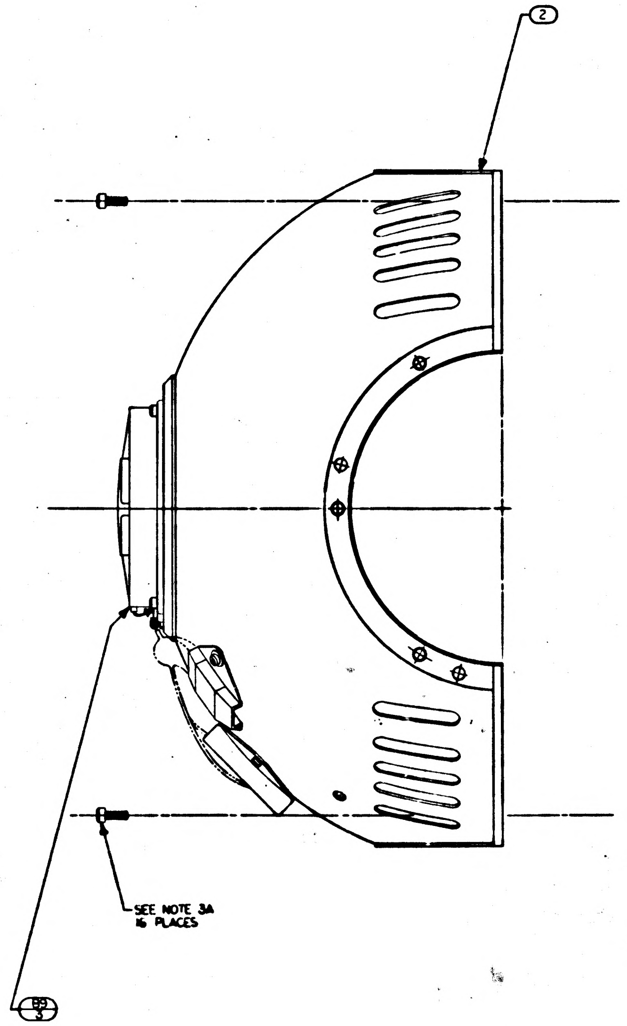
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018602
SCALE 1/1
WT
SHEET

MASTER

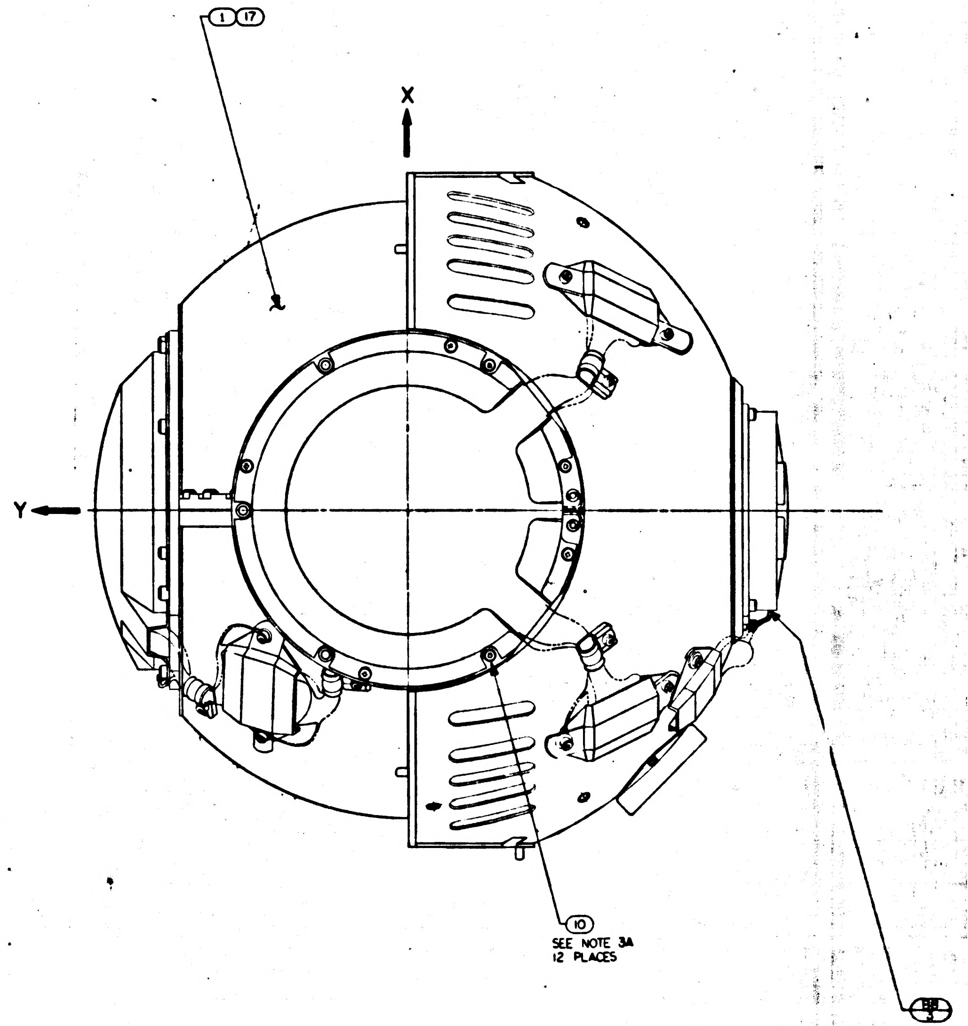
TABLE I	
CABLE CLAMP (12)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8



(8)
SEE NOTE 3B
3 PLACES
B9
E44
F2
E43
J4
P4
C2
1
2
SEE NOTE 5
9 PLACES
(9)
SEE NOTE 3B
2 PLACES
C2/4
(9)(12)(13)
SEE NOTE 3B
F2/7
(16)
(14)
(5)
(9)(11)
SEE NOTE 3C
2 PLACES



(2)
SEE NOTE 3A
16 PLACES
B9/3

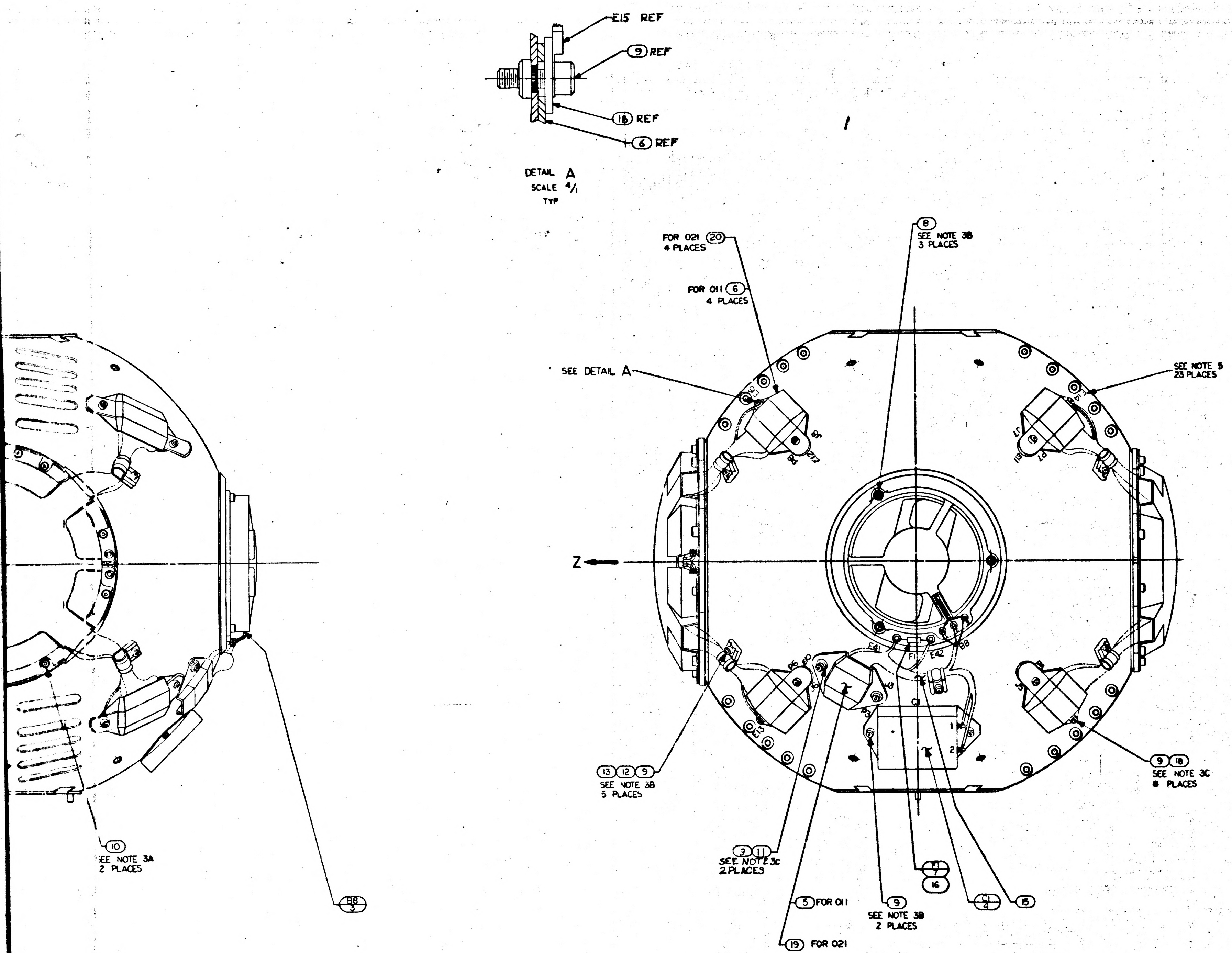


(1)(17)
X
Y
(10)
SEE NOTE 3A
12 PLACES
B8/3

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
6. ITEM (12) TO BE SELECTED FROM TABLE I ASSEMBLY.
   CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES REV H WITH CHANGES PER TDRR 17157			WK
K	REVISED PER TDRR 18740			WK
L	REVISED PER TDRR 18909	25 May 65		WK
M	REVISED PER TDRR 19274	25 May 65		WK
N	REVISED PER TDRR 19275	25 May 65		WK
P	REVISED PER TDRR 20111	22 Jul 65		WK
R	REVISED PER TDRR 21188	22 Jul 65		WK
S	REVISED PER TDRR 22594	28 Sep 65		WK
T	REVISED PER TDRR 23344	19 Oct 65		WK
U	REVISED TDRR 25795	15 Feb 66		WK


E15 REF
9 REF
18 REF
6 REF
DETAIL A
SCALE 4/1
TYP
FOR 021 20
4 PLACES
FOR 011 6
4 PLACES
8
SEE NOTE 3B
3 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
E41
E42
F1
F2
13 12 9
SEE NOTE 3B
5 PLACES
9 18
SEE NOTE 3C
8 PLACES
10
SEE NOTE 3A
2 PLACES
3 11
SEE NOTE 3C
2 PLACES
5 FOR 011
19 FOR 021
9
SEE NOTE 3B
2 PLACES
7
16
4
15
3
B8

QTY REQ'D 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
4	—	2018841	BRACKET, CONN	20
2	—	2018842	BRACKET, CONN	19
8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.	18
1	—	2018603-021	MIDDLE AXIS ASSEMBLY	17
2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	2018797	WIRING HARNESS "B" OA.	15
1	1	2018798	WIRING HARNESS "C" OA.	14
6	6	1000223	WASHER, CABLE CLAMP	13
6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	MS15795-303	WASHER FLAT, METAL, ROUND	11
12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	1001488-1	SCREW HEX, SOC HD SELF-LKG	9
6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
–	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
–	2	2018793	BRACKET, CONNECTOR	5
2	2	1010799	CAPACITOR	4
2	2	2018644	BLOWER	3
1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1

LIST OF MATERIALS

U
2018602

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
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MATERIAL
HEAT TREATMENT
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DRAWN L. MORSE DATE 2-17-65
CHECKED G. Quinn 3-3-65
APPROVAL 9 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL W Kupfer 9 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018602
SCALE 1/1
WT
SHEET 1 OF 1

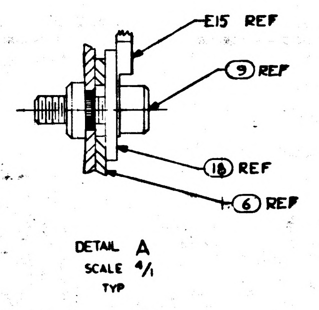
MASTER

F3

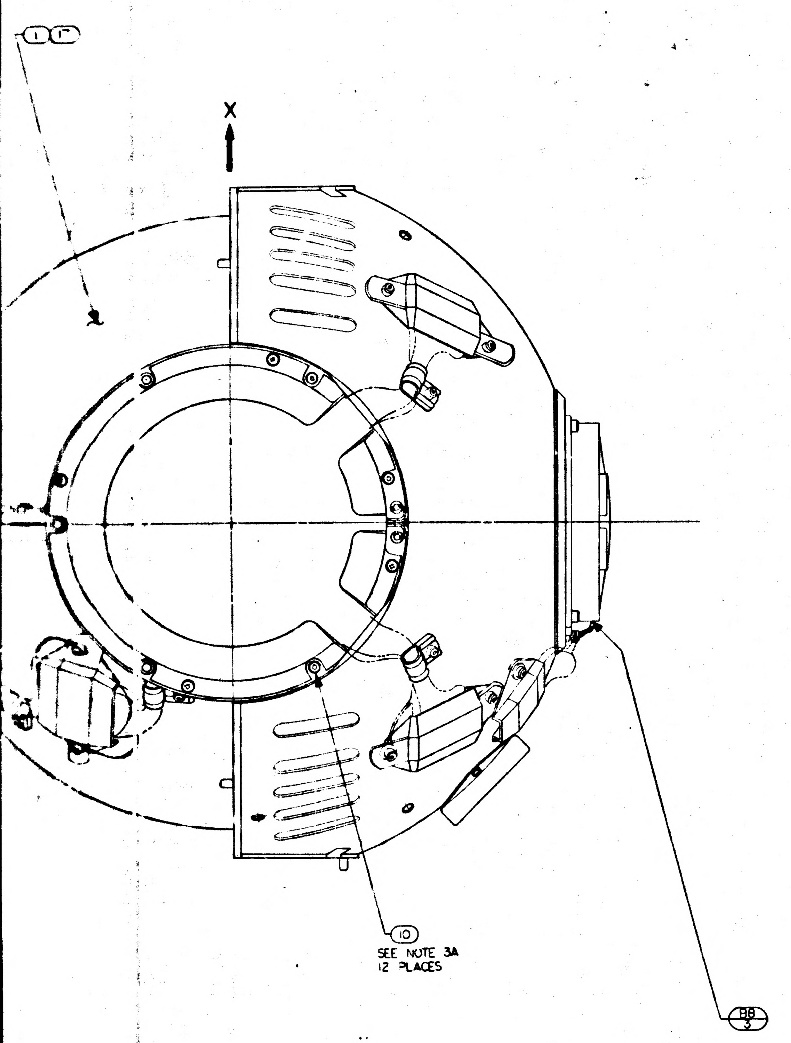
2018602 REV U SHT 1

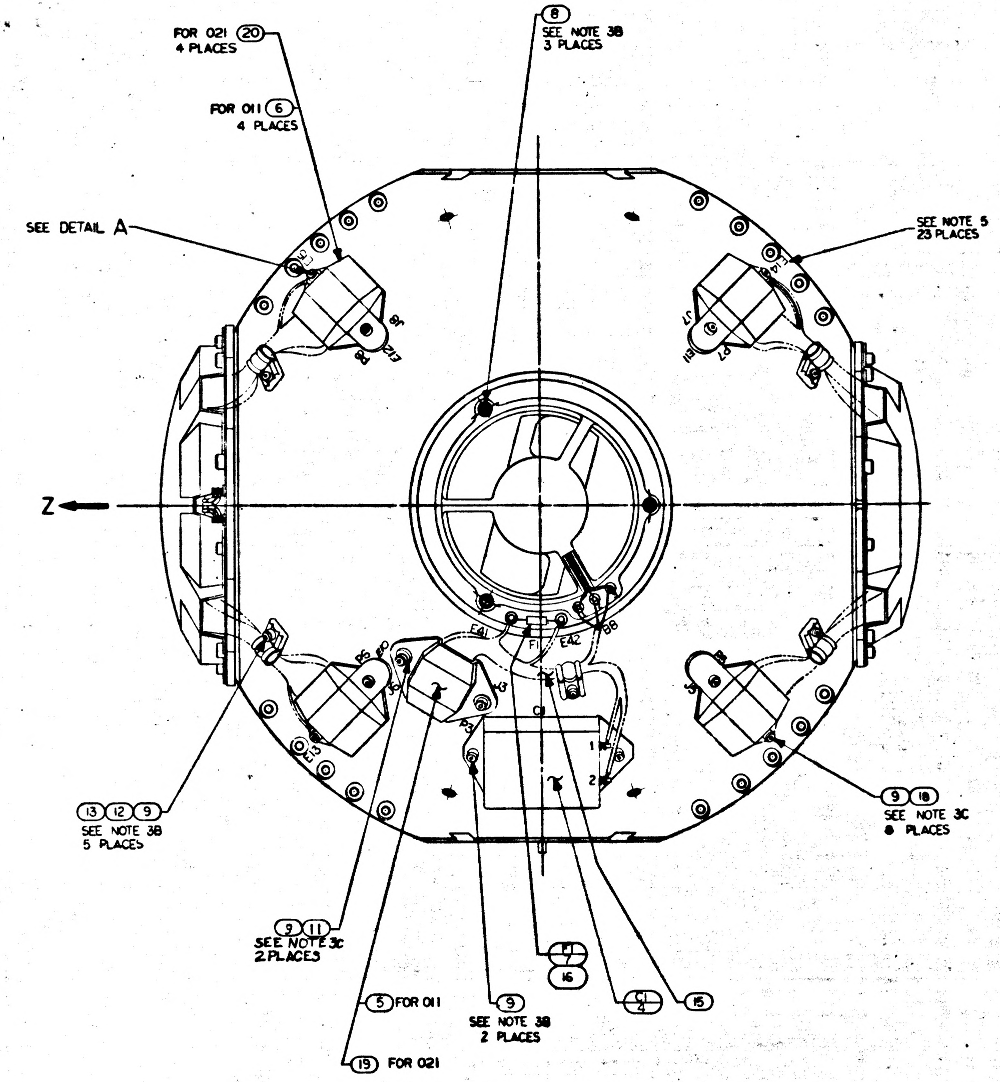
3H

SYM	DESCRIPTION	DATE		APPROVAL
J	REPLACES REV H WITH CHANGES PER TDRR 17157			
K	REVISED PER TDRR 18780	25 May 65		
L	REVISED PER TDRR 18909	26 May 65		
M	REVISED PER TDRR 19274	25 May 65		
N	REVISED PER TDRR 19275	26 May 65		
P	REVISED PER TDRR 20111	22		
R	REVISED PER TDRR 21108	22		
S	REVISED PER TDRR 22594	28 Sep 65		
T	REVISED PER TDRR 23344	19 Oct 65		
U	REVISED TDRR 25795	15		


E15 REF
⑨ REF
⑱ REF
⑥ REF

DETAIL A
SCALE 4/1
TYP


① ①
X
⑩ SEE NOTE 3A 12 PLACES
B8/3


FOR 021 ⑳ 4 PLACES
FOR 011 ⑥ 4 PLACES
SEE DETAIL A
⑧ SEE NOTE 3B 3 PLACES
SEE NOTE 5 23 PLACES
Z
⑬ ⑫ ⑨ SEE NOTE 3B 5 PLACES
⑨ ⑪ SEE NOTE 3C 2 PLACES
⑤ FOR 011
⑲ FOR 021
⑨ SEE NOTE 3B 2 PLACES
F1/7
⑯
C1/4
⑮
⑨ ⑱ SEE NOTE 3C 8 PLACES

QTY REQ'D 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
4	—	2018841	BRACKET, CONN	20
2	—	2018842	BRACKET, CONN	19
8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.	18
1	—	2018603-021	MIDDLE AXIS ASSEMBLY	17
2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	2018797	WIRING HARNESS "B" OA	15
1	1	2018798	WIRING HARNESS "C" OA	14
6	6	1000223	WASHER, CABLE CLAMP	13
6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	MS15795-303	WASHER, FLAT, METAL, ROUND	11
12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	1001488-1	SCREW HEX, SOC HD SELF-LKG	9
6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
–	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
–	2	2018793	BRACKET CONNECTOR	5
2	2	1010799	CAPACITOR	4
2	2	2018644	BLOWER	3
1	1	2018761	HOUSING ASSEMBLY OUTER GIMBAL	2
—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1

LIST OF MATERIALS

2018601	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
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HEAT TREATMENT
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DRAWN L. MORSE DATE 2-17-65
CHECKED G. Quinn 3-3-65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL W.J. Rhine 3-2-65
MIT APPROVAL 9 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

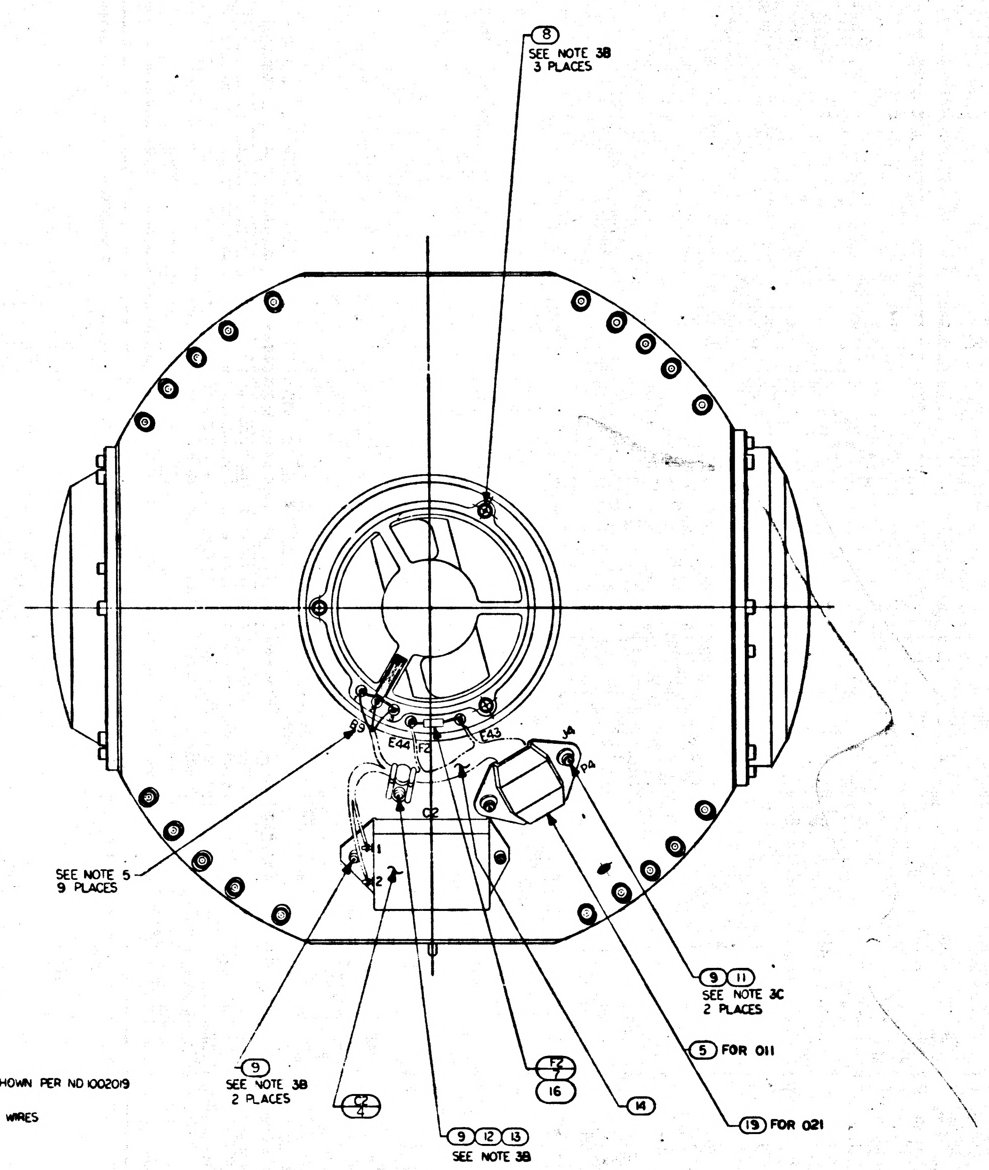
CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 2018602
SCALE 1/1
WT
SHEET 1 OF 1

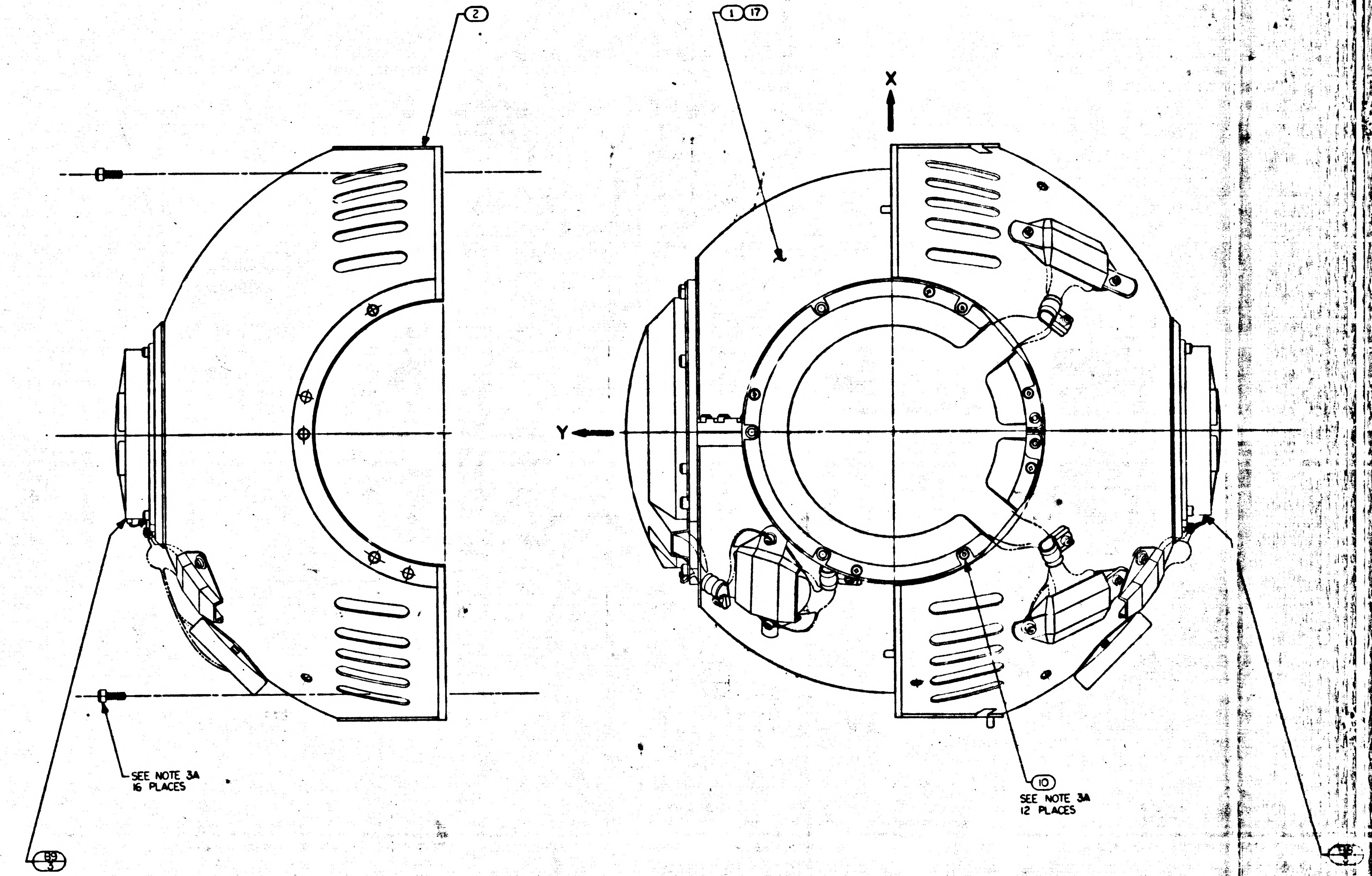
F-2

MASTER

SO18605

TABLE I	
CABLE CLAMP ⑫	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8


⑧
SEE NOTE 3B
3 PLACES
B9
E44
F2
E43
J4
P4
C2
1
2
SEE NOTE 5
9 PLACES
⑨ ⑪
SEE NOTE 3C
2 PLACES
⑤ FOR 011
⑨
SEE NOTE 3B
2 PLACES
C2/4
F2/7
⑯
⑭
⑨ ⑫ ⑬
SEE NOTE 3B
⑲ FOR 021


②
① ⑰
X
Y
SEE NOTE 3A
16 PLACES
B9/3
⑩
SEE NOTE 3A
12 PLACES

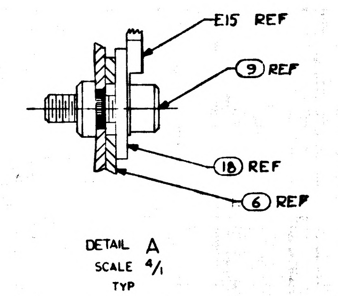
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 10.0 IN-LB
   B. 5.0 IN-LB
   C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS $^{.10}_{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
6. ITEM ⑫ TO BE SELECTED FROM TABLE I ASSEMBLY.
   CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

3H

2018602	REV	SHT
	U	1

SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES REV H WITH CHANGES PER TDRR 17157			WK
K	REVISED PER TDRR 18740	May 65		WK
L	REVISED PER TDRR 18909	May 65		WK
M	REVISED PER TDRR 19274	25 May 65		WK
N	REVISED PER TDRR 19275	25 May 65		WK
P	REVISED PER TDRR 20111	22		WK
R	REVISED PER TDRR 21188	22		WK
S	REVISED PER TDRR 22594	28 Sep 65		WK
T	REVISED PER TDRR 23344	19 Oct 65		WK
U	REVISED TDRR 25795	15 Feb 66		WK
V	REVISED PER TDRR 27508	3 Mar 66		WK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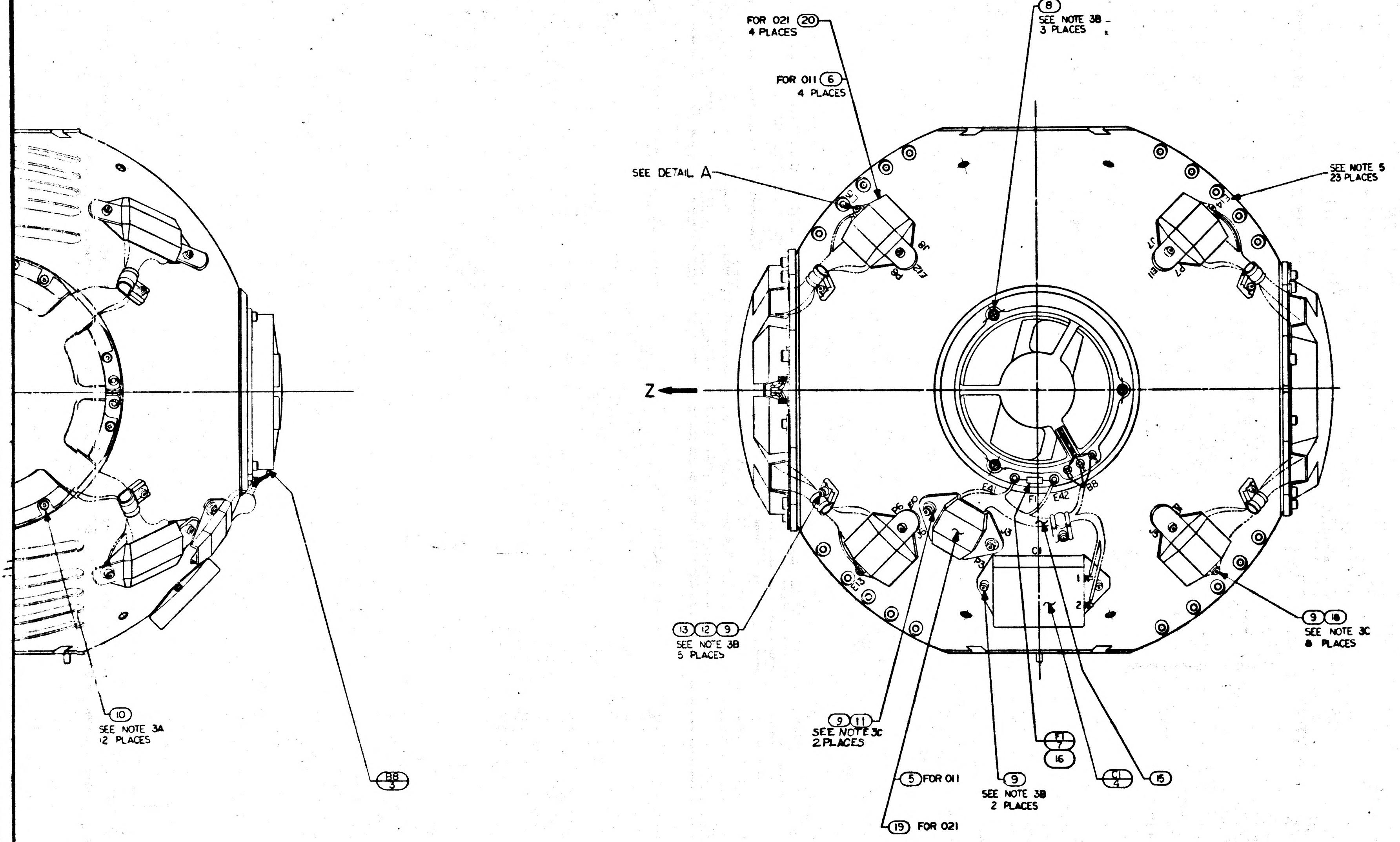
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP


FOR 021 20 4 PLACES
FOR 011 6 4 PLACES
8 SEE NOTE 3B 3 PLACES
SEE DETAIL A
SEE NOTE 5 23 PLACES
Z
J8
P8
E12
J7
P7
E11
E14
E41
E42
F1
B8
P6
E10
J6
J3
P3
C1
E13
J5
P5
1
2
13 12 9 SEE NOTE 3B 5 PLACES
9 18 SEE NOTE 3C 8 PLACES
9 11 SEE NOTE 3C 2 PLACES
5 FOR 011
19 FOR 021
9 SEE NOTE 3B 2 PLACES
F1 7 16
C1 4
15
10 SEE NOTE 3A 12 PLACES
B8 3

QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
4	—	2018841	BRACKET, CONN	20
2	—	2018842	BRACKET, CONN	19
8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.	18
1	—	2018603-021	MIDDLE AXIS ASSEMBLY	17
2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	2018797	WIRING HARNESS "B" OA.	15
1	1	2018798	WIRING HARNESS "C" OA.	14
6	6	1000223	WASHER, CABLE CLAMP	13
6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	MS15795-803	WASHER, FLAT, METAL, ROUND	11
12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	1001488-1	SCREW HEX, SOC HD SELF-LKG	9
6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
—	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
—	2	2018793	BRACKET, CONNECTOR	5
2	2	1010799	CAPACITOR	4
2	2	2018644	BLOWER	3
1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1

LIST OF MATERIALS

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
NEXT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN L. MORSE DATE 2-17-65
CHECKED G. Quinn 3-3-65
APPROVAL 9 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL WKafka 9 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018602
SCALE 1/1 WT SHEET 1 OF 1

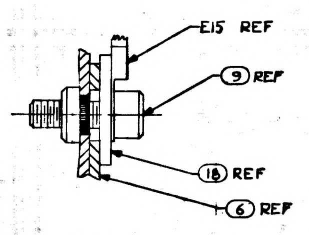
2018602 V

MASTER

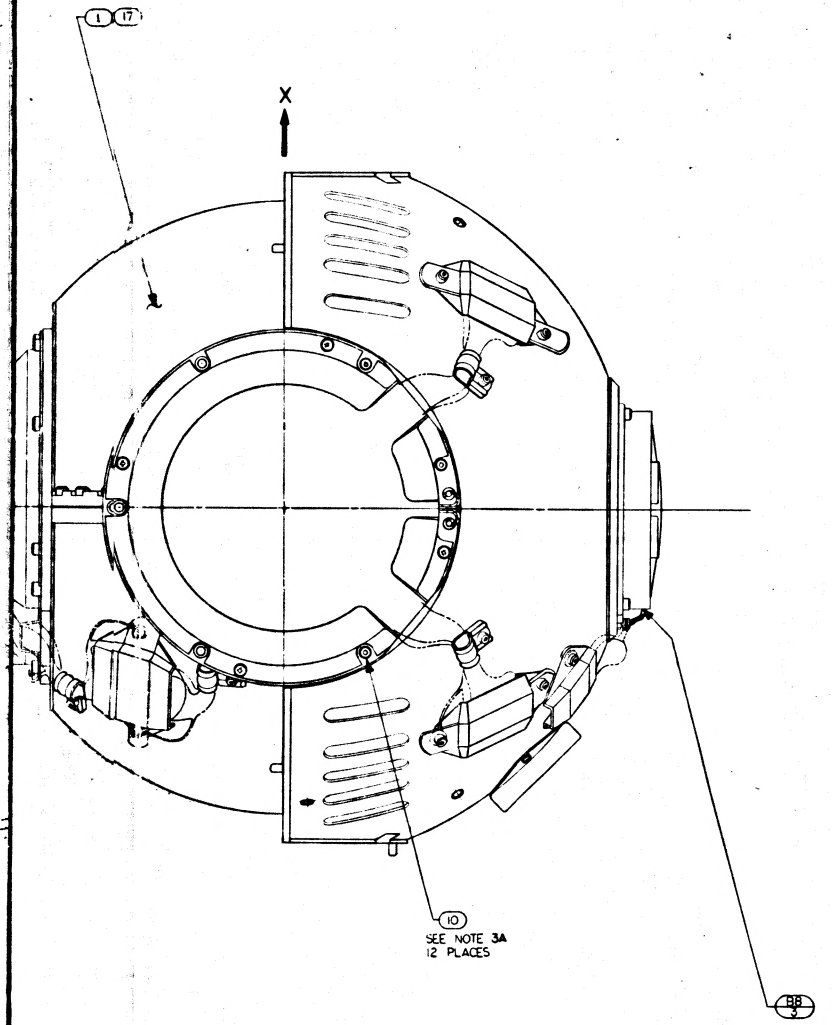
3H

2018602 REV V SHT 1

SYM	DESCRIPTION	DATE	APPROVED
J	REPLACES REV H WITH CHANGES PER TDRR 17157	[illegible]	[illegible]
K	REVISED PER TDRR 18740	May 65	[illegible]
L	REVISED PER TDRR 18909	May 65	[illegible]
M	REVISED PER TDRR 19274	May 65	[illegible]
N	REVISED PER TDRR 19275	May 65	[illegible]
P	REVISED PER TDRR 20111	[illegible]	[illegible]
R	REVISED PER TDRR 21188	[illegible]	[illegible]
S	REVISED PER TDRR 22594	Sep 65	[illegible]
T	REVISED PER TDRR 23344	[illegible]	[illegible]
U	REVISED TDRR 25795	[illegible]	[illegible]
V	REVISED PER TDRR 27808	[illegible]	[illegible]


E15 REF
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP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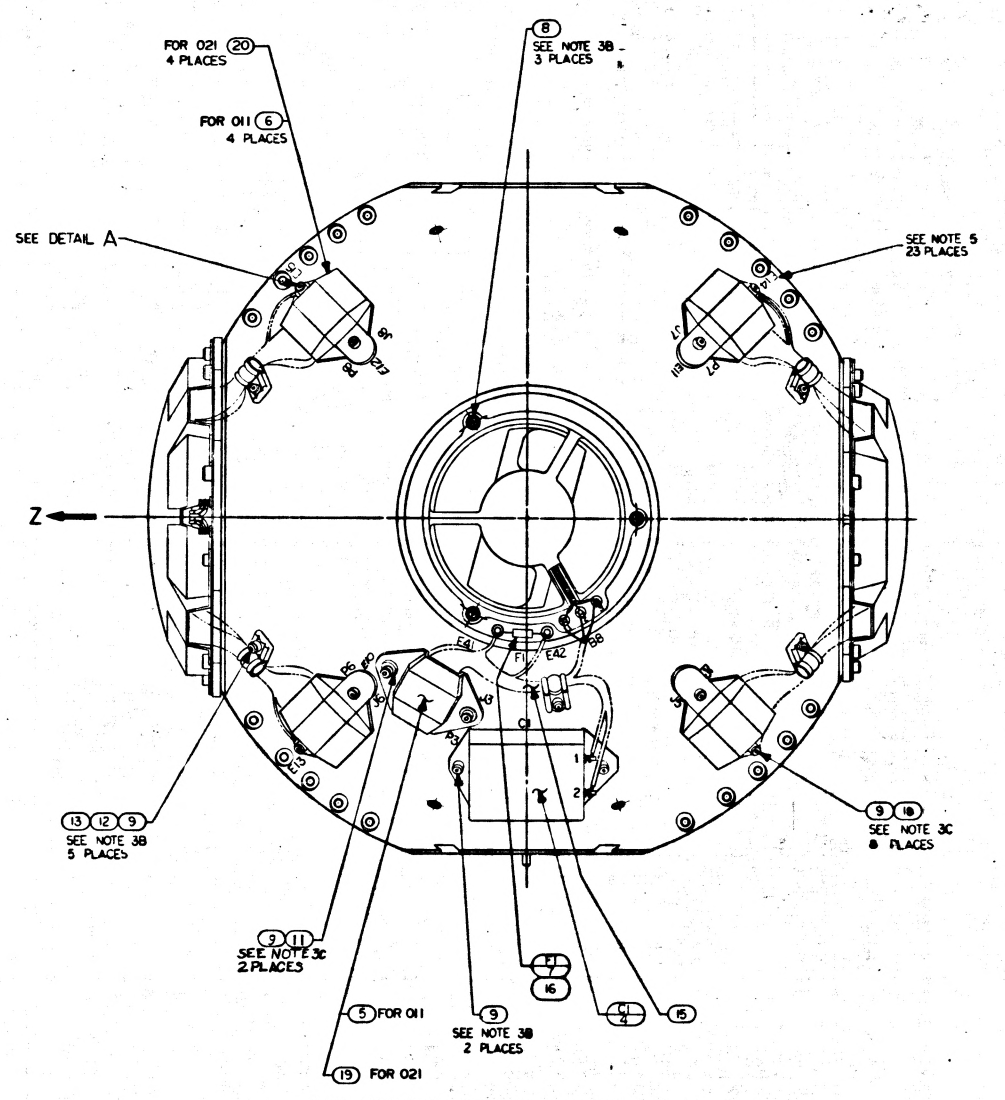
SEE NOTE 3A
12 PLACES
88
3


FOR 021 20
4 PLACES
FOR 011 6
4 PLACES
8
SEE NOTE 3B
3 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
J8
P8
E12
J7
P7
E11
E42
F1
J6
J5
P3
C1
E13
1
2
13 12 9
SEE NOTE 3B
5 PLACES
9 18
SEE NOTE 3C
8 PLACES
9 11
SEE NOTE 3C
2 PLACES
F1
7
16
5 FOR 011
9
SEE NOTE 3B
2 PLACES
C1
4
15
19 FOR 021

021 QTY REQ'D	011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
4	—	2018841	BRACKET, CONN	20
2	—	2018842	BRACKET, CONN	19
8	8	2018812	WASHER BRACKET, CONN M.G & O.G.	18
1	--	2018603-021	MIDDLE AXIS ASSEMBLY	17
2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	2018797	WIRING HARNESS "B" OA.	15
1	1	2018798	WIRING HARNESS "C" OA.	14
6	6	1000223	WASHER, CABLE CLAMP	13
6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	MS15795-803	WASHER, FLAT, METAL, ROUND	11
12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	1001488-1	SCREW HEX, SOC HD SELF-LKG	9
6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
-	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
-	2	2018793	BRACKET CONNECTOR	5
2	2	1010799	CAPACITOR	4
2	2	2018644	BLOWER	3
1	1	2018761	HOUSING ASSEMBLY OUTER GIMBAL	2
—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1

LIST OF MATERIALS

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN L. MORSE DATE 2-17-65
CHECKED G. QUINN 3-3-65
APPROVAL
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

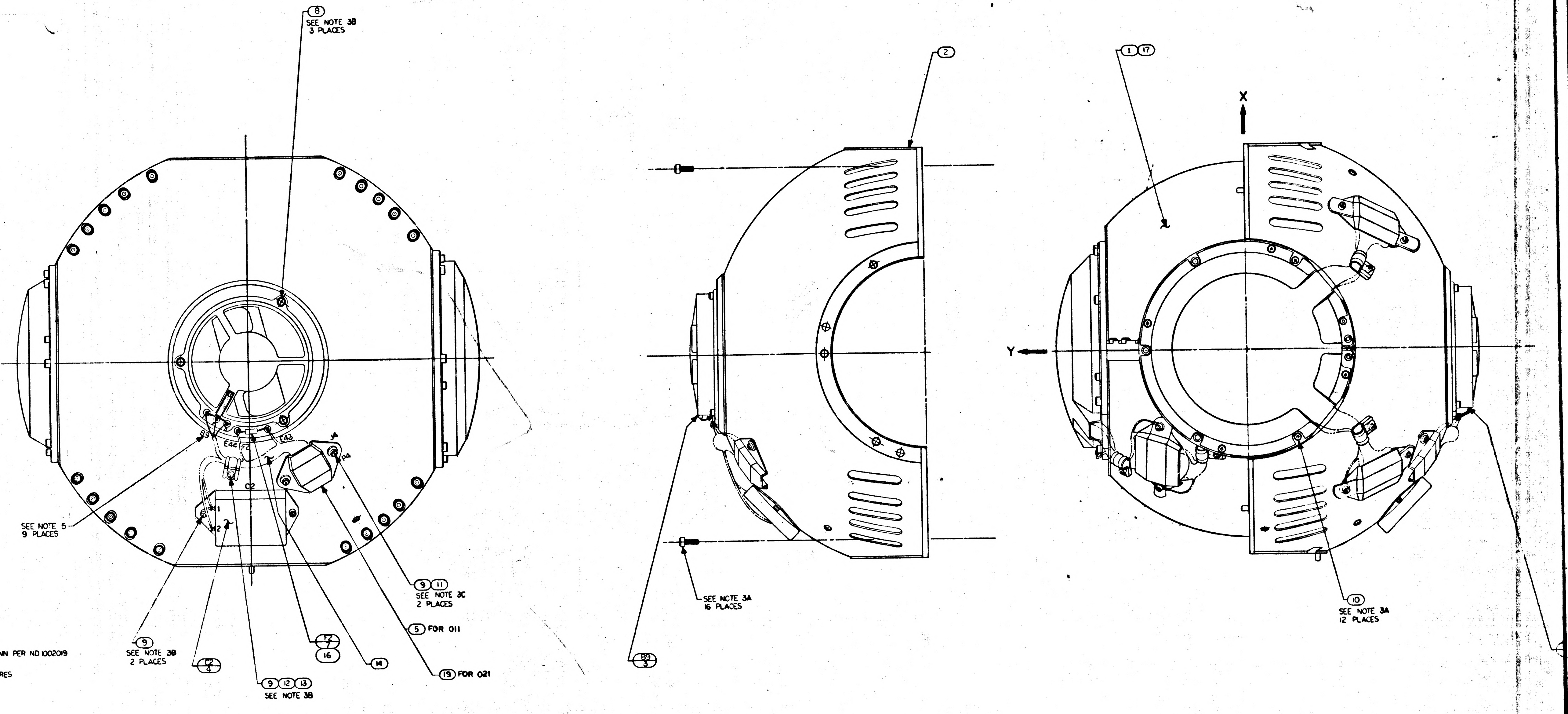
CODE IDENT NO. 80230
SIZE J
NASA DWG NO. 2018602
SCALE 1/1
WT
SHEET 1 OF 1

2018602 V

2018602 REV V SHT 1

MASTER

TABLE I	
CABLE CLAMP (12)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8


8
SEE NOTE 3B
3 PLACES
2
1
17
X
Y
SEE NOTE 5
9 PLACES
B9
E44
F2
E43
J4
P4
C2
1
2
9
11
SEE NOTE 3C
2 PLACES
5 FOR 011
19 FOR 021
14
F2
7
16
9
12
13
SEE NOTE 3B
C2
4
9
SEE NOTE 3B
2 PLACES
B9
3
SEE NOTE 3A
16 PLACES
10
SEE NOTE 3A
12 PLACES

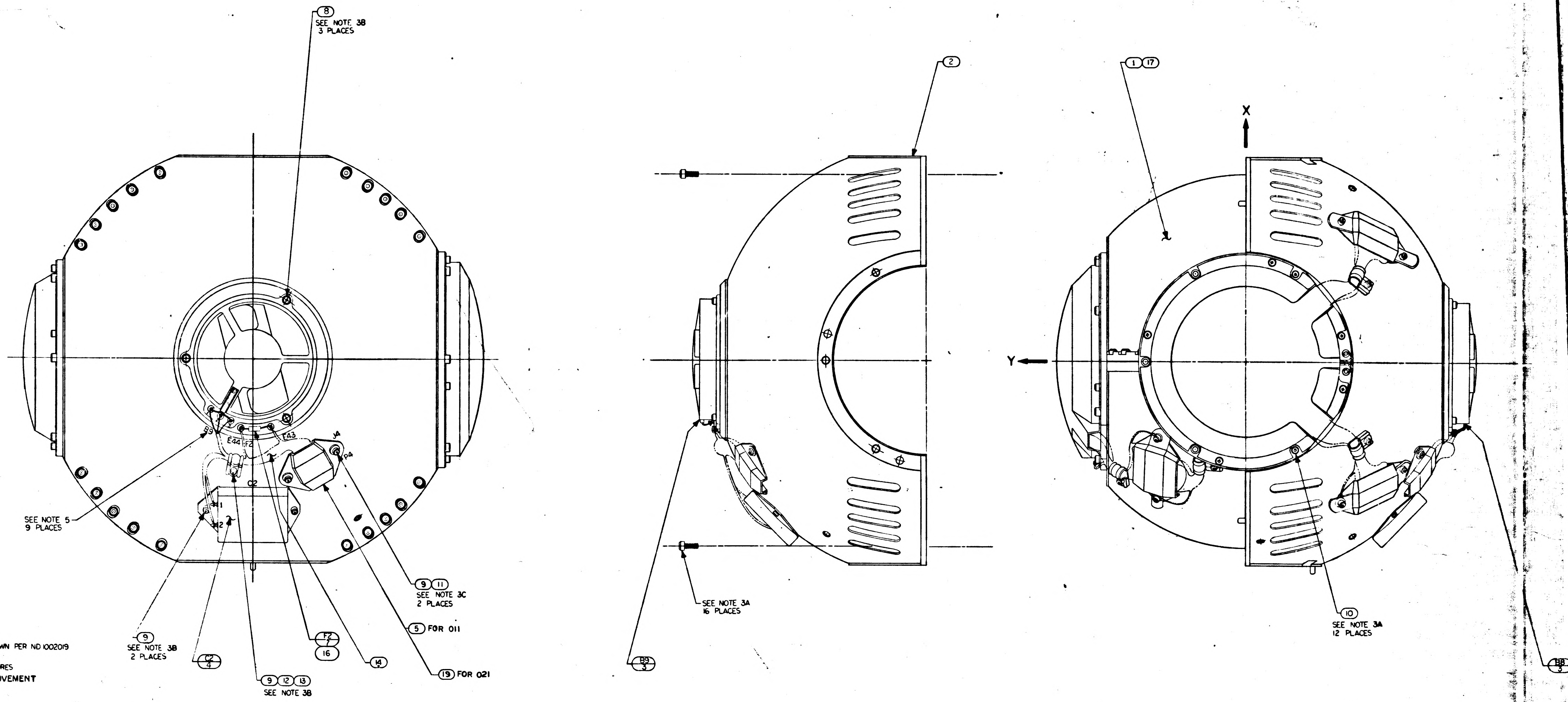
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
6. ITEM (12) TO BE SELECTED FROM TABLE I ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

2018602	REV	SHT
	V	1

2018602

TABLE I	
CABLE CLAMP (12)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8



8
SEE NOTE 3B
3 PLACES
B9
E44
F2
E43
J4
P4
C2
1
2
SEE NOTE 5
9 PLACES
9
SEE NOTE 3B
2 PLACES
C2/4
9 12 13
SEE NOTE 3B
F2/7
16
14
19 FOR 021
5 FOR 011
9 11
SEE NOTE 3C
2 PLACES
2
1 17
X
Y
SEE NOTE 3A
16 PLACES
B9/3
10
SEE NOTE 3A
12 PLACES
B8/3

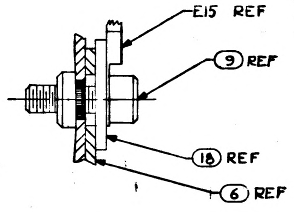
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS $^{.10}_{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
6. ITEM (12) TO BE SELECTED FROM TABLE I ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
7. TAPE (21) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

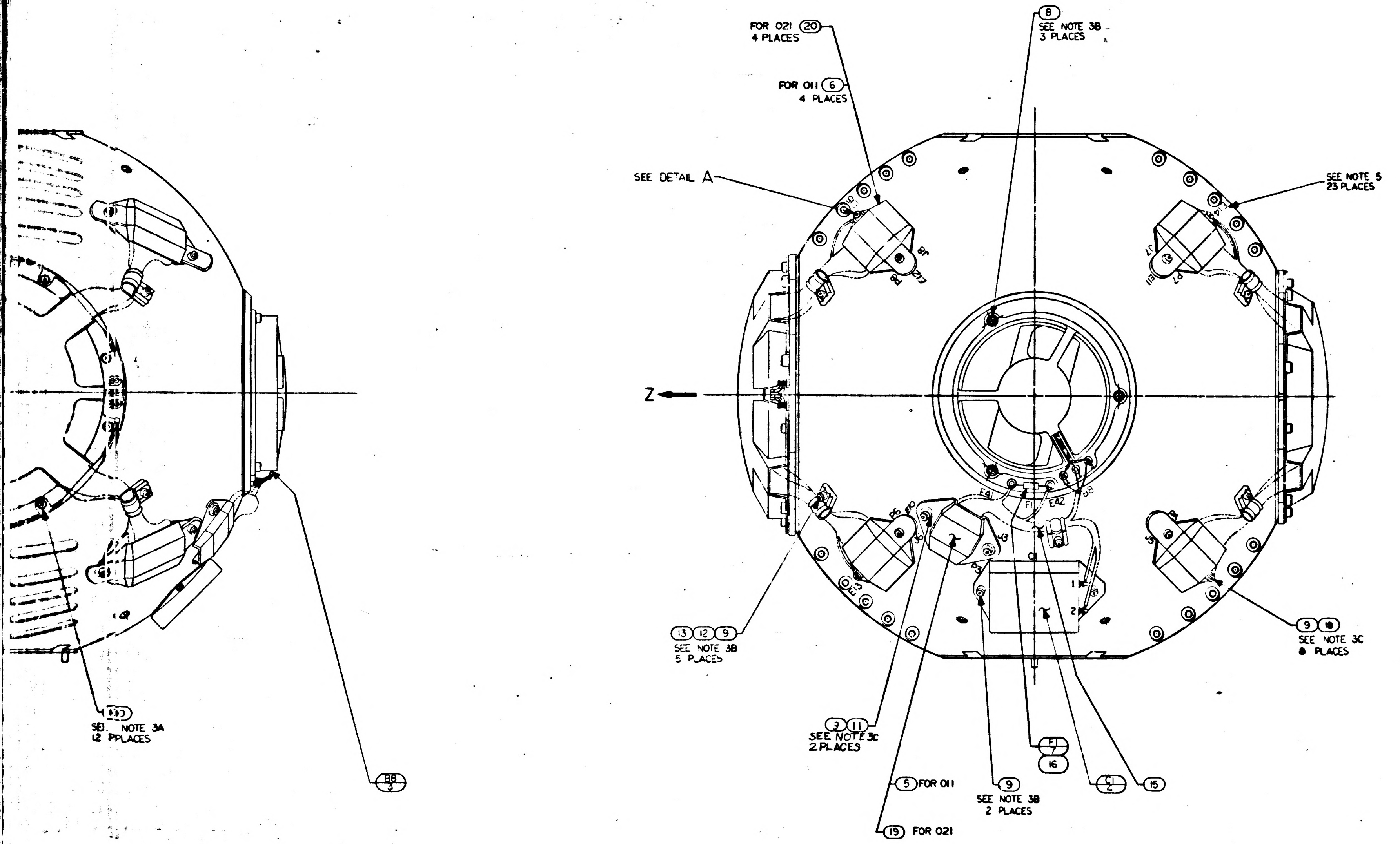
3H

2018602	REV W	SHT 1

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES REV H WITH CHANGES PER TDRR 17157	9 MAR 65		
K	REVISED PER TDRR 18740	25 May 65		WK
L	REVISED PER TDRR 18909	25 May 65		WK
M	REVISED PER TDRR 19274	25 May 65		WK
N	REVISED PER TDRR 19275	26 May 65		WK
P	REVISED PER TDRR 20111	22 Jul 65		WK
R	REVISED PER TDRR 21188	22 Jul 65		WK.
S	REVISED PER TDRR 22594	28 Sep 65		WK
T	REVISED PER TDRR 23344	19 Oct 65		WK
U	REVISED TDRR 25795	15 Feb 66		WK
V	REVISED PER TDRR 27508	3 Mar 66		WK
W	REVISED PER TDRR 32106	3 DEC 66	EH	


E15 REF
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP


FOR 021 20
4 PLACES
FOR 011 6
4 PLACES
8
SEE NOTE 3B
3 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
J8
P8
E12
J7
P7
E11
E14
J6
J3
J5
P3
E13
C1
E42
1
2
13 12 9
SEE NOTE 3B
5 PLACES
9 10
SEE NOTE 3C
8 PLACES
9 11
SEE NOTE 3C
2 PLACES
5 FOR 011
19 FOR 021
9
SEE NOTE 3B
2 PLACES
F1 7
16
C1 4
15
SEE NOTE 3A
12 PPLACES
BB 3

3H

SEE NOTE 7

QTY REQ'D	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH., ELEC. PRESS, SENSITIVE	21
4	—	2018841	BRACKET, CONN	20
2	—	2018842	BRACKET, CONN	19
8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.	18
1	—	2018603-021	MIDDLE AXIS ASSEMBLY	17
2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	2018797	WIRING HARNESS "B" OA.	15
1	1	2018798	WIRING HARNESS "C" OA.	14
6	6	1000223	WASHER, CABLE CLAMP	13
6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	MS15795-803	WASHER, FLAT, METAL, ROUND	11
12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	1001488-1	SCREW, HEX, SOC HD SELF-LKG	9
6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
—	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
—	2	2018793	BRACKET, CONNECTOR	5
2	2	1010799	CAPACITOR	4
2	2	2018644	BLOWER	3
1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1
021	011	LIST OF MATERIALS		

W

2018602

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN L. MORSE DATE 2-17-65
CHECKED G. QUINN 3-3-65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL 9 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

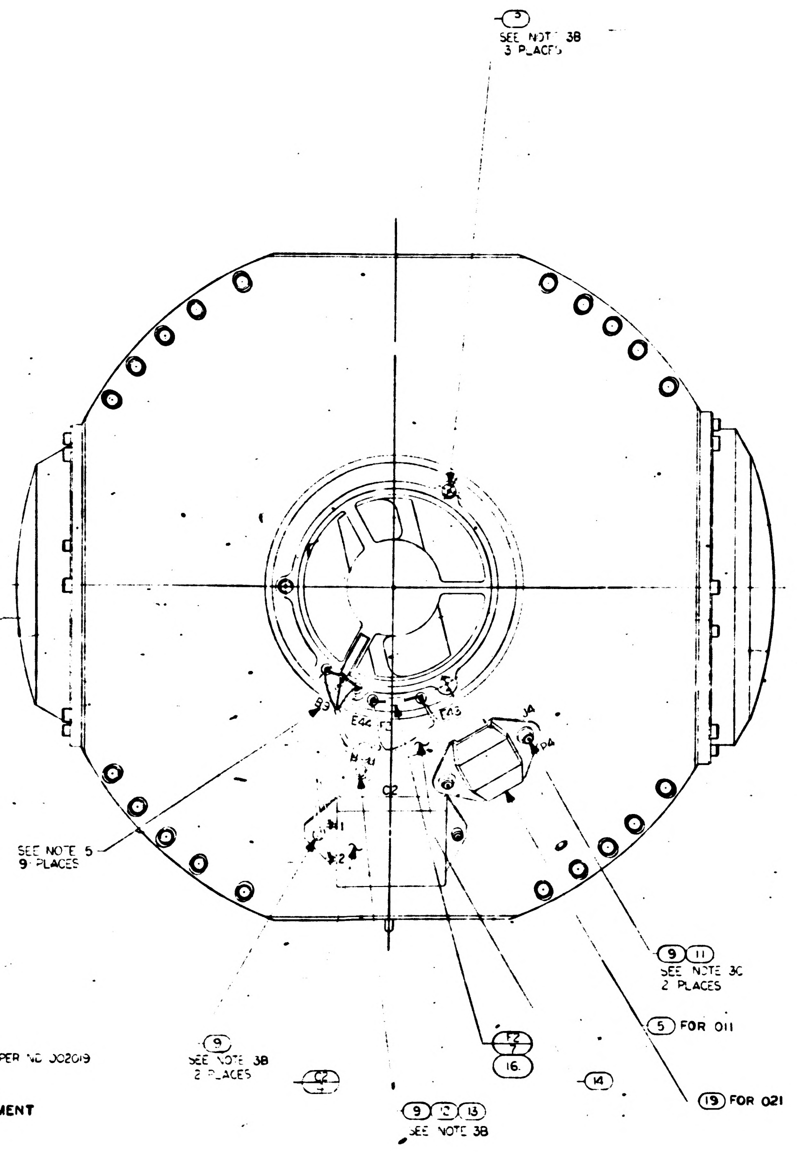
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018602
SCALE 1/1
WT
SHEET 1 OF 1

2018602 REV W SHT 1

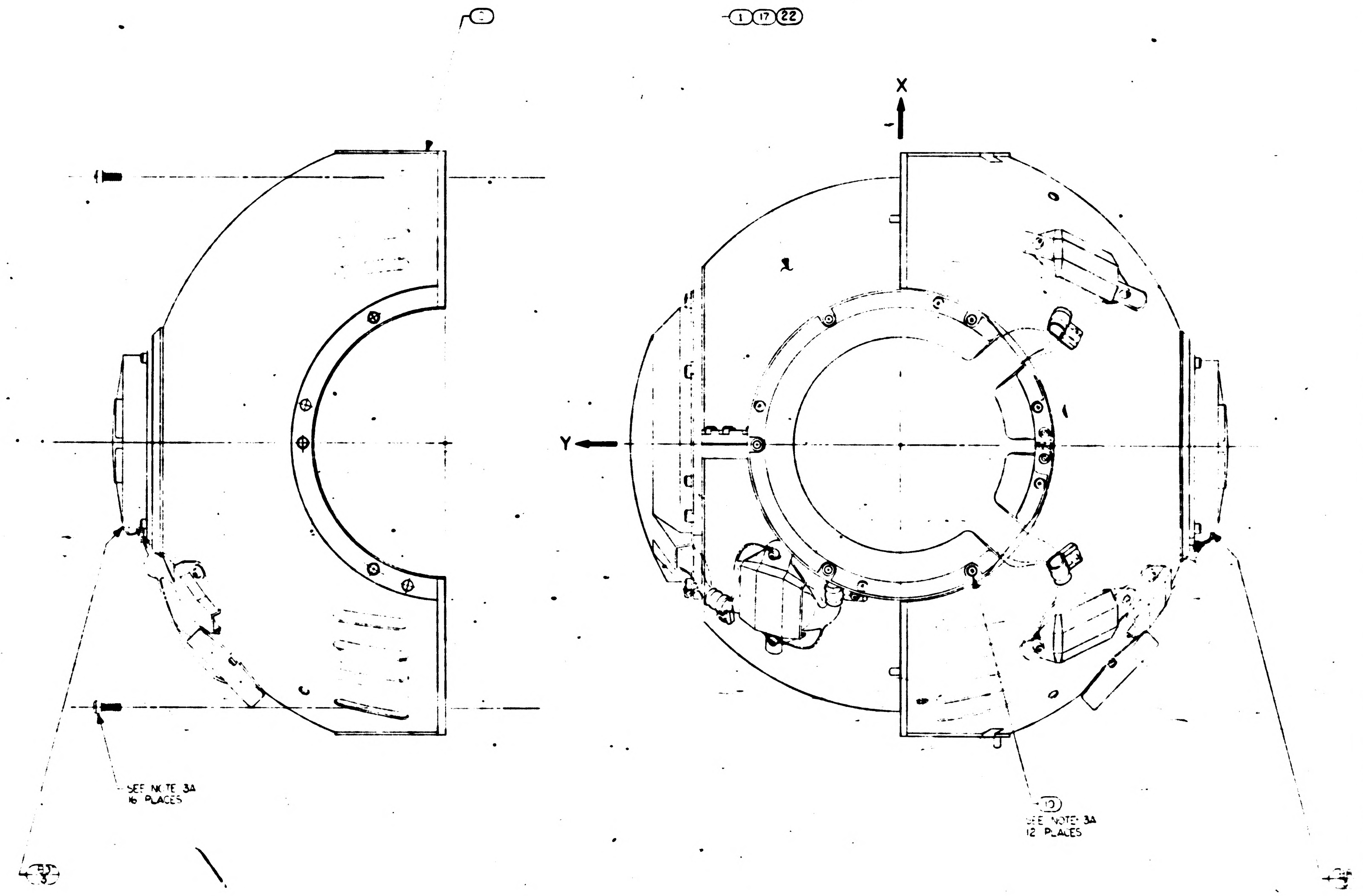
2018602

2/2018602

TABLE I	
CABLE CLAMP (2)	
PART NO.	DIA. REF
[illegible]22[illegible]	[illegible]/8
-2	3/32
-3	[illegible]/8
-3	[illegible]/32
-4	[illegible]/8
-4	7/32
-5	[illegible]/4
[illegible]	5/32
-6	[illegible]/8
-6	[illegible]/32
[illegible]	3/8



3
SEE NOTE 3B
3 PLACES
B3
E44
F3
E43
J4
P4
B11
C2
J1
J2
SEE NOTE 5
9 PLACES
9 11
SEE NOTE 3C
2 PLACES
5 FOR 011
F2
7
16.
19 FOR 021
14
C2
9
SEE NOTE 3B
2 PLACES
9 12 13
SEE NOTE 3B



1 17 22
X
Y
SEE NOTE 3A
16 PLACES
10
SEE NOTE 3A
12 PLACES
3

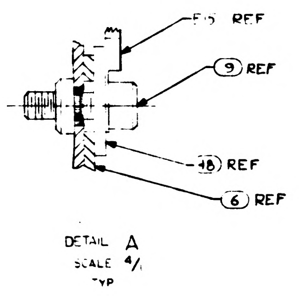
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS .10/.12 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 002019
6. ITEM (2) TO BE SELECTED FROM TABLE I ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
7. TAPE (21) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

2018602 REV Y SH 1

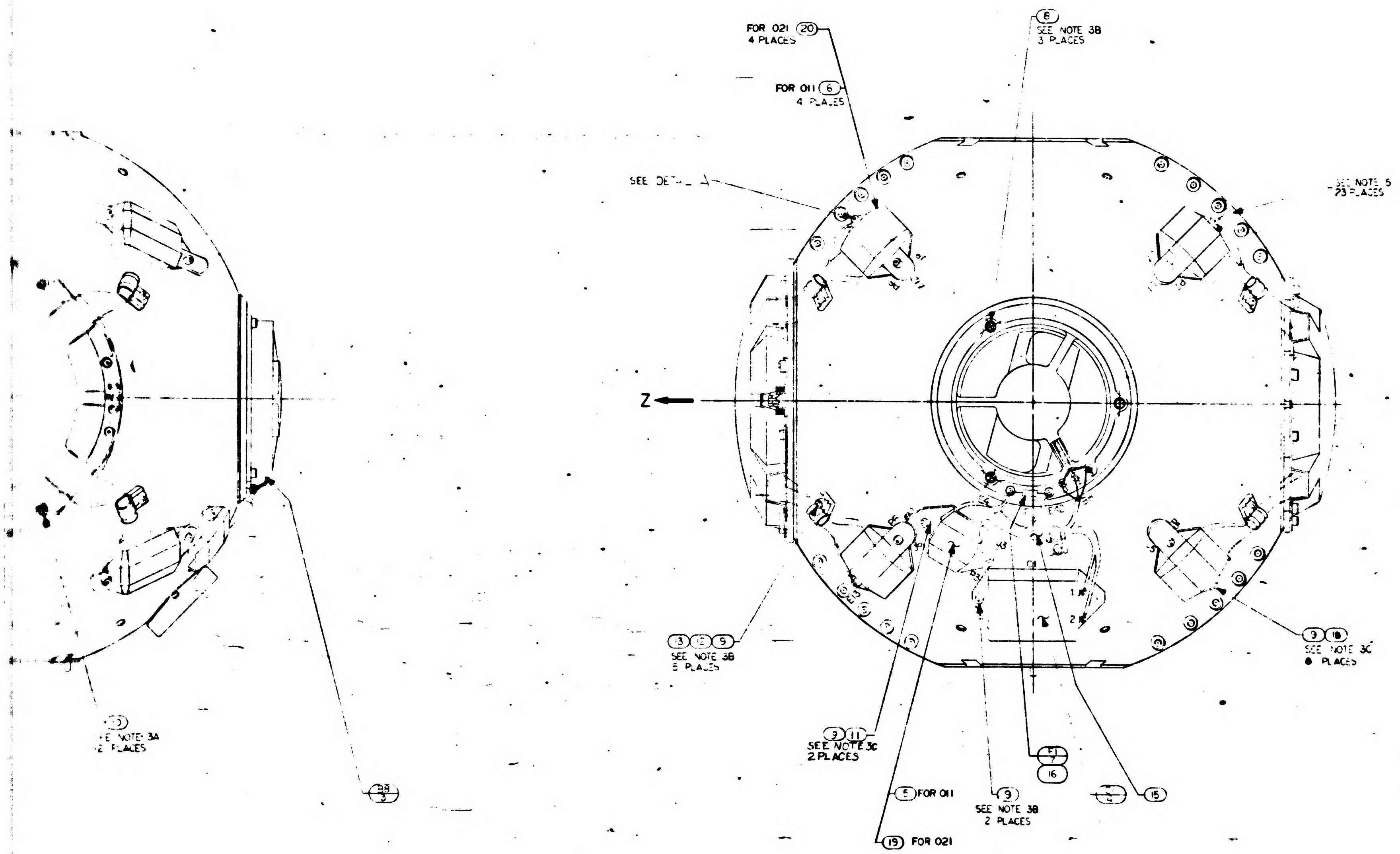
1/2018602

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
J	CHANGES PER TDRR 17157	9 MAR 65		
K	REVISED PER TDRR 18740	25 May 65		
L	REVISED PER TDRR 8909	25 May 65		
M	REVISED PER TDRR 19274	25 May 65		
N	REVISED PER TDRR 19275			
P	REVISED PER TDRR 20111	22		
R	REVISED PER TDRR 21188	22		
S	REVISED PER TDRR 22594	28 SEP 65		
T	REVISED PER TDRR 23344	19 Oct 65		
U	REVISED TDRR 25795	15 Feb 66		
V	REVISED PER TDRR 27508	31 Mar 66		
W	REVISED PER TDRR 32106	5 DEC 66	EH	
Y	REVISED PER TDRR 33317	6 APR 67	AE	



F15 REF
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP



FOR 021 20
4 PLACES
FOR 011 6
4 PLACES
8
SEE NOTE 3B
3 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
13 12 9
SEE NOTE 3B
5 PLACES
9 18
SEE NOTE 3C
8 PLACES
10
SEE NOTE 3A
12 PLACES
18
3
9 11
SEE NOTE 3C
2 PLACES
F1
7
16
5 FOR 011
9
SEE NOTE 3B
2 PLACES
4
15
19 FOR 021

SEE NOTE 7

1	-	-	2018603-031	MIDDLE AXIS ASSEMBLY	22
A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH., ELEC. PRESS, SENSITIVE	21
4	4	—	2018841	BRACKET, CONN	20
2	2	—	2018842	BRACKET, CONN	19
8	8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.	18
—	1	—	2018603 021	MIDDLE AXIS ASSEMBLY	17
2	2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	1	2018797	WIRING HARNESS "B" OA	15
1	1	1	2018798	WIRING HARNESS "C" OA	14
6	6	6	1000223	WASHER, CABLE CLAMP	13
6	6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	4	MS15795-803	WASHER, FLAT, METAL, ROUND	11
12	12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	22	1001488-1	SCREW HEX, SOC HD SELF-LKG	9
6	6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
-		4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
-		2	2018793	BRACKET, CONNECTOR	5
2	2	2	1010799	CAPACITOR	4
2	2	2	2018644	BLOWER	3
1	1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
-	—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1
QTY REQD	QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
031	021	011	LIST OF MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN
DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 3-4-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OUTER AXIS
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018602
SCALE 1/1
WT
SHEET 1 OF 1

2018602 Y

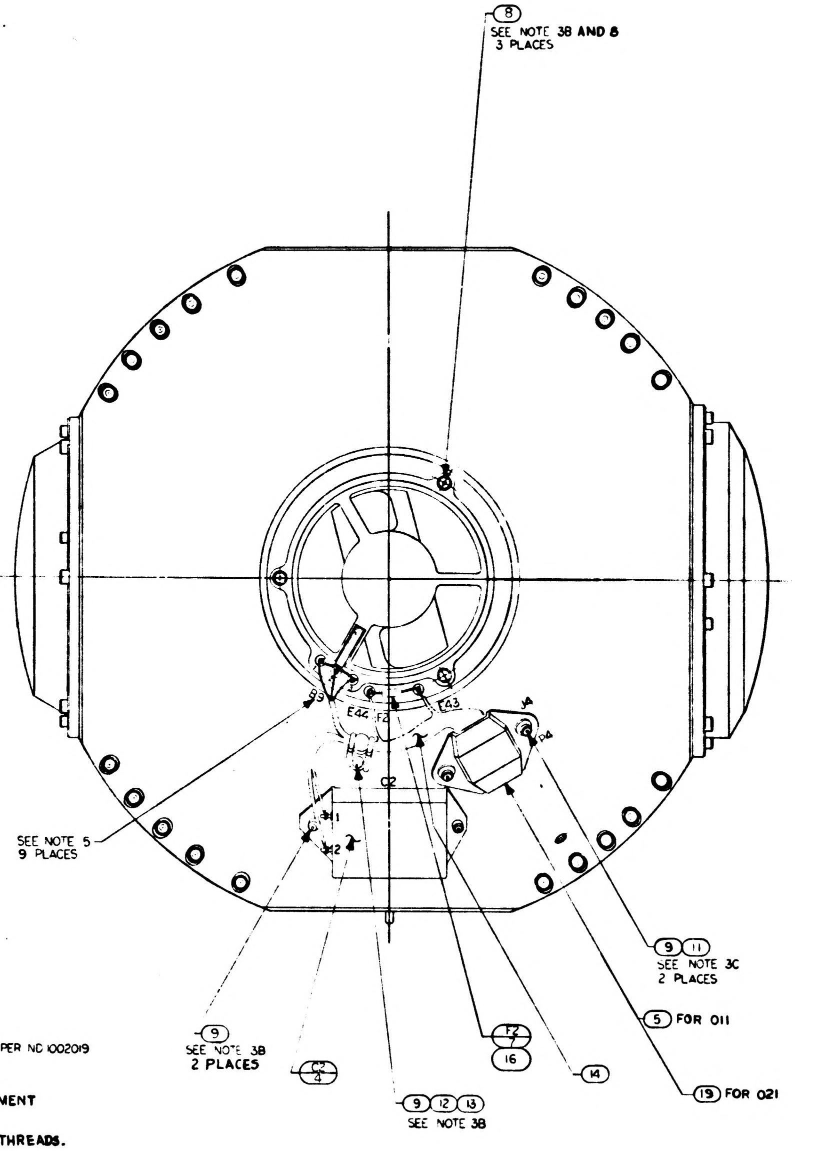
3

2018602 REV Y SH 1

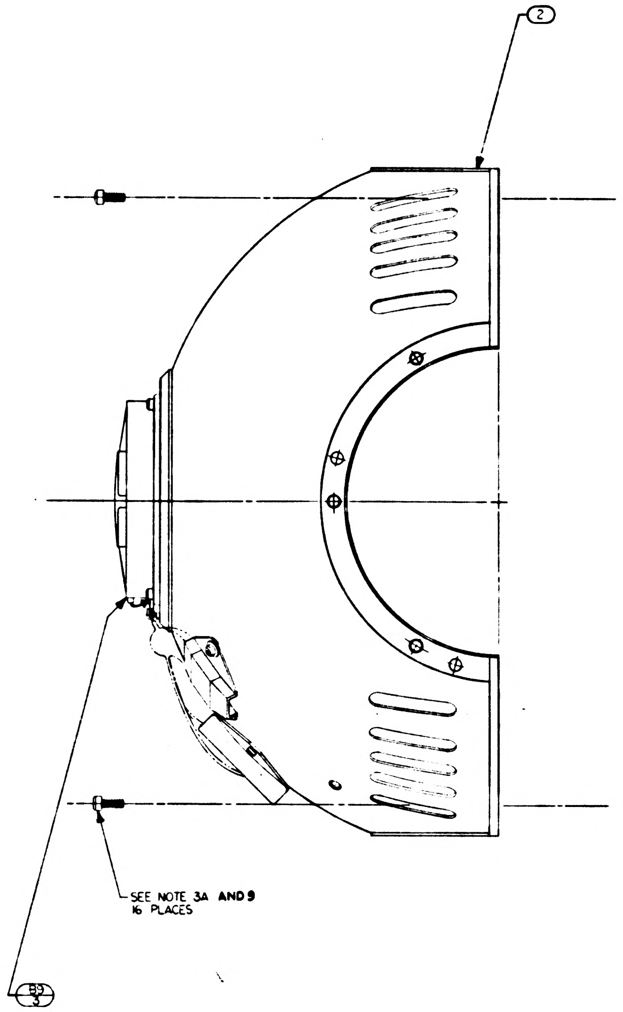
2/2018602

2018602

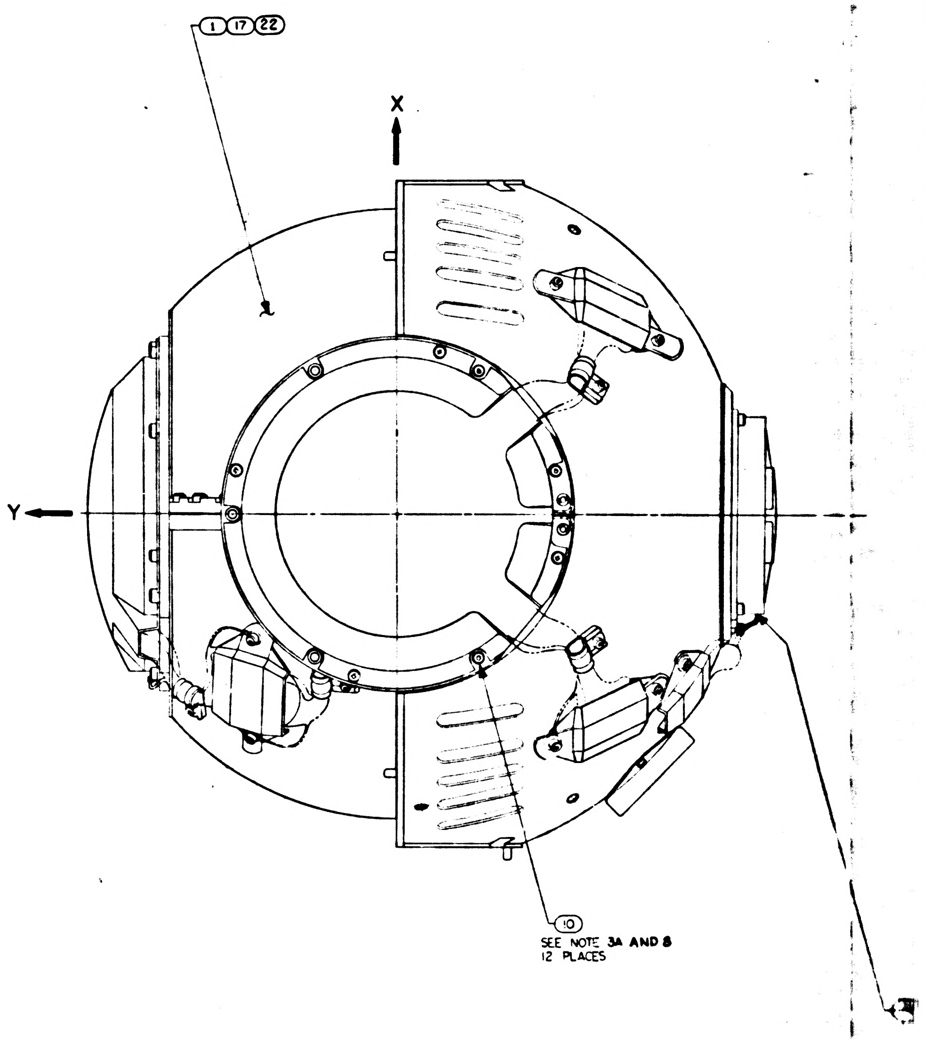
TABLE I	
CABLE CLAMP (12)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8



(8) SEE NOTE 3B AND 8
3 PLACES
B9
E44
F2
E43
J4
P4
C2
1
2
SEE NOTE 5
9 PLACES
(9) SEE NOTE 3B
2 PLACES
C2/4
(9) (12) (13)
SEE NOTE 3B
F2/7
(16)
(14)
(9) (11)
SEE NOTE 3C
2 PLACES
(5) FOR 011
(19) FOR 021



(2)
SEE NOTE 3A AND 9
16 PLACES
B9/3



(1) (17) (22)
X
Y
(10)
SEE NOTE 3A AND 8
12 PLACES

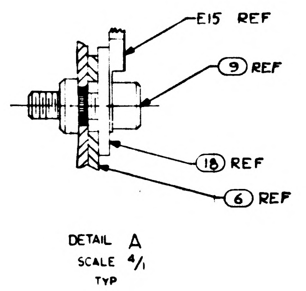
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. INSTALL FINGER TIGHT
4. SOLDER PER ND1002071
5. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
6. ITEM (12) TO BE SELECTED FROM TABLE I ASSEMBLY.
   CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
7. TAPE (21) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
8. APPLY A UNIFORM THIN FILM OF ITEM (23) TO SCREW THREADS.
9. APPLY A UNIFORM THIN FILM OF ITEM (23) TO SCREW THREDS AND UNDERSIDE OF SCREW HEAD.

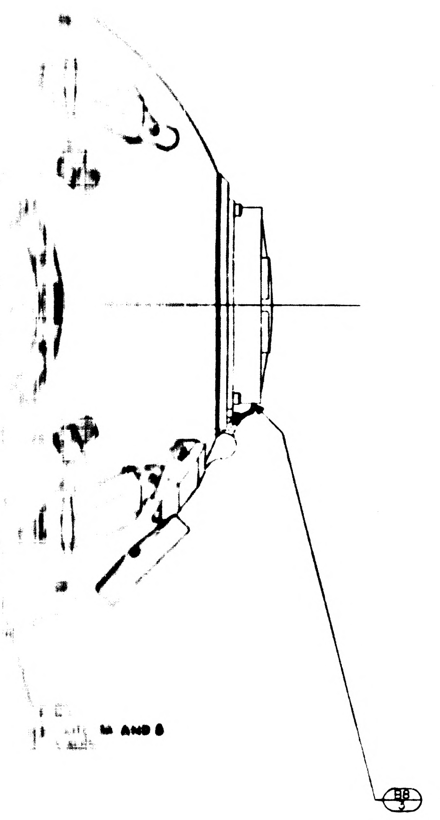
3H

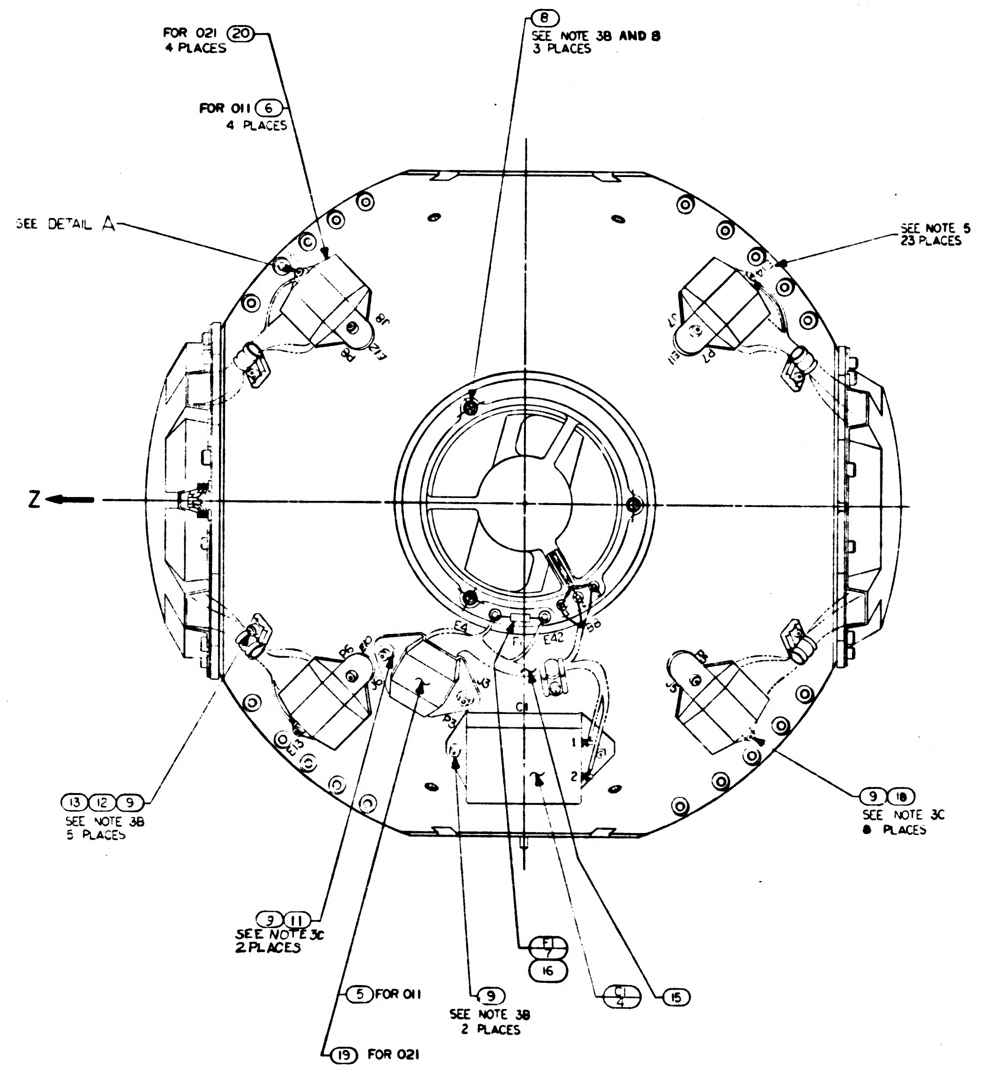
2018602	REV	SHT
	Z	1

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
J	REPLACES REV H WITH CHANGES PER TDRR 17157	9 MAR 65		
K	REVISED PER TDRR 18740	25 May 65		
L	REVISED PER TDRR 18909	26 May 65		
M	REVISED PER TDRR 19274	25 May 65		
N	REVISED PER TDRR 19275	26 May 65		
P	REVISED PER TDRR 20111	22 Jul 65		
R	REVISED PER TDRR 21188	22 Jul 65		
S	REVISED PER TDRR 22594	28 Sep 65		
T	REVISED PER TDRR 23344	19 Oct 65		
U	REVISED TDRR 23795	15 Feb 66		
V	REVISED PER TDRR 27808	3 Mar 66		
W	REVISED PER TDRR 32166	5 DEC 66	EH	
Y	REVISED PER TDRR 333 7	6 APR 67	ME	
Z	REVISED PER TDRR 33354	6 APR 67	ME	VH


E15 REF
9 REF
18 REF
6 REF

DETAIL A
SCALE 4/1
TYP




FOR 021 20
4 PLACES
FOR 011 6
4 PLACES
8
SEE NOTE 3B AND 8
3 PLACES
SEE DETAIL A
SEE NOTE 5
23 PLACES
Z
13 12 9
SEE NOTE 3B
5 PLACES
9 18
SEE NOTE 3C
8 PLACES
9 11
SEE NOTE 3C
2 PLACES
5 FOR 011
19 FOR 021
9
SEE NOTE 3B
2 PLACES
F1
7
16
C1
4
15
C1
1
2
P3
E13
J5

SEE NOTE 7

QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	A/R	1008930	GREASE MOLYBDENUM DISULFIDE	23
1	-	-	2018603-031	MIDDLE AXIS ASSEMBLY	22
A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH., ELEC. PRESS. SENSITIVE	21
4	4	—	2018841	BRACKET, CONN	20
2	2	—	2018842	BRACKET, CONN	19
8	8	8	2018812	WASHER BRACKET, CONN M.G. & O.G.	18
–	1	–	2018603 021	MIDDLE AXIS ASSEMBLY	17
2	2	2	1010490-078	SLEEVING, ELECTRICAL, HEAT SHRINK	16
1	1	1	2018797	WIRING HARNESS "B" OA	15
1	1	1	2018798	WIRING HARNESS "C" OA	14
6	6	6	1000223	WASHER, CABLE CLAMP	13
6	6	6	1000220-SEE NOTE 6	CLAMP, CABLE	12
4	4	4	MS15795 808	WASHER, FLAT, METAL, ROUND	11
12	12	12	1001489-18	SCREW, HEX, SOC HD	10
22	22	22	1001488-1	SCREW, HEX, SOC HD SELF-LKG	9
6	6	6	1001489-2	SCREW, HEX, SOC HD	8
2	2	2	1000170-12	FUSE, PIGTAIL, SUBMINIATURE	7
-	-	4	2018794	BRACKET CONNECTOR OUTER GIMBAL	6
-	-	2	2018793	BRACKET, CONNECTOR	5
2	2	2	1010799	CAPACITOR	4
2	2	2	2018644	BLOWER	3
1	1	1	2018761	HOUSING ASSEMBLY, OUTER GIMBAL	2
-	—	1	2018603-011	MIDDLE AXIS ASSEMBLY	1

LIST OF MATERIALS

2018601	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	M I T INSTRUMENTATION LAB CAMBRIDGE MASS DRAWN L. MORSE DATE 2-17-65 CHECKED G. Guinn 3-3-65 APPROVAL APPROVAL NASA APPROVAL 3-9-65 MIT APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS OUTER AXIS ASSEMBLY
NEXT ASSY	USED ON			CODE IDENT NO 80230 SIZE J NASA DRAWING NO 2018602
APPLICATION				SCALE 1/1 WT SHEET 1 OF 1

Z

2018602

3H

2018602

2/2018602

PART NO.	NOMENCLATURE	QTY REQ'D
2018603	MIDDLE AXIS ASSY	1

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	RELEASE TDRR 10806	7 JUL 64	WK

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED		July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC	W S	7/7/64
MIT/IL APPROVAL		DATE
	W Kupfer	7/7/64

OUTER
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

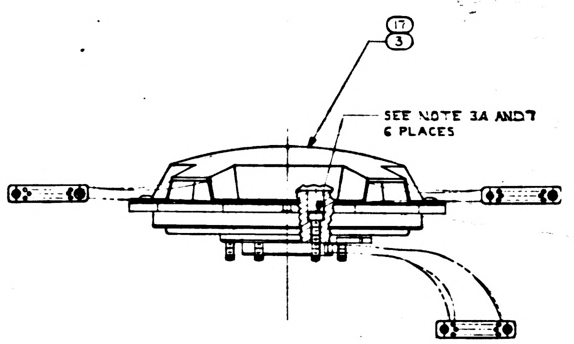
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

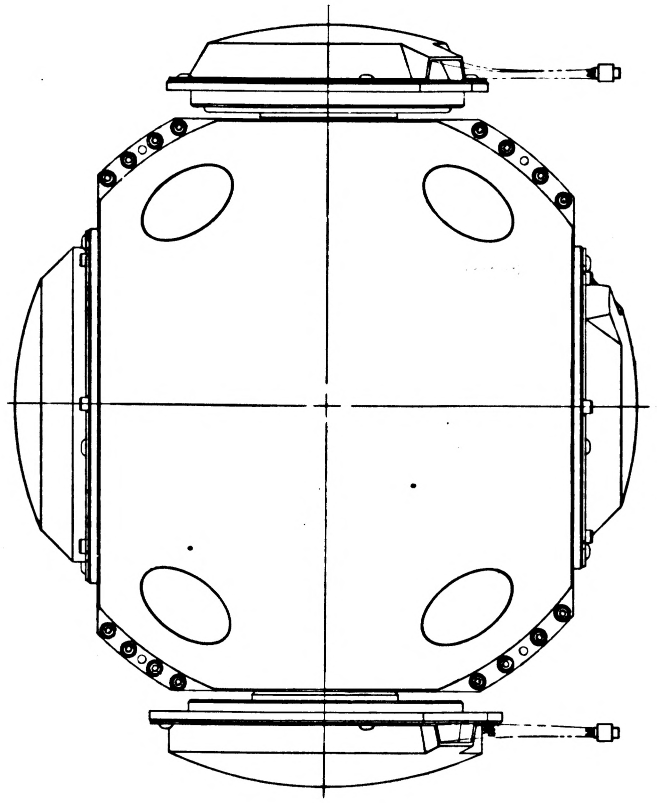
NASA DRAWING NO.
2018602

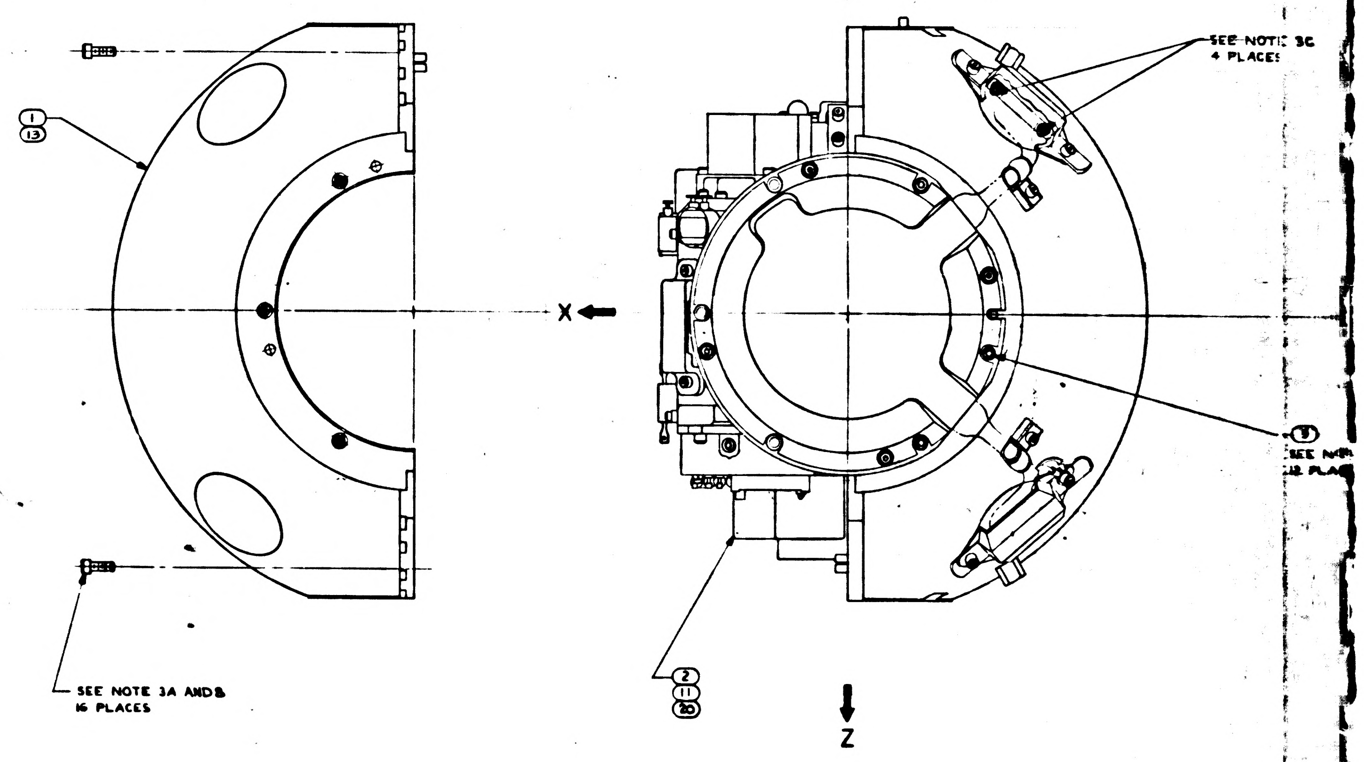
SHEET OF

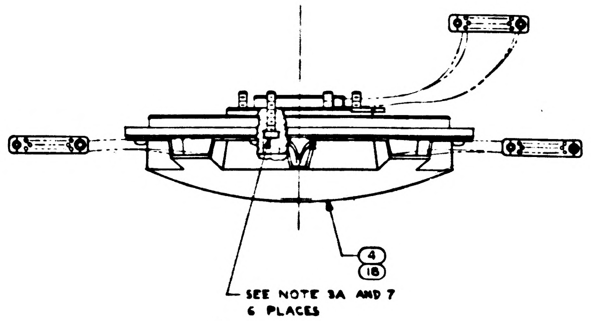
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

TABLE I		
CABLE CLAMP (6)		CABLE CLAMP (14)
PART NO.	DIA REF	DIA REF
1000220-13	5/32	—
1000220-4	3/16	—
1000220-14	7/32	—
1000220-5	1/4	—
1000220-15	9/32	—
1000220-6	5/16	—
1000220-16	11/32	—
1000220-7	3/8	—
2018843-001	—	1/4
2018843-002	—	5/16
2018843-003	-	3/8


(17)
(3)
SEE NOTE 3A AND 7
6 PLACES




(1)
(13)
SEE NOTE 3A AND 8
16 PLACES
X
SEE NOTE 3C
4 PLACES
(9)
SEE NO
12 PLA
(2)
(11)
(20)
Z


(4)
(18)
SEE NOTE 3A AND 7
6 PLACES

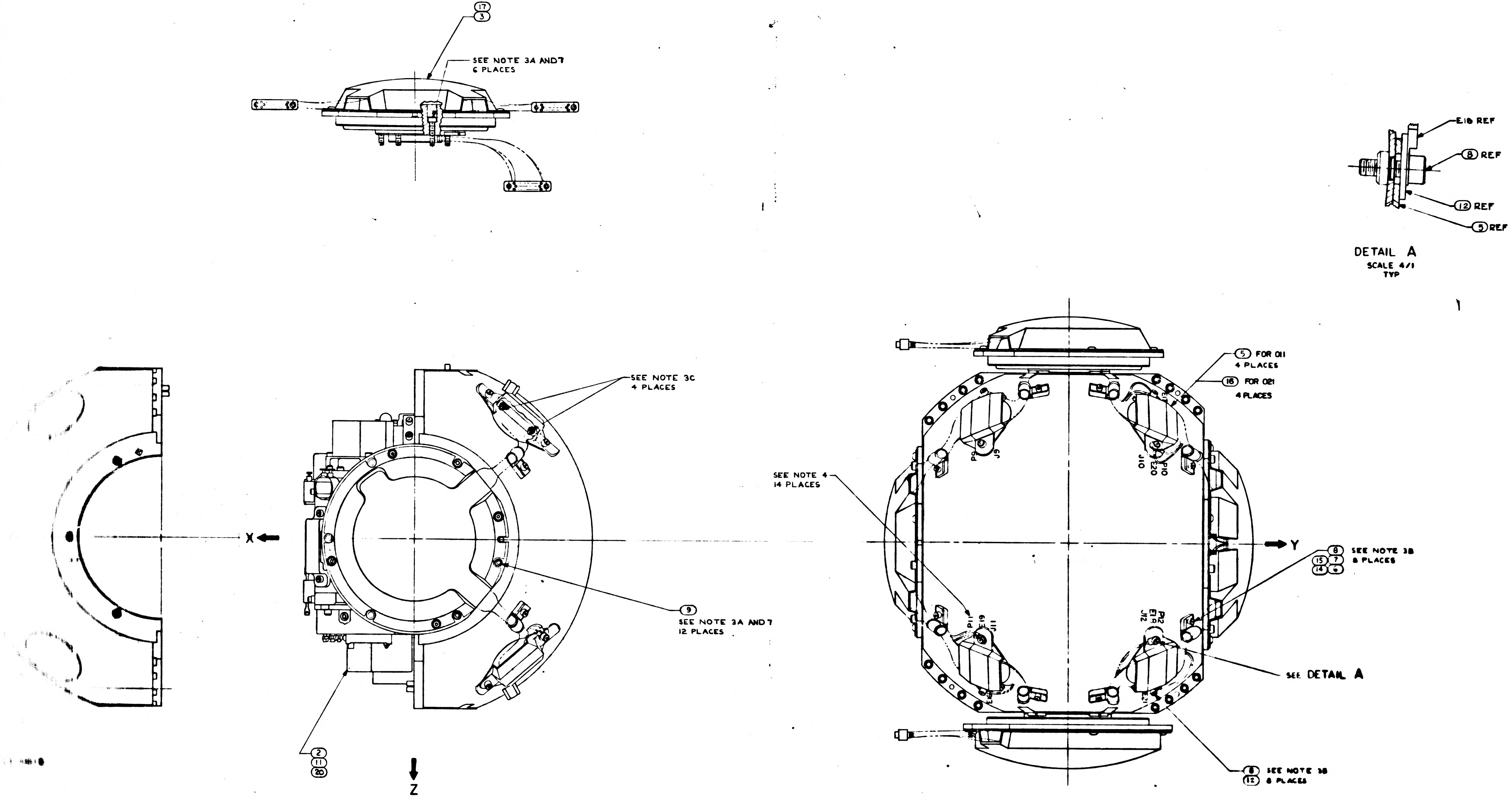
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

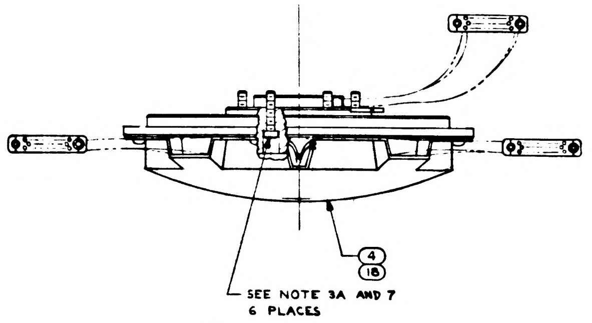
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM (6) + (14) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
6. TAPE (19) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
7. APPLY A UNIFORM THIN FILM OF ITEM (21) TO SCREW THREADS.
8. APPLY A UNIFORM THIN FILM OF ITEM (21) TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.

2018603	REV	SHEET
	AA	1

SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES TDRR 17096	2 Mar 65		WK
M	REVISED PER TDRR 19275	2 Jun 65		WK
N	REVISED PER TDRR 20089	22 Jul 65	apd	WK
P	REVISED PER TDRR 21189	22 Jul 65	apd	WK
R	REVISED PER TDRR 22594	28 Sep 65		WK
S	REVISED TDRR 23701	11 Oct 65		WK
T	REVISED TDRR 25796	15 Feb 66		WK
U	REVISED TDRR 26252	15 Feb 66		WK
V	REVISED PER TDRR 26598	24 Feb 66		WK
W	REVISED PER TDRR 27508	3 Mar 66		WK
Y	REVISED PER TDRR 32107	6 DEC 66	E H	EFS
Z	REVISED PER TDRR 33318	4 APR 67		
AA	REVISED PER TDRR 33355	4 APR 67		



17
3
SEE NOTE 3A AND 7
6 PLACES
E16 REF
8 REF
12 REF
5 REF
DETAIL A
SCALE 4/1
TYP
SEE NOTE 3C
4 PLACES
X
9
SEE NOTE 3A AND 7
12 PLACES
2
11
20
Z
SEE NOTE 4
14 PLACES
5 FOR 011
4 PLACES
16 FOR 021
4 PLACES
P9
J9
J10
P10
E20
Y
8
15
14
7
6
SEE NOTE 3B
8 PLACES
P11
E19
J11
P12
E17
J12
SEE DETAIL A
8
12
SEE NOTE 3B
8 PLACES



4
18
SEE NOTE 3A AND 7
6 PLACES

SEE NOTE 6

QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
AR	AR	AR	1008930	GREASE, MOLYBDENUM DISULFIDE	21
1	—	—	2018604-031	INNER AXIS ASSEMBLY	20
AR	AR	AR	MIL-T-15126 TYPE "ACT"	TAPE, ADH. ELEC PRESS SENSITIVE	19
1	1	—	2018610-021	IGSA TORQUE MOTOR MIDDLE AXIS	18
1	1	—	2018613-021	IGSA RESOLVER MIDDLE AXIS	17
4	4	—	2018841	BRACKET, CONN.	16
8	8	—	MS15795-803	WASHER, FLAT ROUND	15
8	8	—	2018843 SEE NOTE 5	CABLE, CLAMP	14
1	1	—	2018758-001	MIDDLE GIMBAL HOUSING ASSEMBLY	13
8	8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMBL	12
—	1	—	2018804-021	INNER AXIS ASSEMBLY	11
~~[illegible]~~	~~[illegible]~~	~~8~~	~~MS15795-805~~	~~WASHER, FLAT, METAL, [illegible]~~	~~10~~
12	12	12	[illegible] 499 [illegible]	SCREW, HEX SOC HD	9
16	16	16	1001486-[illegible]	SCREW, HEX SOC HD	8
—	—	8	1000223	WASHER, CABLE CLAMP.	7
—	—	8	1000220 SEE NOTE 5	CABLE CLAMP	6
—	—	4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
—	—	1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
—	—	1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
—	—	1	2018604-011	INNER AXIS ASSEMBLY	2
—	—	1	2018758	MIDDLE GIMBAL HOUSING ASSY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
2018602	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DATE 65
CHECKED 65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

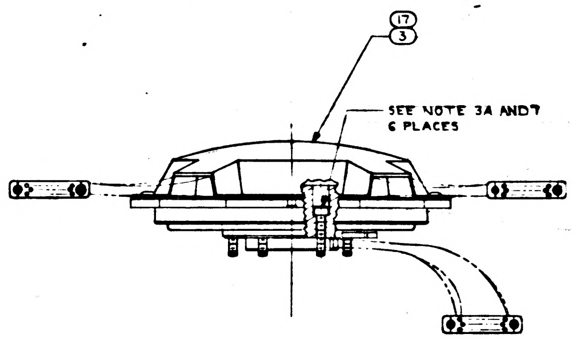
MIDDLE AXIS ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 2018603
SCALE 1/1
WT
SHEET 1 OF 1

2018603

2/2018603

TABLE I		
CABLE CLAMP ⑥		CABLE CLAMP ⑭
PART NO.	DIA REF	DIA REF
1000220-13	5/32	—
1000220-4	3/16	—
1000220-14	7/32	—
1000220-5	1/4	—
1000220-15	9/32	—
1000220-6	5/16	—
1000220-16	11/32	—
1000220-7	3/8	—
2018843-001	—	1/4
2018843-002	—	5/16
2018843-003	-	3/8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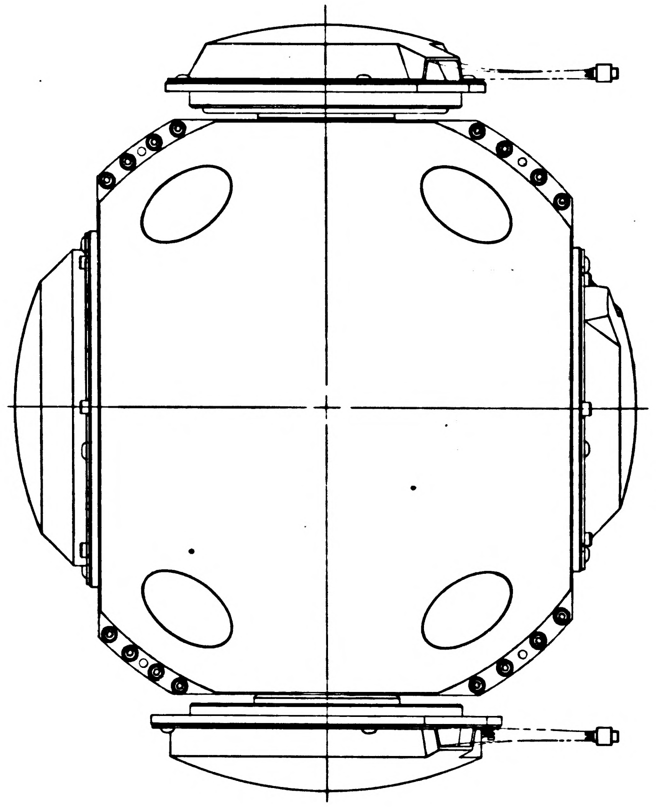
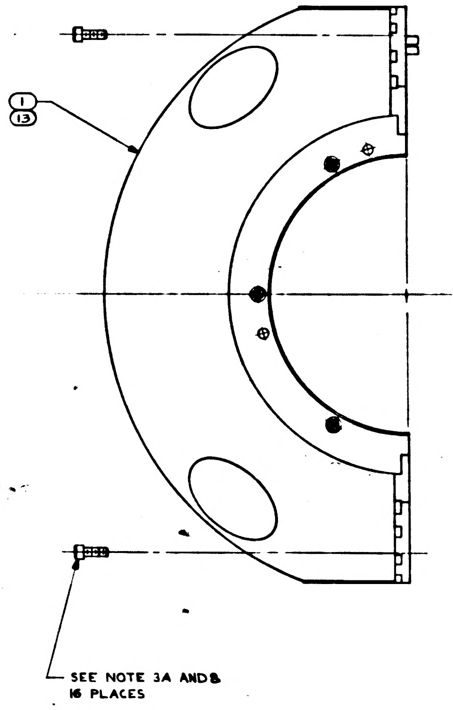
③
SEE NOTE 3A AND 7
6 PLACES

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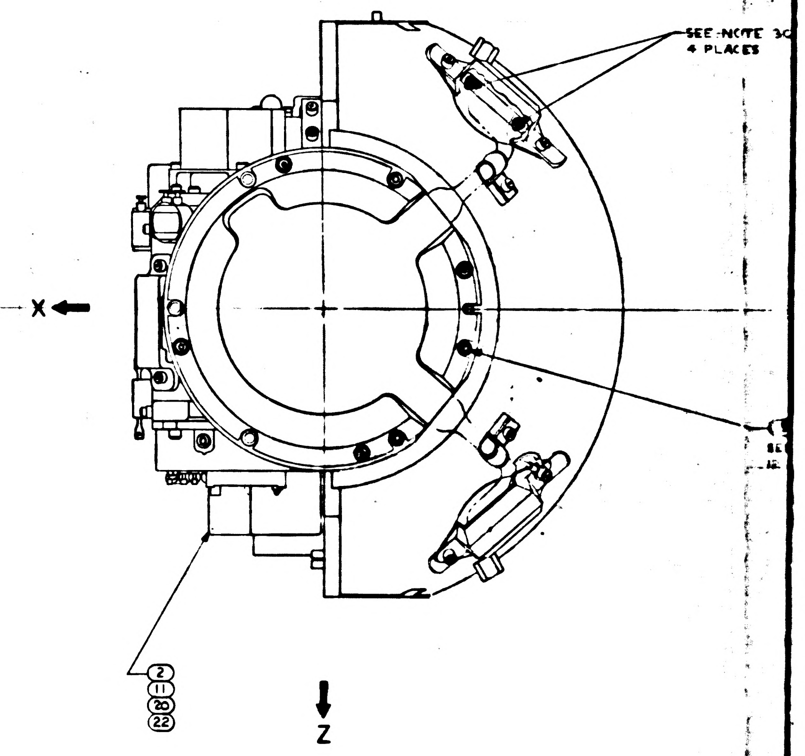
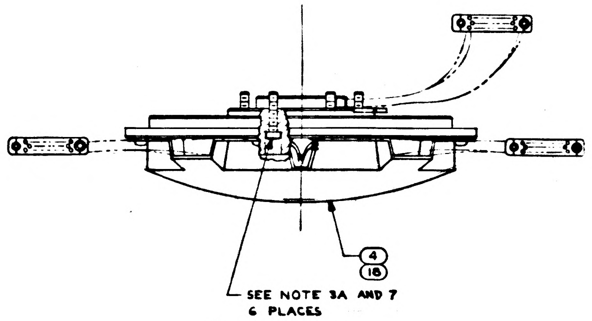
⑬
SEE NOTE 3A AND 8
16 PLACES


SEE NOTE 3C
4 PLACES
X
②
⑪
⑳
㉒
Z


④
⑱
SEE NOTE 3A AND 7
6 PLACES

NOTES

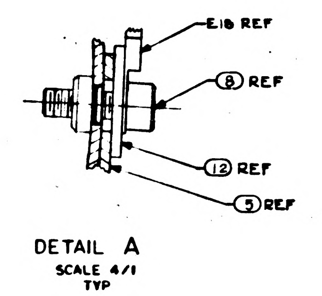
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM ⑥ + ⑭ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
6. TAPE ⑲ SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
7. APPLY A UNIFORM THIN FILM OF ITEM ㉑ TO SCREW THREADS.
8. APPLY A UNIFORM THIN FILM OF ITEM ㉑ TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.

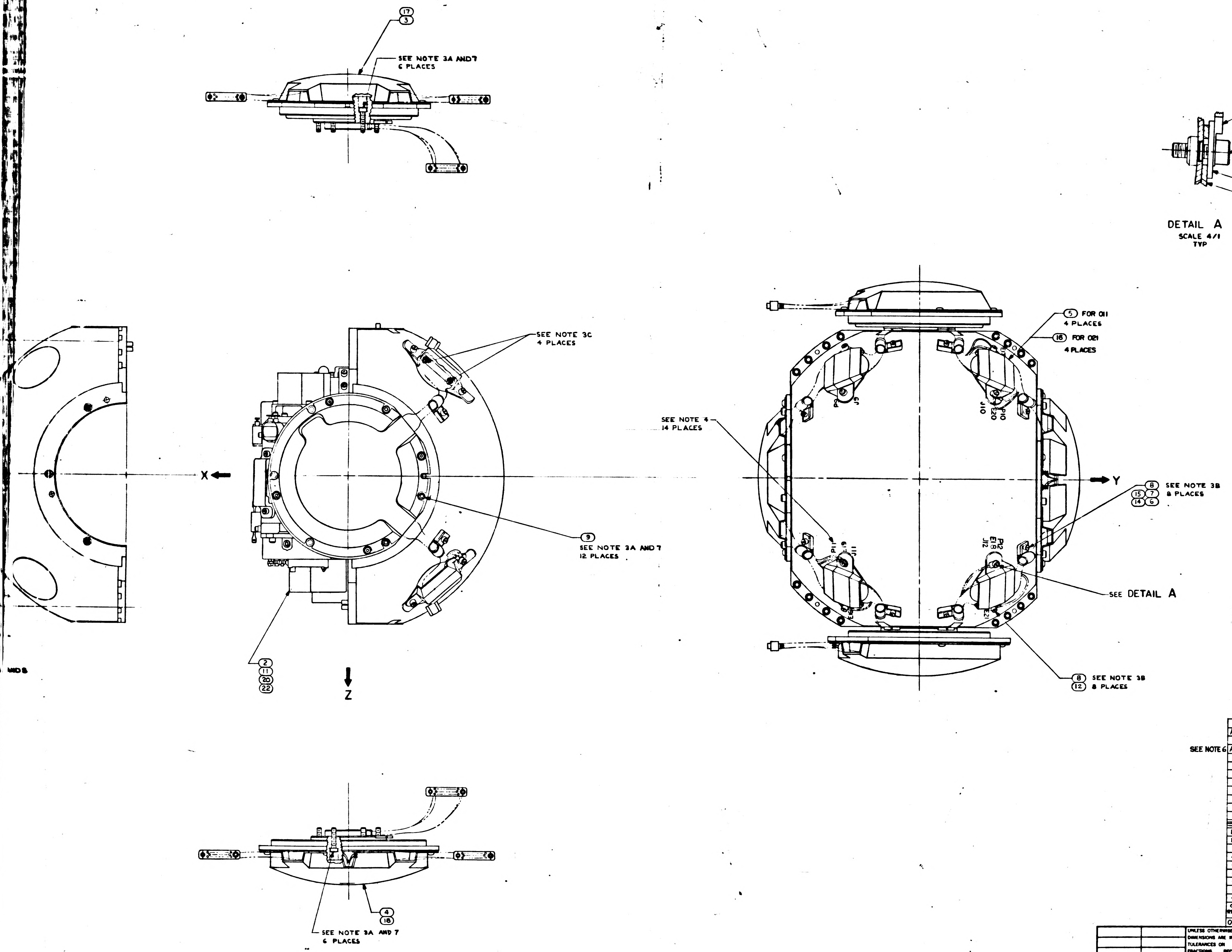
2018603	AB	1

1/2018603

SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES TDRR 17086	[illegible]	[illegible]	WK
M	REVISED PER TDRR 19275	2 Jun 65	[illegible]	WK
N	REVISED PER TDRR 20089	22 Jul 65	agd	WK
P	REVISED PER TDRR 21189	22 Jul 65	agd	WK
R	REVISED PER TDRR 22594	28 Sep 65	[illegible]	WK
Ⓜ S	REVISED TDRR 23701	[illegible]	[illegible]	WK
T	REVISED TDRR 25796	15 Feb 66	[illegible]	WK
U	REVISED TDRR 26252	15 Feb 66	[illegible]	WK
V	REVISED PER TDRR 26598	24 Feb 66	[illegible]	WK
W	REVISED PER TDRR 27508	3 Mar 66	[illegible]	WK
Ⓜ Y	REVISED PER TDRR 32107	6 DEC 66	EH	EFS
Z	REVISED PER TDRR 33318	4 APR 67	[illegible]	[illegible]
Ⓜ AA	REVISED PER TDRR 33355	4 APR 67	[illegible]	[illegible]
AB	REVISED PER TDRR 34722	20 OCT 67	JS	RWH


E18 REF
8 REF
12 REF
5 REF

DETAIL A
SCALE 4/1
TYP


17
3
SEE NOTE 3A AND 7
6 PLACES
SEE NOTE 3C
4 PLACES
X
9
SEE NOTE 3A AND 7
12 PLACES
2
11
20
22
Z
SEE NOTE 4
14 PLACES
5 FOR 011
4 PLACES
16 FOR 021
4 PLACES
P9
J9
P10
E20
J10
Y
8 SEE NOTE 3B
15 7
14 6
8 PLACES
P11
J11
P2
E18
J12
E21
SEE DETAIL A
8 SEE NOTE 3B
12 8 PLACES
4
18
SEE NOTE 3A AND 7
6 PLACES
MID8

	QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
	1	—	—	—	2018604-041	INNER AXIS ASSEMBLY	22
	AR	AR	AR	AR	1008930	GREASE, MOLYBDENUM DISULFIDE	21
	—	1	—	—	2018604-031	INNER AXIS ASSEMBLY	20
SEE NOTE 6	AR	AR	AR	AR	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	19
	1	1	1	—	2018610-021	IGSA TORQUE MOTOR MIDDLE AXIS	18
	1	1	1	—	2018613-021	IGSA RESOLVER MIDDLE AXIS	17
	4	4	4	—	2018841	BRACKET, CONN.	16
	8	8	8	—	MS15795-803	WASHER, FLAT ROUND	15
	8	8	8	—	2018843 SEE NOTE 5	CABLE, CLAMP	14
	1	1	1	—	2018758-001	MIDDLE GIMBAL HOUSING ASSEMBLY	13
	8	8	8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMBL	12
	—	—	1	—	2018604-021	INNER AXIS ASSEMBLY	11
	~~—~~	~~—~~	~~8~~	~~8~~	~~MS15795-303~~	~~WASHER, FLAT, METAL, ROUND~~	~~10~~
	12	12	12	12	1001489-18	SCREW, HEX SOC HD	9
	16	16	16	16	1001488-1	SCREW, HEX SOC HD	8
	—	—	—	8	1000223	WASHER, CABLE CLAMP.	7
	—	—	—	8	1000220-SEE NOTE 5	CABLE CLAMP	6
	—	—	—	4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
	—	—	—	1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
	—	—	—	1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
	—	—	—	1	2018604-011	INNER AXIS ASSEMBLY	2
	—	—	—	1	2018758	MIDDLE GIMBAL HOUSING ASSY	1

LIST OF MATERIALS

2018603 AB

NEXT ASSY	USED ON
2018602	DL2018601

APPLICATION

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HEAT TREATMENT ———
FINAL FINISH ———

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DWG NO CONTRACT
DRAWN P. F[illegible] DATE 4 Mar 65
CHECKED G. Quinn 3-1-65
APPROVAL [illegible] 2 Mar 65
APPROVAL
NASA APPROVAL W. J. [illegible] 3-2-65
MIT APPROVAL W. [illegible] 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MIDDLE AXIS ASSEMBLY

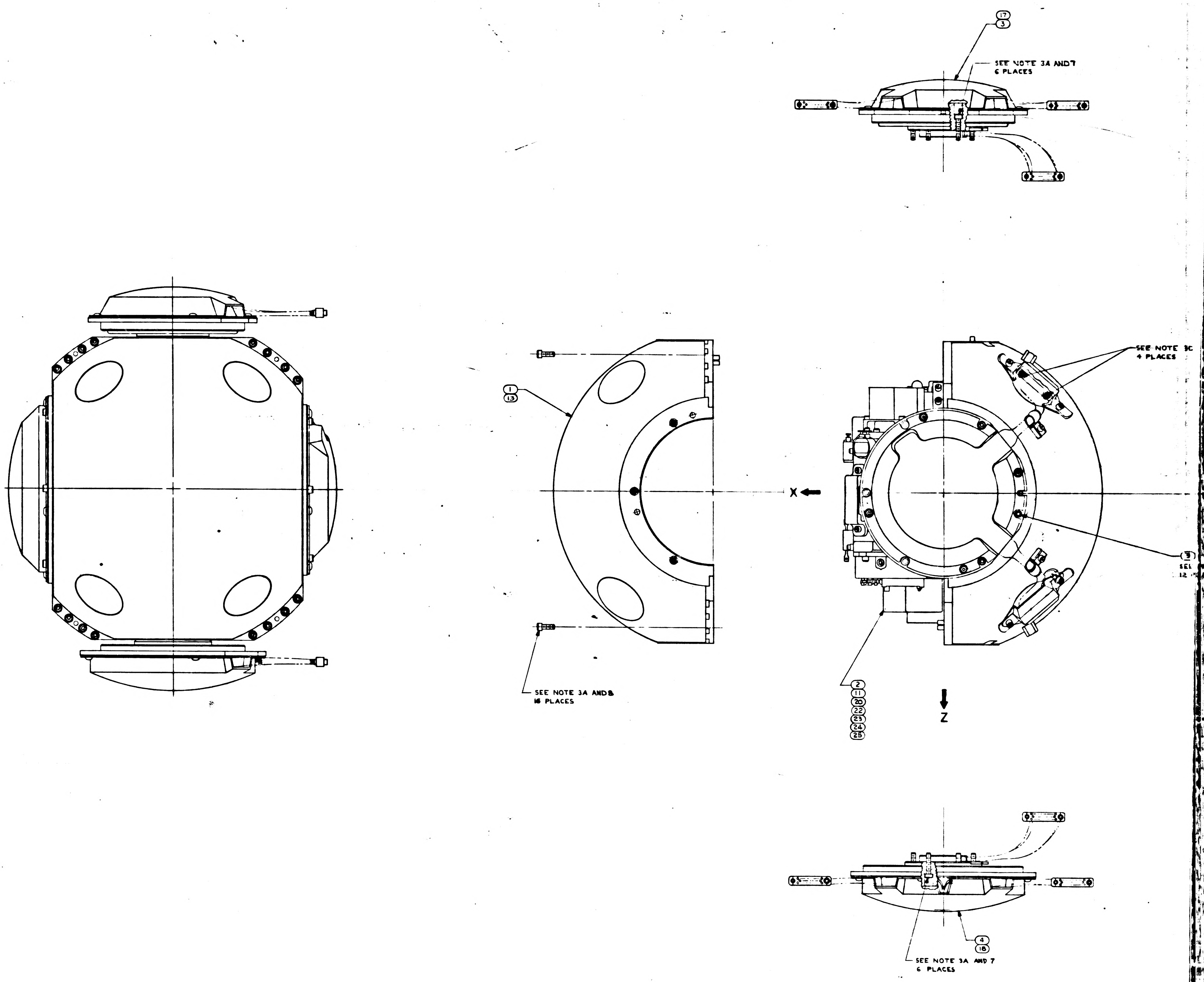
CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 2018603
SCALE 1/1
WT
SHEET 1 OF 1

8603	AB	1

272018603

TABLE I	
CABLE CLAMP ⑥	CABLE CLAMP ⑭

PART NO.	DIA REF	DIA REF
1000220-13	5/32	—
1000220-4	3/16	—
1000220-14	7/32	—
1000220-5	1/4	—
1000220-15	9/32	—
1000220-6	5/16	—
1000220-16	11/32	—
1000220-7	3/8	—
2018843-001	—	1/4
2018843-002	—	5/16
2018843-003	-	3/8



⑰
③
SEE NOTE 3A AND 7
6 PLACES
①
⑬
X
SEE NOTE 3C
4 PLACES
⑨
SEE NOTE
12 PLACES
SEE NOTE 3A AND 8
16 PLACES
②
⑪
⑳
㉒
㉓
㉔
㉕
Z
④
⑱
SEE NOTE 3A AND 7
6 PLACES

NOTES

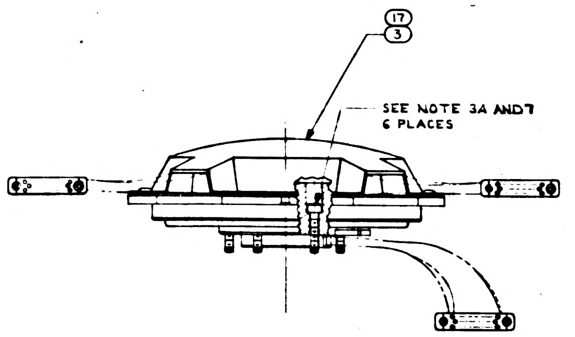
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

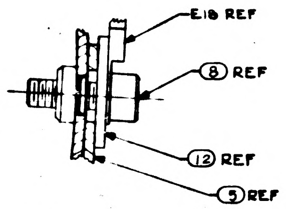
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 10.0 IN-LB
   B. 5.0 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM ⑥ + ⑭ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
6. TAPE ⑮ SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
7. APPLY A UNIFORM THIN FILM OF ITEM ㉑ TO SCREW THREADS.
8. APPLY A UNIFORM THIN FILM OF ITEM ㉑ TO SCREW THREADS AND UNDERSIDE OF SCREW HEAD.

3H

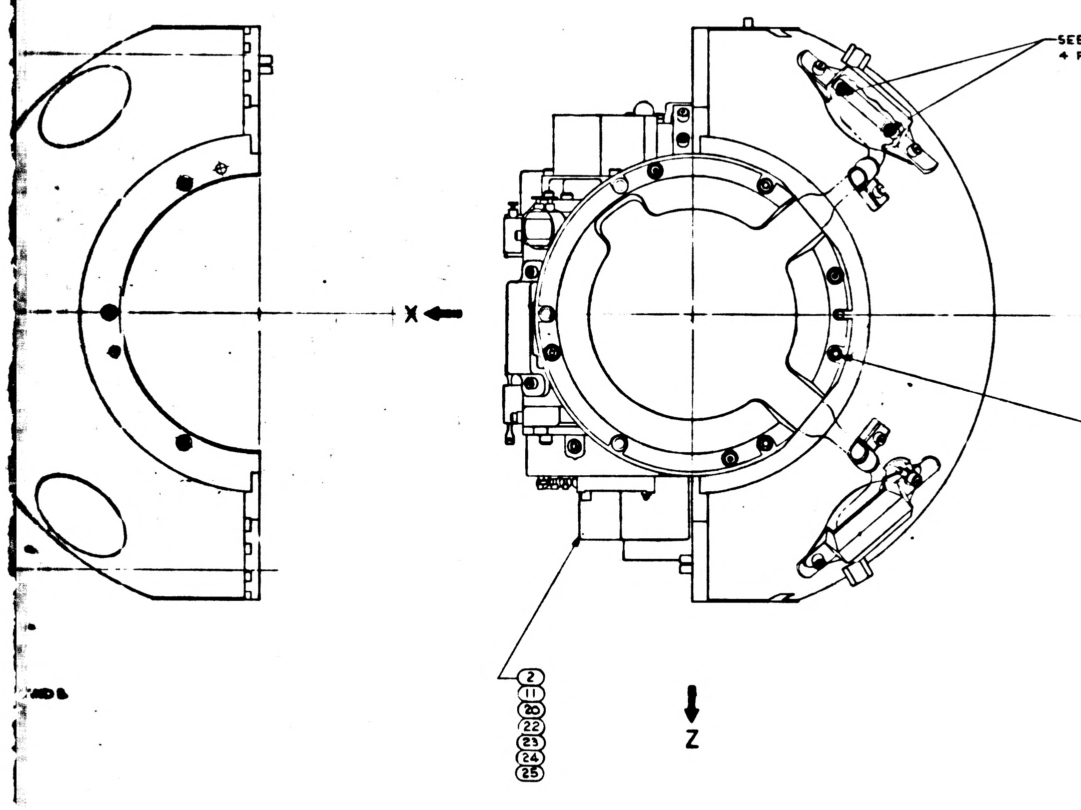
2018603	AC	1

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES TDRR 17096	[illegible]		
M	REVISED PER TDRR 19275	2 Jun 65		
N	REVISED PER TDRR 20089	22 Jul 65		
P	REVISED PER TDRR 21189	22 Jul 65		
R	REVISED PER TDRR 22594	28 Sep 65		
S	REVISED TDRR 23701	[illegible]		
T	REVISED TDRR 25796	[illegible]		
U	REVISED TDRR 26252	[illegible]		
V	REVISED PER TDRR 26598	[illegible]		
W	REVISED PER TDRR 27508	[illegible]		
Y	REVISED PER TDRR 32107	[illegible]	E H	EFS
Z	REVISED PER TDRR 33318	[illegible]		
AA	REVISED PER TDRR 33355	[illegible]		
AB	REVISED PER TDRR 34722	20 OCT 67	JS	RWH
AC	REVISED PER TDRR 35726	[illegible]	JJ	


17
3
SEE NOTE 3A AND 7
6 PLACES


E16 REF
8 REF
12 REF
5 REF

DETAIL A
SCALE 4/1
TYP


SEE NOTE 3C
4 PLACES
X
9
SEE NOTE 3A AND 7
12 PLACES
2
11
20
22
23
24
25
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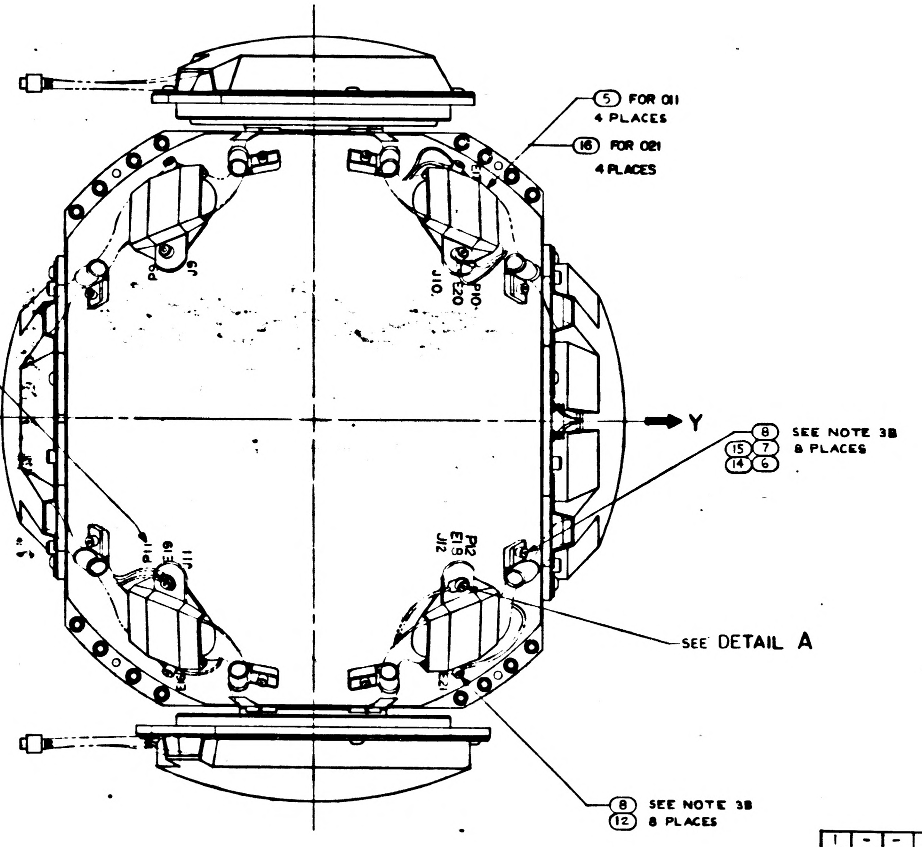
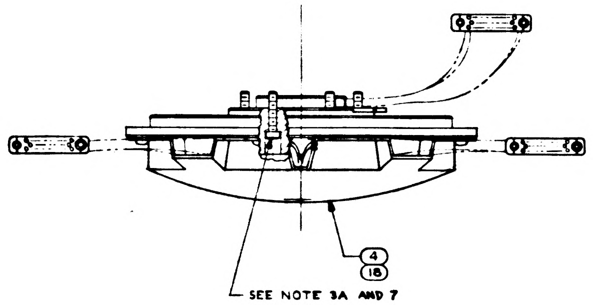

5 FOR 011
4 PLACES
16 FOR 021
4 PLACES
SEE NOTE 4
14 PLACES
P9
J9
J10
P10
E20
Y
8 SEE NOTE 3B
15 7
14 6
8 PLACES
P11
E19
J11
P12
E19
J12
SEE DETAIL A
8 SEE NOTE 3B
12 8 PLACES


4
18
SEE NOTE 3A AND 7
6 PLACES

1	-	-	-	-	-	-	2018604-071	INNER AXIS ASSEMBLY	25
-	1	-	-	-	-	-	2018604-061	INNER AXIS ASSEMBLY	24
-	-	1	-	-	-	-	2018604-051	INNER AXIS ASSEMBLY	23
-	-	-	1	-	-	-	2018604-041	INNER AXIS ASSEMBLY	22
AR	AR	AR	AR	AR	AR	AR	1008930	GREASE, MOLYBDENUM DISULFIDE	21
-	-	-	-	1	-	-	2018604-031	INNER AXIS ASSEMBLY	20
AR	AR	AR	AR	AR	AR	AR	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	19
-	1	1	1	1	1	-	2018610-021	IGSA TORQUE MOTOR MIDDLE AXIS	18
-	1	1	1	1	1	-	2018613-021	IGSA RESOLVER MIDDLE AXIS	17
-	4	4	4	4	4	-	2018841	BRACKET, CONN.	16
-	8	8	8	8	8	-	MS15795-803	WASHER, FLAT ROUND	15
-	8	8	8	8	8	-	2018843 SEE NOTE 5	CABLE, CLAMP	14
-	1	1	1	1	1	-	2018758-001	MIDDLE GIMBAL HOUSING ASSEMBLY	13
8	8	8	8	8	8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMBL	12
-	-	-	-	-	1	-	2018604-021	INNER AXIS ASSEMBLY	11
					~~8~~	~~8~~	~~MS15795-303~~	~~WASHER, FLAT, METAL, ROUND~~	~~10~~
12	12	12	12	12	12	12	1001489-18	SCREW, HEX SOC HD	9
16	16	16	16	16	16	16	1001486-1	SCREW, HEX SOC HD	8
8	-	-	-	-	-	8	1000223	WASHER, CABLE CLAMP.	7
8	-	-	-	-	-	8	1000220-SEE NOTE 5	CABLE CLAMP	6
4	-	-	-	-	-	4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
1	-	-	-	-	-	1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
1	-	-	-	-	-	1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
-	-	-	-	-	-	1	2018604-011	INNER AXIS ASSEMBLY	2
1	-	-	-	-	-	1	2018758	MIDDLE GIMBAL HOUSING ASSY	1
QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
071	061	051	041	031	021	011	LIST OF MATERIALS		

SEE NOTE 6

2018602	DL2018601
NEXT ASSY	USED ON
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APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

MIDDLE AXIS
ASSEMBLY

CODE IDENT NO 80230 | SIZE J | NASA DRAWING NO 2018603
SCALE 1/1 | WT | SHEET 1 OF 1

2018603 AC

1603 | AC | 1

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4 3 2 1

PART NO.	NOMENCLATURE	QTY REQ'D
2018602	INNER AXIS ASSY	1
1000119	CONNECTOR	2
2018758	HSG ASSY M.G.	1
2018621	BEARING, DUPLEX	2
2018731	CLIP, WIRE RETAINER	3
2018736	HSG, BRG RSVR M.A.	1
2018730	SHAFT, STUB RSVR	1
2018631	RESOLVER	1
2018723	NUT, BRG RET	1
2018733	PLATE, BRG RET	1
2018732	CLIP, WIRE RET.	1
100100-1	TERMINAL	2
2018749	HOUSING, BEARING TM MA	1
2018753	PLATE, BEARING RET MA&OA	1
2018745	CLIP, RETAINING TM IA&MA	6
2018748	SHAFT, STUB TM MA	1

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REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 Jul 64	WK	
	A	TDRR 10904	14 Jul 64	saa	WK

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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APPLICATION

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APPROVED		1 July 64
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APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE 7/7/64

MIDDLE
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ASS'Y

SCALE	UNIT WT.	CODE IDENT.

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SHEET OF

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PART NO.	NOMENCLATURE	QTY REQ'D
2018602	INNER AXIS ASSY	1
1000119	CONNECTOR	2
2018758	HSG ASSY M.G.	1
2018621	BEARING DUPLEX	2
2018731	CLIP, WIRE RETAINER	3
2018736	HSG, BRG RSVR M.A.	1
2018730	SHAFT, STUB RSVR	1
2018631	RESOLVER	1
2018723	NUT, BRG RET	1
2018733	PLATE, BRG RET	1
2018732	CLIP, WIRE RET.	1
100100-1	TERMINAL	2
2018749	HOUSING, BEARING TM MA	1
2018753	PLATE, BEARING RET MA&OA	1
2018745	CLIP, RETAINING TM IA& MA	6
2018748	SHAFT, STUB TM MA	1
2018624	SLIP RING ASSY	2

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10904	14 JUL 64		WK
	B	TDRR 11886	17 AUG 64		WK

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LIST OF PARTS AND MATERIALS

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APPROVED FOR MSC: 7/7/64
MIT/IL APPROVAL: W Ruefer DATE: 7/7/64

MIDDLE
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ASS'Y

SCALE
UNIT WT.
CODE IDENT.

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SHEET OF

INCHES
0 1 2
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PART NO.	NOMENCLATURE	QTY REQ'D
2018602	INNER AXIS ASSY	1
1000119	CONNECTOR	2
2018758	HSG ASSY M.G.	1
2018621	BEARING, DUPLEX	1
2018731	CLIP, WIRE RETAINER	2
~~2018736~~	~~HSG, BRG RSVR M.A.~~	~~1~~
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018723~~	~~NUT, BRG RET~~	~~1~~
~~2018733~~	~~PLATE, BRG RET~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET.~~	~~1~~
100100-1	TERMINAL	2
2018749	HOUSING, BEARING TM MA	1
2018753	PLATE, BEARING RET MA&OA	1
2018745	CLIP, RETAINING TM IA& MA	6
2018748	SHAFT, STUB TM MA	1
2018624	SLIP RING ASSY	2
2018607	RESOLVER ASS'Y M.A.	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 Jul 64	WK	
	A	TDRR 10904	14 Jul 64	SAA	WK
	B	TDRR 11886	17 AUG 64	SAA	WK
	C	TDRR 11992	25 AUG 64	AJB	WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

2018602	
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APPLICATION	

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APPROVED FOR MSC		7/7/64
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MIDDLE
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ASS'Y

SCALE	UNIT WT.	CODE IDENT.

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2018603

SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

PART NO.	NOMENCLATURE	QTY REQ'D
2018602	INNER AXIS ASSY	1
1000122	CONNECTOR ELECT	4
2018758	HSG ASSY M.G.	1
2018621	BEARING DUPLEX	1
2018731	CLIP, WIRE RETAINER	2
~~2018736~~	~~HSG, BRG RSVR M.A.~~	~~1~~
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018723~~	~~NUT, BRG RET~~	~~1~~
~~2018733~~	~~PLATE, BRG RET~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET.~~	~~1~~
100100-1	TERMINAL	2
2018749	HOUSING, BEARING TM MA	1
2018753	PLATE, BEARING RET MA&OA	1
2018745	CLIP, RETAINING TM IA&MA	6
2018748	SHAFT, STUB TM MA	1
2018624	SLIP RING ASSY	2
2018607	RESOLVER ASS'Y M.A.	1
1000123	CONNECTOR ELECT	4

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 Jul 64	WK	
	A	TDRR 10904	14 Jul 64		WK
	B	TDRR 11886	17 AUG 64		WK
	C	TDRR 11992	23 AUG 64	AJB	WK
	D	TDRR 12642	10 Sep 64		

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018602	

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		DATE
APPROVED		July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE
		7/7/64

MIDDLE
AXIS
ASS'Y

SCALE
UNIT WT.
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2018603

SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

PART NO.	NOMENCLATURE	QTY REQ'D
2018604	INNER AXIS ASSY	1
1000122	CONNECTOR ELECT	4
2018758	HSG ASSY M.G.	1
2018621	BEARING, DUPLEX	1
2018731	CLIP, WIRE RETAINER	2
~~2018736~~	~~HSG, BRG RSVR M.A.~~	~~1~~
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018723~~	~~NUT, BRG RET~~	~~1~~
~~2018733~~	~~PLATE, BRG RET~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET.~~	~~1~~
100100-1	TERMINAL	2
2018749	HOUSING, BEARING TM MA	1
2018753	PLATE, BEARING RET MA&OA	1
2018745	CLIP, RETAINING TM IA&MA	6
2018748	SHAFT, STUB TM MA	1
2018624	SLIP RING ASSY	2
2018607	RESOLVER ASS'Y M.A.	1
1000123	CONNECTOR ELECT	4

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 Jul 64	WK	
	A	TDRR 10904	14 Jul 64		WK
	B	TDRR 11886	17 AUG 64		WK
	C	TDRR 11992	25 AUG 64	AJB	WK
	D	TDRR 12642	10 SEP 64		
	E	TDRR 13163	30 SEP 64		WK.

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018602	

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		DATE
APPROVED		July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE 7/7/64

MIDDLE
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

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INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED
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HOUSTON TEXAS

NASA DRAWING NO.
2018603

SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4 3 2 1

PART NO.	NOMENCLATURE	QTY REQ'D
2018604	INNER AXIS ASSY	1
1000122	CONNECTOR ELECT	4
2018758	HSG ASSY M.G.	1
2018621	BEARING, DUPLEX	1
2018731	CLIP, WIRE RETAINER	2
~~2018736~~	~~HSG, BRG RSVR M.A.~~	~~1~~
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018723~~	~~NUT, BRG RET~~	~~1~~
~~2018733~~	~~PLATE, BRG RET~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET.~~	~~1~~
100100-1	TERMINAL	2
2018749	HOUSING, BEARING TM MA	1
2018753	PLATE, BEARING RET MA&OA	1
2018745	CLIP, RETAINING TM IA&MA	6
2018748	SHAFT, STUB TM MA	1
2018624	SLIP RING ASSY	2
2018607	RESOLVER ASS'Y M.A.	1
1000123	CONNECTOR ELECT	4
2018790	BRACKET, CONNECTOR	4

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 Jul 64	WK	
	A	TDRR 10904	14 Jul 64	SAH	WK
	B	TDRR 11886	17 AUG 64	SAH	WK
	C	TDRR 11992	25 AUG 64	AJB	WK
	D	TDRR 12642	10 Sep 64	[illegible]	[illegible]
	E	TDRR 13163	30 Sep 64	SAH	WK
	F	TDRR 14435	24 Nov 64	SAH	WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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NAS 9-153

		DATE
APPROVED		July 64
CHECKED		
DRAWN	JCE	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL	WKupfer	7/7/64

MIDDLE
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO.
2018603

SHEET OF

4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

4 3 2 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018604-011	INNER AXIS ASSY	1
1000122	CONNECTOR ELECT	4
2018758	HSG ASSY M.G.	1
2018621	BEARING DUPLEX	1
2018731	CLIP, WIRE RETAINER	2
~~2018736~~	~~HSG, BRG RSVR M.A.~~	~~1~~
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018723~~	~~NUT, BRG RET~~	~~1~~
~~2018733~~	~~PLATE, BRG RET~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET.~~	~~1~~
1000100-1	TERMINAL	2
2018749	HOUSING, BEARING TM MA	1
2018753	PLATE, BEARING RET MA&OA	1
2018745	CLIP, RETAINING TM IA& MA	6
2018748	SHAFT, STUB TM MA	1
2018624	SLIP RING ASSY	2
2018607-011	RESOLVER ASS'Y M.A.	1
1000123	CONNECTOR ELECT	4
2018790	BRACKET, CONNECTOR	4

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 Jul 64	WK	
	A	TDRR 10904	14 JUL 64	SAA	WK
	B	TDRR 11886	17 AUG 64	SAA	WK
	C	TDRR 11992	25 AUG 64	AJB	WK
	D	TDRR 12642	10 SEP 64	SAA	[illegible]
	E	TDRR 13163	30 SEP 64	SAA	WK
	F	TDRR 14435	24 Nov 64	SAA	WK
	G	TDRR 14784	15 DEC 64	SAA	WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018602	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED	[illegible]	July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC	[illegible]	7/7/64
MIT/IL APPROVAL	[illegible]	7/7/64

MIDDLE
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO.
2018603

SHEET OF

4 3 2 1

4 3 2 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018604-011	INNER AXIS ASSY	1
1000122	CONNECTOR ELECT	4
2018758	HSG ASSY M.G.	1
2018621	BEARING DUPLEX	1
2018731	CLIP, WIRE RETAINER	2
~~2018736~~	~~HSG, BRG RSVR M.A.~~	~~1~~
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018723~~	~~NUT, BRG RET~~	~~1~~
~~2018733~~	~~PLATE, BRG RET~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET.~~	~~1~~
1000100-1	TERMINAL	2
2018749	HOUSING, BEARING TM MA	1
2018753	PLATE, BEARING RET MA&OA	1
2018745	CLIP, RETAINING TM IA& MA	6
2018748	SHAFT, STUB TM MA	1
2018624	SLIP RING ASSY	2
2018607-011	RESOLVER ASS'Y M.A.	1
1000123	CONNECTOR ELECT	4
2018790	BRACKET, CONNECTOR	4
2018783	WIRE GUIDE	1
2018784	WIRE GUIDE	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10904	14 JUL 64		WK
	B	TDRR 11886	17 AUG 64		WK
	C	TDRR 11992	25 AUG 64	AJB	WK
	D	TDRR 12642	10 SEP 64		
	E	TDRR 13163	30 SEP 64		WK
	F	TDRR 14435	24 Nov 64		WK
	G	TDRR 14784	15 DEC 64		WK
	H	TDRR 15342	4 JAN 65		WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018602	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED		July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE
		7/7/64

MIDDLE
AXIS
ASS'Y

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO.
2018603

SHEET OF

4 3 2 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018604-011	INNER AXIS ASSY	1
1000122	CONNECTOR ELECT	4
2018758	HSG ASSY M.G.	1
2018621	BEARING, DUPLEX	1
2018731	CLIP, WIRE RETAINER	2
~~2018736~~	~~HSG, BRG RSVR M.A.~~	~~1~~
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018723~~	~~NUT, BRG RET~~	~~1~~
~~2018733~~	~~PLATE, BRG RET~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET.~~	~~1~~
1000100-1	TERMINAL	2
2018749	HOUSING, BEARING TM MA	1
2018753	PLATE, BEARING RET MA&OA	1
2018745	CLIP, RETAINING TM IA&MA	6
2018748	SHAFT, STUB TM MA	1
2018624	SLIP RING ASSY	2
2018607-011	RESOLVER ASS'Y M.A.	1
1000123	CONNECTOR ELECT	4
2018790	BRACKET, CONNECTOR	4
2018783	WIRE GUIDE	1
2018784	WIRE GUIDE	1
2018623	MOTOR TORQUE	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
r	—	RELEASE TDRR 10806	7 Jul 64	WK	
r	A	TDRR 10904	14 Jul 64	SAH	WK
	B	TDRR 11886	17 AUG 64	SAH	WK
	C	TDRR 11992	25 AUG 64	AJB	WK
r	D	TDRR 12642	10 SEP 64	SAH	JW
	E	TDRR 13163	30 SEP 64	SAH	WK
	F	TDRR 14435	24 Nov 64	SAH	WK
	G	TDRR 14784	15 DEC 64	SAH	WK
r	H	TDRR 15342	4 JAN 65	SAH	WK
	J	TDRR 15714	25 JAN 65	SAH	WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018602	

APPLICATION

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
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MATERIAL:

MIT INSTRUMENTATION LAB
CONTRACT NAS 9-153
APPROVED — DATE July 64
CHECKED
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APPROVED FOR MSC — 7/7/64
MIT/IL APPROVAL — DATE 7/7/64

MIDDLE
AXIS
ASS'Y

SCALE
UNIT WT.
CODE IDENT.

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DWG. NO.
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO. 2018603
SHEET OF

2018603

PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018604-011	INNER AXIS ASSY	1
1000122	CONNECTOR ELECT	4
2018758	HSG ASSY M.G.	1
2018621	BEARING DUPLEX	1
2018731	CLIP, WIRE RETAINER	2
~~2018736~~	~~HSG, BRG RSVR M.A.~~	~~1~~
~~2018730~~	~~SHAFT, STUB RSVR~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018723~~	~~NUT, BRG RET~~	~~1~~
~~2018733~~	~~PLATE, BRG RET~~	~~1~~
~~2018732~~	~~CLIP, WIRE RET.~~	~~1~~
1000100-1	TERMINAL	2
2018749	HOUSING, BEARING TM MA	1
2018753	PLATE, BEARING RET MA&OA	1
2018745	CLIP, RETAINING TM IA&MA	6
2018748	SHAFT, STUB TM MA	1
2018624	SLIP RING ASSY	2
2018607-011	RESOLVER ASS'Y M.A.	1
1000123	CONNECTOR ELECT	4
2018790	BRACKET, CONNECTOR	4
2018783	WIRE GUIDE	1
2018784	WIRE GUIDE	1
2018623	MOTOR TORQUE	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	RELEASE TDRR 10806	7 Jul 64	WK
	A	TDRR 10904	14 Jul 64	WK
	B	TDRR 11886	17 AUG 64	WK
	C	TDRR 11992	23 AUG 64	WK
	D	TDRR 12642	10 SEP 64	
	E	TDRR 13163	30 SEP 64	WK.
	F	TDRR 14435	24 Nov 64	WK
	G	TDRR 14784	15 DEC 64	WK
	H	TDRR 15342	4 JAN 65	WK
	J	TDRR 15714	25 JAN 65	WK.
	K	REPLACED BY REV L WITH CHANGES TDRR 17096	2 Mar 65	WK.

REPLACED BY REV L WITH CHANGES

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018602	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153
APPROVED — DATE: July 64
CHECKED
DRAWN JCF
APPROVED FOR MSC — 7/7/64
MIT/IL APPROVAL — DATE 7/7/64

MIDDLE
AXIS
ASS'Y

SCALE
UNIT WT.
CODE IDENT.

MIT
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CAMBRIDGE, MASS.
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MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018603
SHEET OF

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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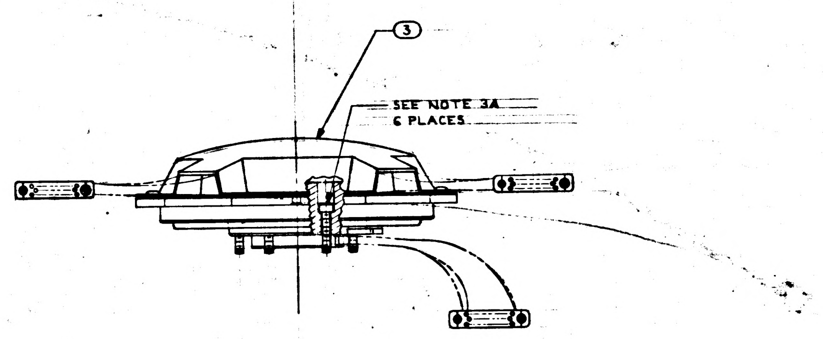
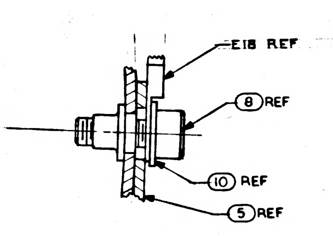
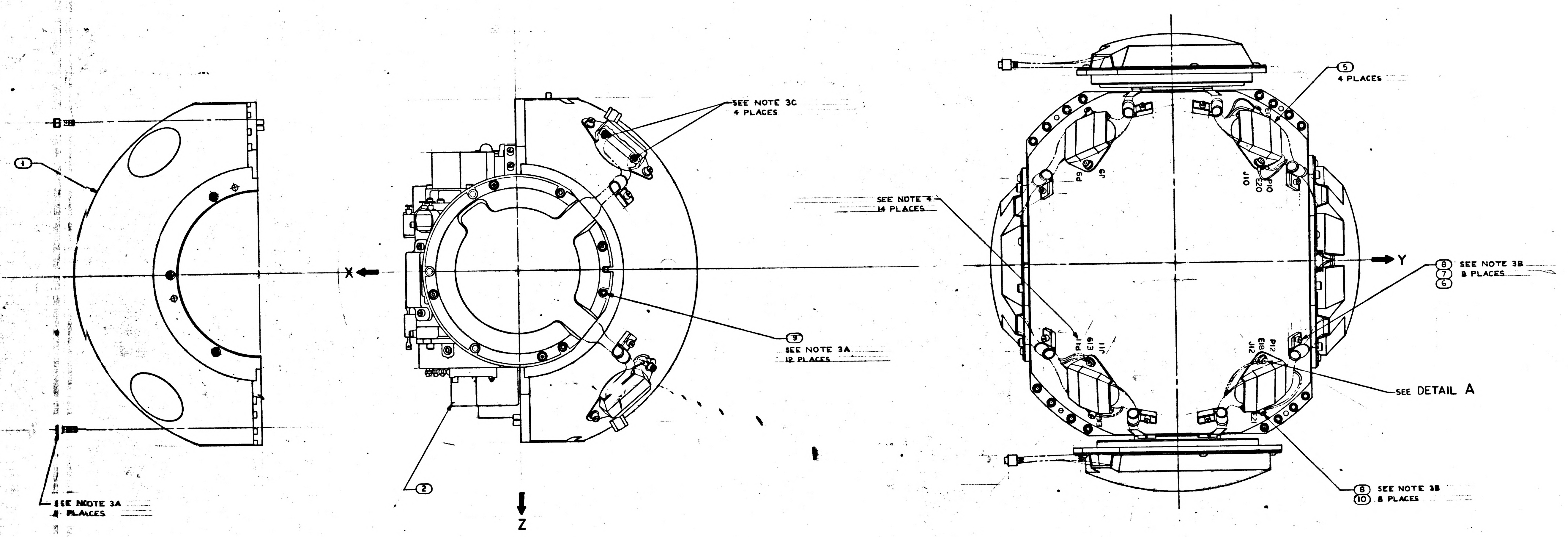
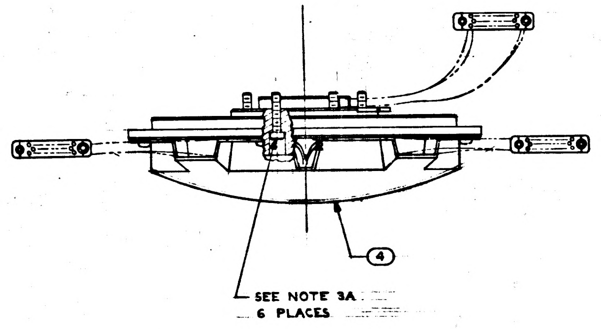

3
SEE NOTE 3A
6 PLACES


E18 REF
8 REF
10 REF
5 REF

DETAIL A
SCALE 4/1
TYP


1
SEE NOTE 3A
8 PLACES
X
2
Z
SEE NOTE 3C
4 PLACES
9
SEE NOTE 3A
12 PLACES
SEE NOTE 4
14 PLACES
5
4 PLACES
P9
J9
J10
P10
E20
Y
8
7
6
SEE NOTE 3B
8 PLACES
P11
J11
E19
P12
E18
J12
SEE DETAIL A
8
10
SEE NOTE 3B
8 PLACES


4
SEE NOTE 3A
6 PLACES

REPLACES REV K
WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
8	MS15795-303	WASHER, FLAT, METAL, ROUND	10
12	1001489-18	SCREW, HEX SOC HD	9
16	1001489-2	SCREW, HEX SOC HD	8
8	1000223	WASHER, CABLE CLAMP	7
8	1000220-SEE NOTE 5	CABLE CLAMP	6
4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
1	2018604-011	INNER AXIS ASSEMBLY	2
1	2018758	MIDDLE GIMBAL HOUSING ASSY	1
011	LIST OF MATERIALS		

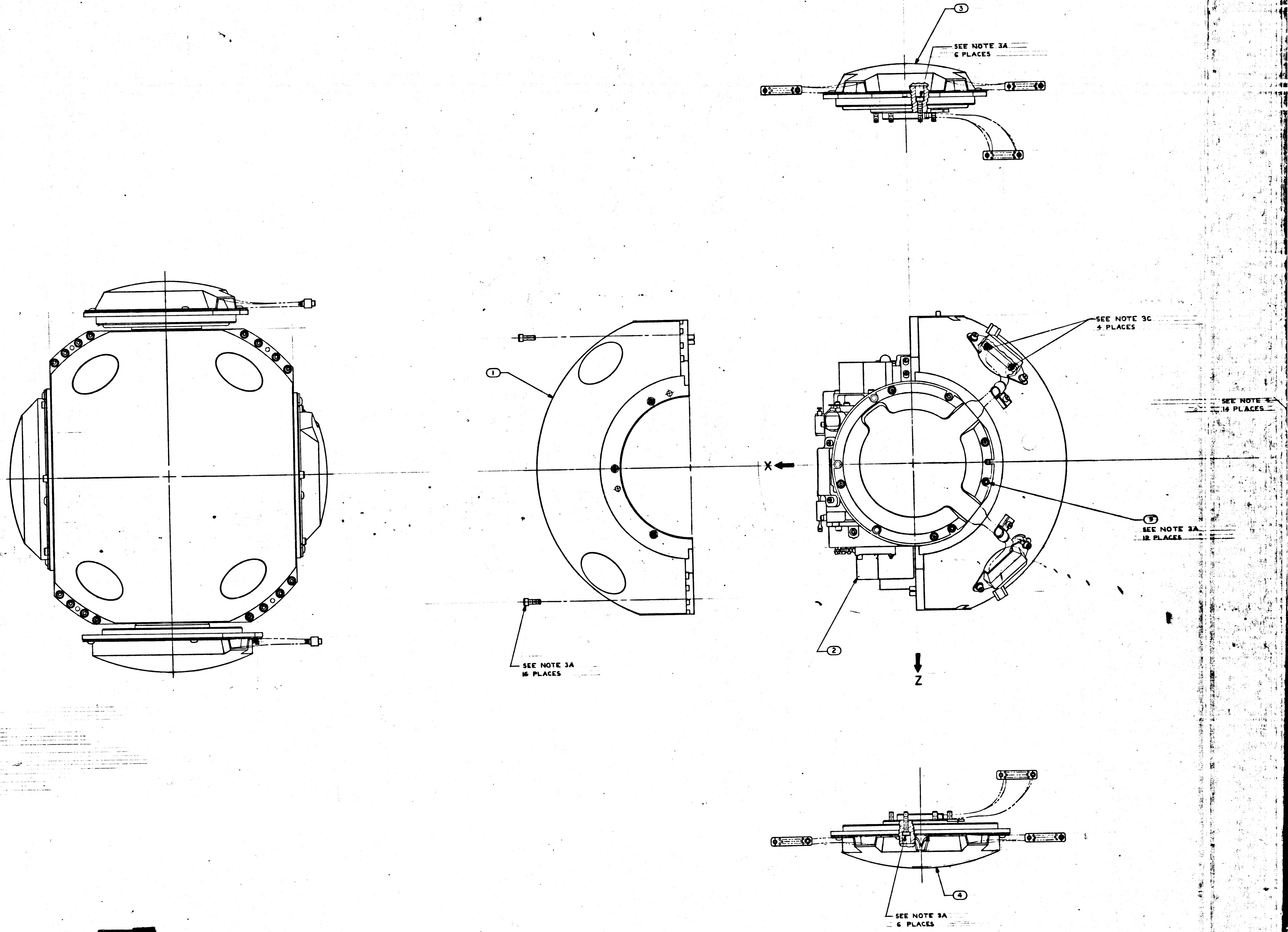
E-2

MASTER

2018602	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	MIT INSTRUMENTATION LAB Cambridge, Mass DRAWN J. Falzone DATE 4 Feb 65 CHECKED G. QUINN 3-1-65 APPROVAL 2 Mar 65 APPROVAL NASA APPROVAL 3-2-65 MIT APPROVAL 2 Mar 65	MANNED SPACECRAFT CENTER HOUSTON, TEXAS MIDDLE AXIS ASSEMBLY CODE IDENT NO. SIZE J NASA DRAWING NO. 2018603 SCALE 1/1 WT SHEET 1 OF
NEXT ASSY	USED ON			
APPLICATION				

2018603 REV L SHEET 1

TABLE I	
CABLE CLAMP ⑥	
PART NO.	DIA REF
1000220-13	5/32
1000220-4	3/16
1000220-14	7/32
1000220-5	1/4
1000220-15	9/32
1000220-6	5/16
1000220-16	11/32
1000220-7	3/8


③
SEE NOTE 3A
6 PLACES
①
SEE NOTE 3C
4 PLACES
SEE NOTE 4
14 PLACES
X
⑤
SEE NOTE 3A
12 PLACES
SEE NOTE 3A
16 PLACES
②
Z
④
SEE NOTE 3A
6 PLACES

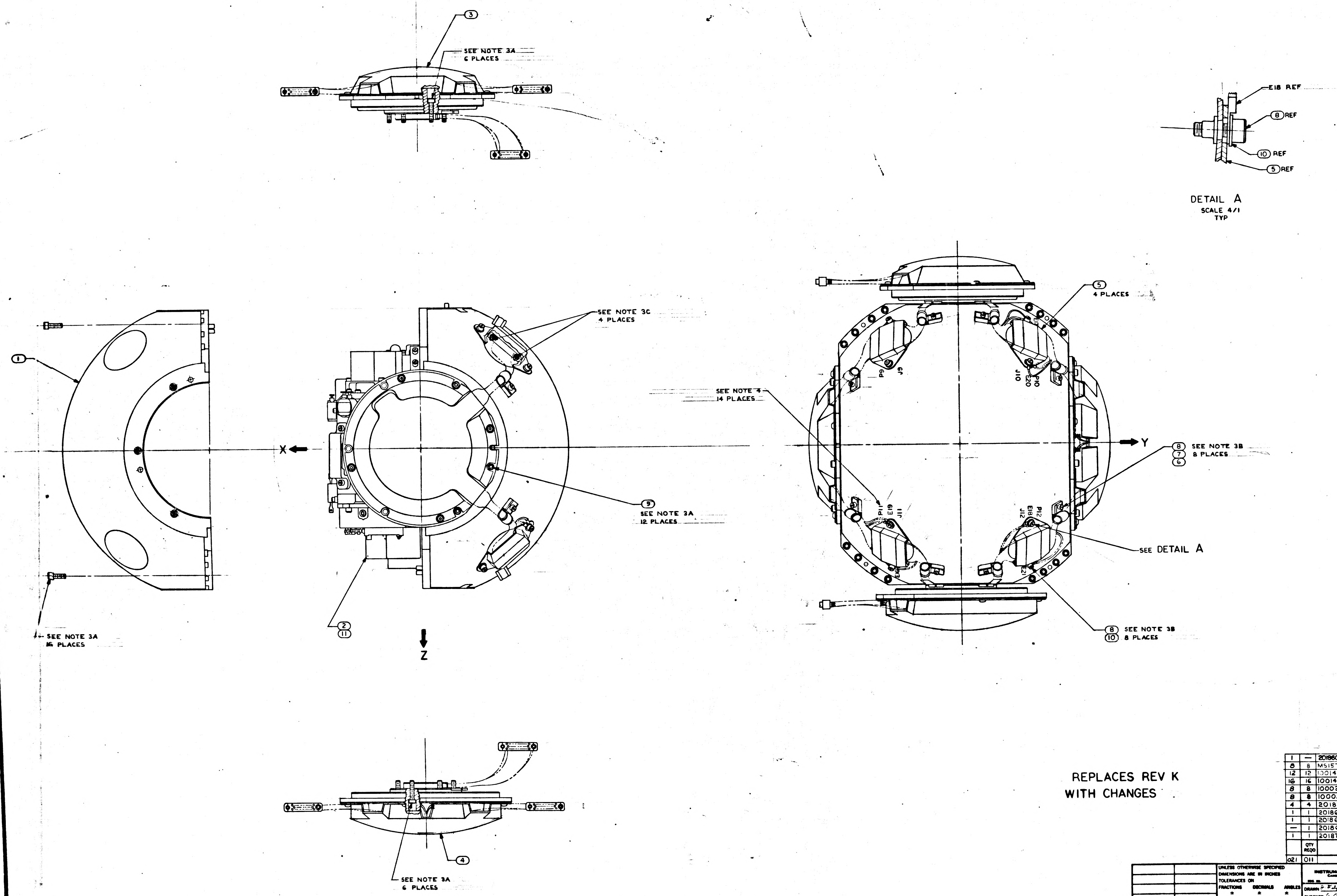
NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS 2007203
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 10.0 IN-LB
   B. 5.0 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM ⑥ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

F1

	REV	SHEET
2018603	L	1

PS 2007 203

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
L	REPLACES REV K WITH CHANGES TDRR 17096	2 MAR 65	
M	REVISED PER TDRR 19275	2 Jun 65	



3
SEE NOTE 3A
6 PLACES
E18 REF
8 REF
10 REF
5 REF
DETAIL A
SCALE 4/1
TYP
1
SEE NOTE 3C
4 PLACES
X
SEE NOTE 3A
16 PLACES
2
11
Z
9
SEE NOTE 3A
12 PLACES
5
4 PLACES
SEE NOTE 4
14 PLACES
P9
J9
J10
P10
E20
Y
8
7
6
SEE NOTE 3B
8 PLACES
P11
E19
J11
P12
E18
J12
E21
SEE DETAIL A
8
10
SEE NOTE 3B
8 PLACES
4
SEE NOTE 3A
6 PLACES

REPLACES REV K
WITH CHANGES

	QTY REQD		PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011				
1	—		2018604-021	INNER AXIS ASSEMBLY	11
8	8		MS15795-303	WASHER, FLAT, METAL, ROUND	10
12	12		1001489-18	SCREW, HEX SOC HD	9
16	16		1001489-2	SCREW, HEX SOC HD	8
8	8		1000223	WASHER, CABLE CLAMP.	7
8	8		1000220-SEE NOTE 5	CABLE CLAMP	6
4	4		2018790	BRACKET, CONN MIDDLE GIMBAL	5
1	1		2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
1	1		2018613-011	IGSA RESOLVER MIDDLE AXIS	3
—	1		2018604-011	INNER AXIS ASSEMBLY	2
1	1		2018758	MIDDLE GIMBAL HOUSING ASSY	1

LIST OF MATERIALS

2018602	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
Cambridge, Mass
DWG. NO. CONTRACT
DRAWN J. Falzone DATE 11 FEB 65
CHECKED G. QUINN 3-1-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MIDDLE AXIS
ASSEMBLY

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	J	2018603

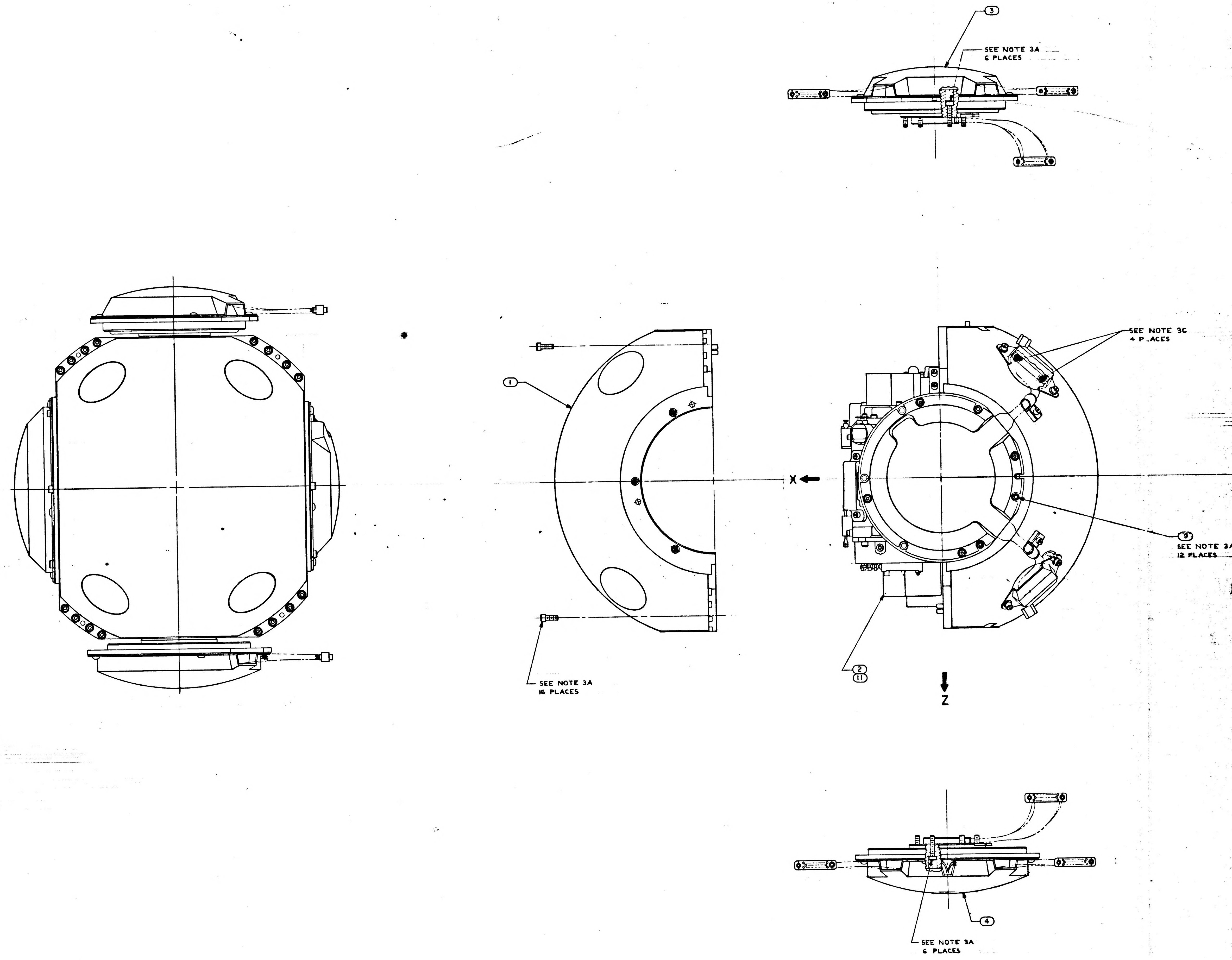
SCALE 1/1 WT SHEET 1 OF

2018603 M

MASTER

	REV	SHEET
2018603	M	1

TABLE I	
CABLE CLAMP ⑥	
PART NO.	DIA REF
1000220-13	5/32
1000220-4	3/16
1000220-14	7/32
1000220-5	1/4
1000220-15	9/32
1000220-6	5/16
1000220-16	11/32
1000220-7	3/8


③
SEE NOTE 3A
6 PLACES
SEE NOTE 3C
4 PLACES
①
X
⑨
SEE NOTE 3A
12 PLACES
②
⑪
Z
SEE NOTE 3A
16 PLACES
④
SEE NOTE 3A
6 PLACES

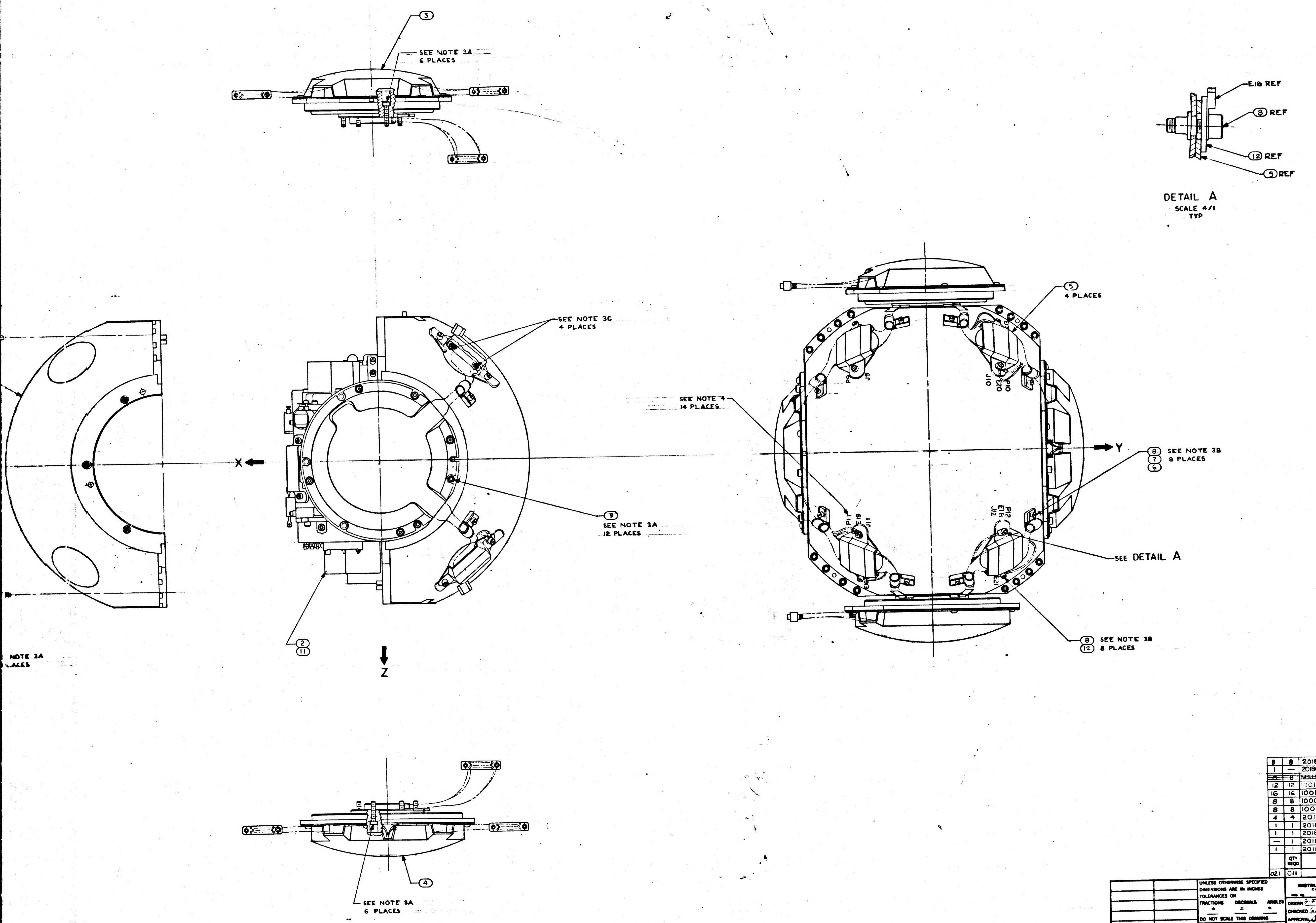
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM ⑥ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

	REV	SHEET
2018603	M	1

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES TDRR 17086	2[illegible]65		WK
M	REVISED PER TDRR 19275	2 Jun 65		WK
N	REVISED PER TDRR 20089	22 Jun 65	ag	WK
P	REVISED PER TDRR 21189	22 Jun 65	ag	WK


4
3
2
1
D
C
B
A
3
SEE NOTE 3A
6 PLACES
E18 REF
8 REF
12 REF
5 REF
DETAIL A
SCALE 4/1
TYP
5
4 PLACES
SEE NOTE 3C
4 PLACES
SEE NOTE 4
14 PLACES
X
Y
8 SEE NOTE 3B
7 8 PLACES
6
P9
J9
E19
P10
E20
J10
P11
E19
J11
P12
E16
J12
9
SEE NOTE 3A
12 PLACES
SEE DETAIL A
2
11
Z
8 SEE NOTE 3B
12 8 PLACES
NOTE 3A
PLACES
4
SEE NOTE 3A
6 PLACES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
8	8	2018812	WASHER BRACKET,CONN MID & OUTER GMBL	12
1	—	2018604-021	INNER AXIS ASSEMBLY	11
~~8~~	8	~~MS15795-303~~	~~WASHER, FLAT, METAL, ROUND~~	~~10~~
12	12	1001489-18	SCREW, HEX SOC HD	9
16	16	1001489-2	SCREW, HEX SOC HD	8
8	8	1000223	WASHER, CABLE CLAMP.	7
8	8	1000220-SEE NOTE 5	CABLE CLAMP	6
4	4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
1	1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
1	1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
—	1	2018604-011	INNER AXIS ASSEMBLY	2
1	1	2018758	MIDDLE GIMBAL HOUSING ASSY	1
021	011	LIST OF MATERIALS		

2018602	DL2018601
NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
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MATERIAL
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FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT

DRAWN J. Falzone DATE 11 Feb 65
CHECKED G. QUINN 3-1-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MIDDLE AXIS
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018603
SCALE 1/1
WT
SHEET 1 OF 1

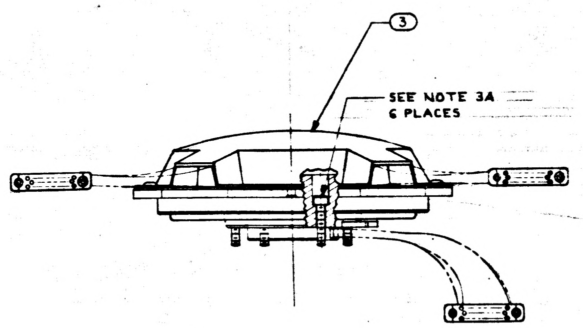
2018603 P

MASTER

2018603 REV P SHEET 1

3H

TABLE I	
CABLE CLAMP (6)	
PART NO.	DIA REF
1000220-13	5/32
1000220-4	3/16
1000220-14	7/32
1000220-5	1/4
1000220-15	9/32
1000220-6	5/16
1000220-16	11/32
1000220-7	3/8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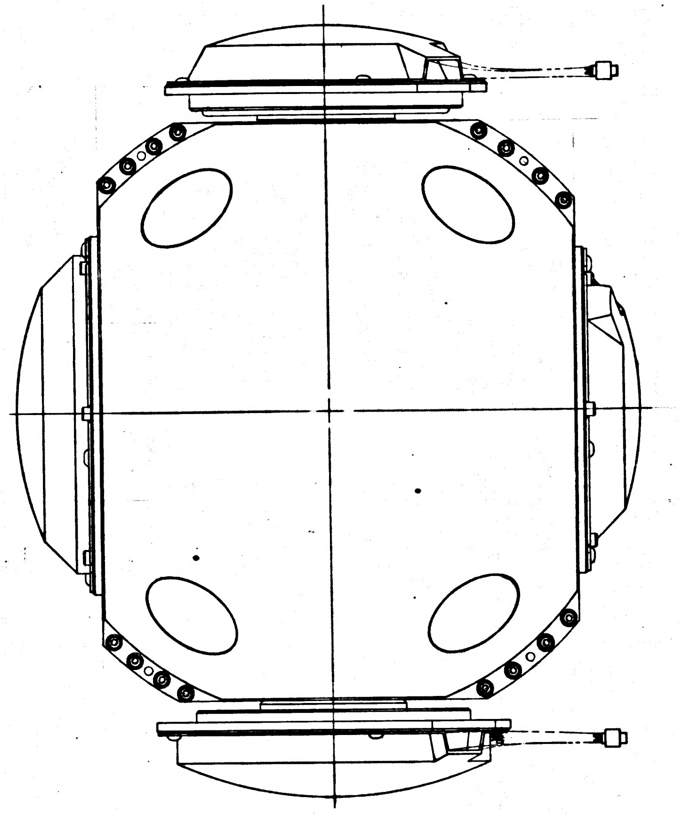
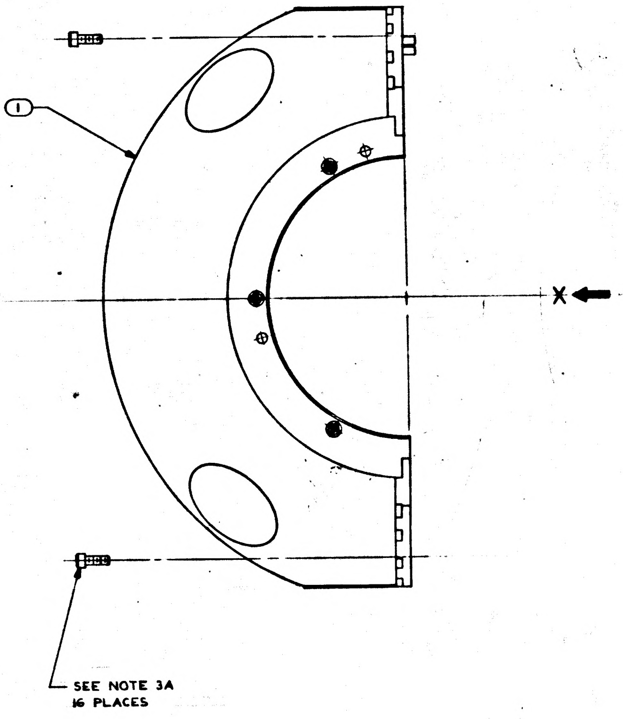
SEE NOTE 3A
6 PLACES

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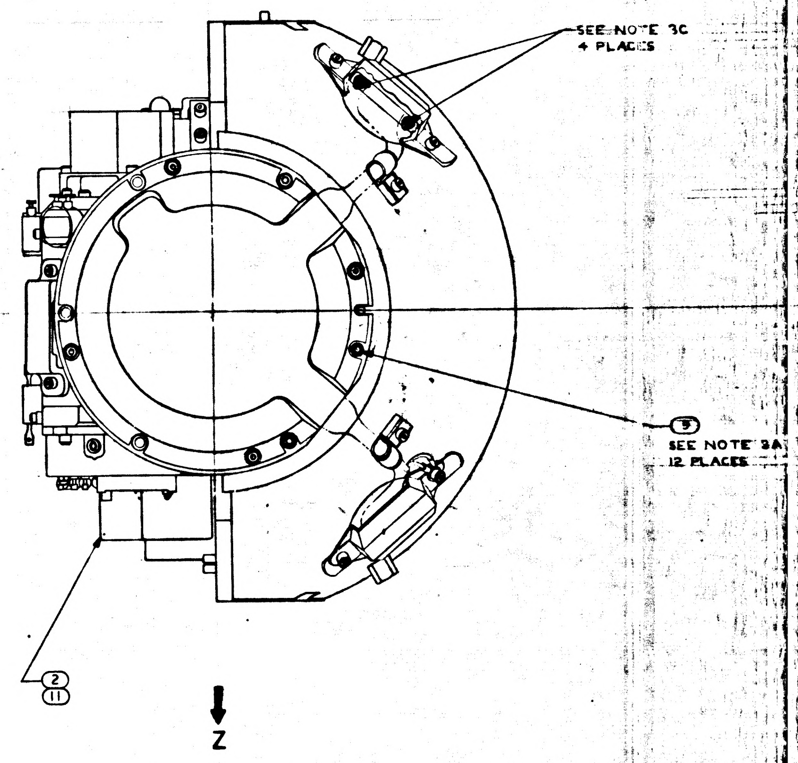
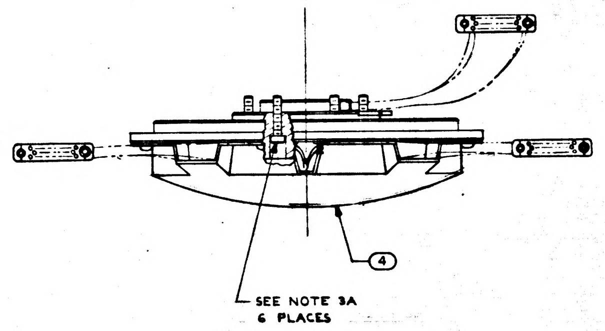
SEE NOTE 3A
16 PLACES


SEE NOTE 3C
4 PLACES
9
SEE NOTE 3A
12 PLACES
2
11
Z

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM (6) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES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SEE NOTE 3A
6 PLACES

2018603	REV	SHEET
	P	1

SYM	DESCRIPTION	DATE	APPROVAL	
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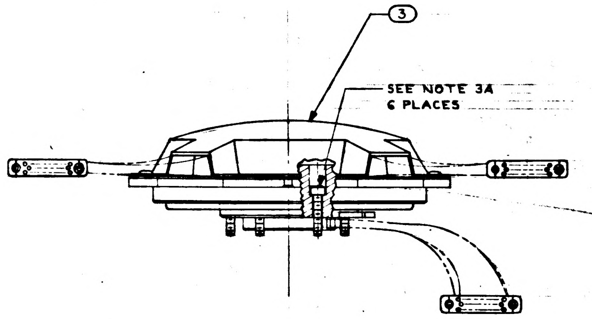
M	REVISED PER TDRR 19275	2 Jun 65	[illegible]	WK
N	REVISED PER TDRR 20089	22 Jul 65	ago	WK
P	REVISED PER TDRR 21189	22 Jul 65	ago	WK
R	REVISED PER TDRR 22594	28 Sep 65	[illegible]	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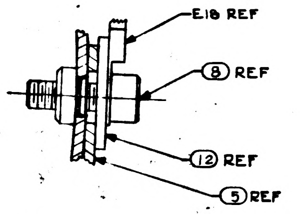
SEE NOTE 3A
6 PLACES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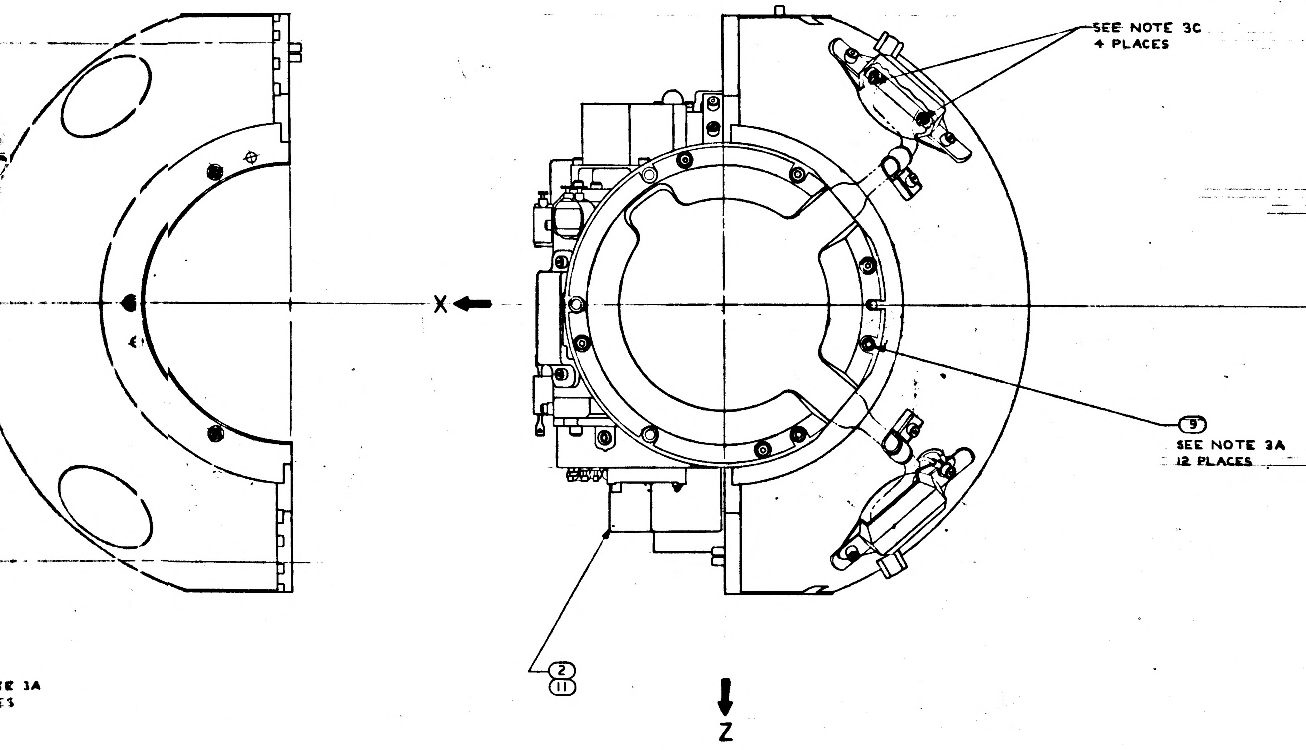
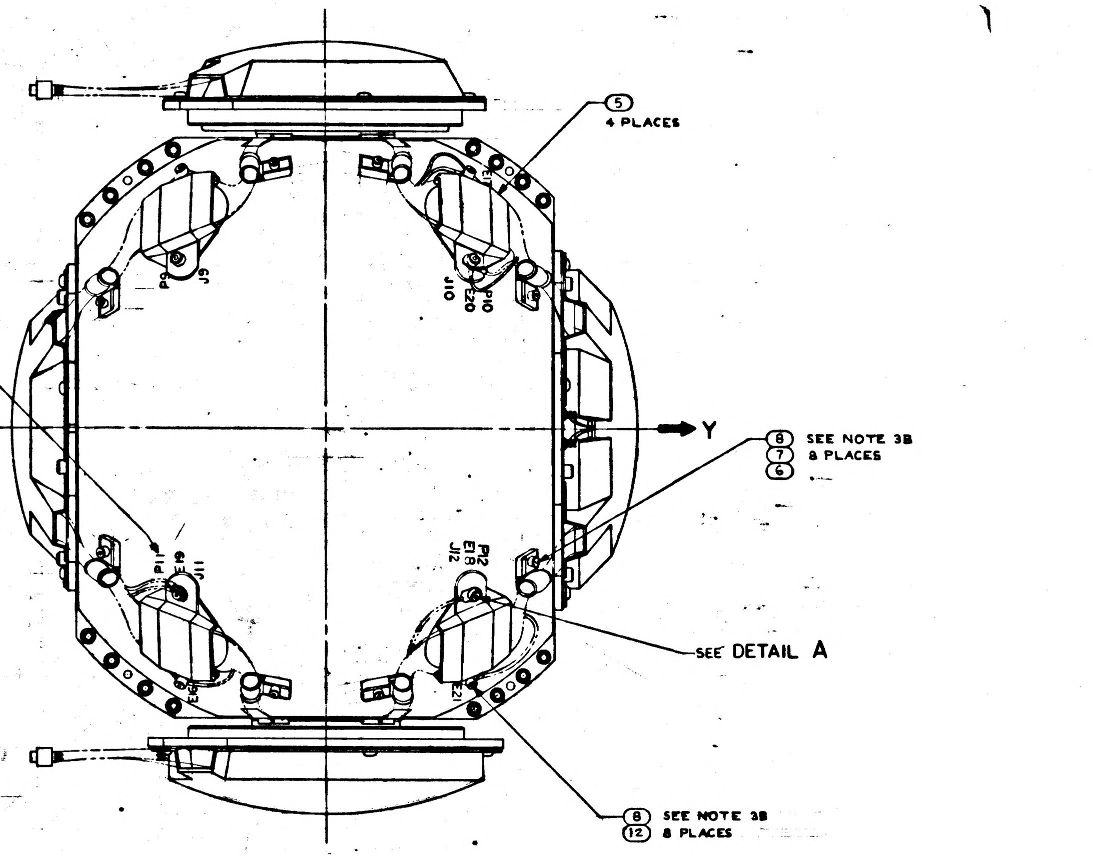
8 REF
12 REF
5 REF

DETAIL A
SCALE 4/1
TYP


SEE NOTE 3C
4 PLACES
X
9
SEE NOTE 3A
12 PLACES
2
11
Z
E 3A
ES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4 PLACES
SEE NOTE 4
14 PLACES
P9
J9
P10
J10
E20
Y
8
7
6
SEE NOTE 3B
8 PLACES
P11
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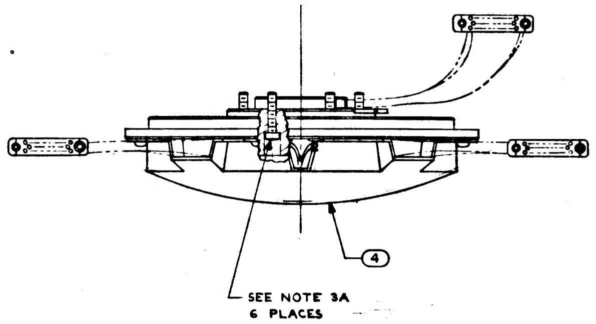
J11
P12
E18
J12
SEE DETAIL A
E3
E2
8
12
SEE NOTE 3B
8 PLACES


4
SEE NOTE 3A
6 PLACES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMBL	12
1	—	2018604-021	INNER AXIS ASSEMBLY	11
~~8~~	~~8~~	~~MS15795-305~~	~~WASHER, FLAT, METAL, ROUND~~	~~10~~
12	12	1001489-18	SCREW, HEX SOC HD	9
16	16	1001488-1	SCREW, HEX SOC HD	8
8	8	1000223	WASHER, CABLE CLAMP	7
8	8	1000220-SEE NOTE 5	CABLE CLAMP	6
4	4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
1	1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
1	1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
—	1	2018604-011	INNER AXIS ASSEMBLY	2
1	1	2018758	MIDDLE GIMBAL HOUSING ASSY	1
021	011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018602	DL2018601
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN J. Falzone DATE 11 Feb 65
CHECKED G. QUINN 3-1-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MIDDLE AXIS
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018603
SCALE 1/1
WT
SHEET 1 OF 1

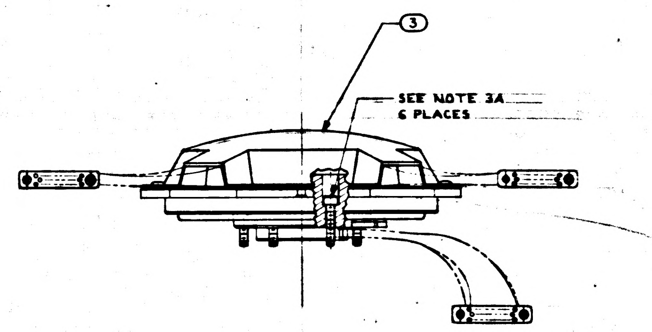
2018603 R

MASTER

	REV	SHEET
2018603	R	1

TABLE I

CABLE CLAMP ⑥	
PART NO.	DIA REF
1000220-13	5/32
1000220-4	3/16
1000220-14	7/32
1000220-5	1/4
1000220-15	9/32
1000220-6	5/16
1000220-16	11/32
1000220-7	3/8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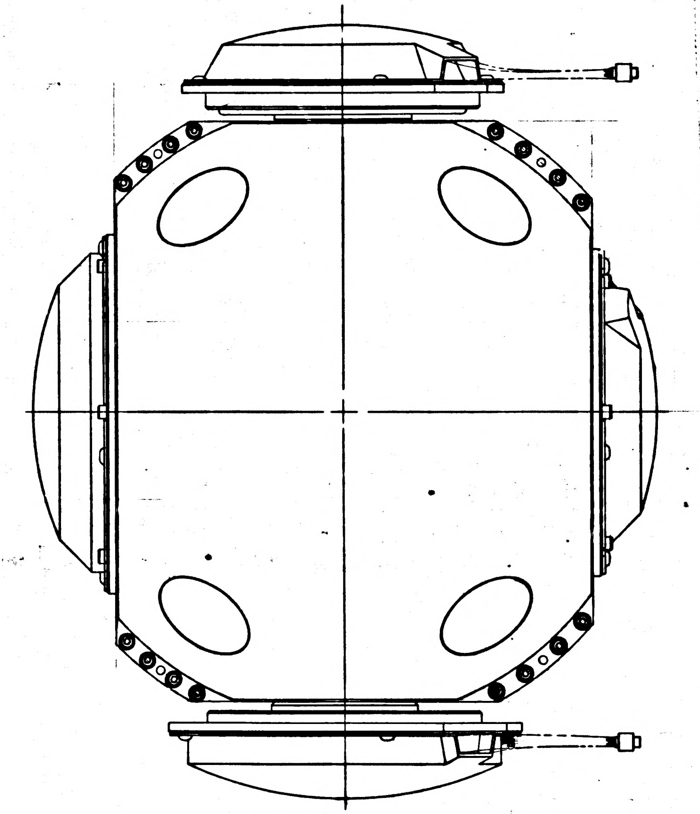
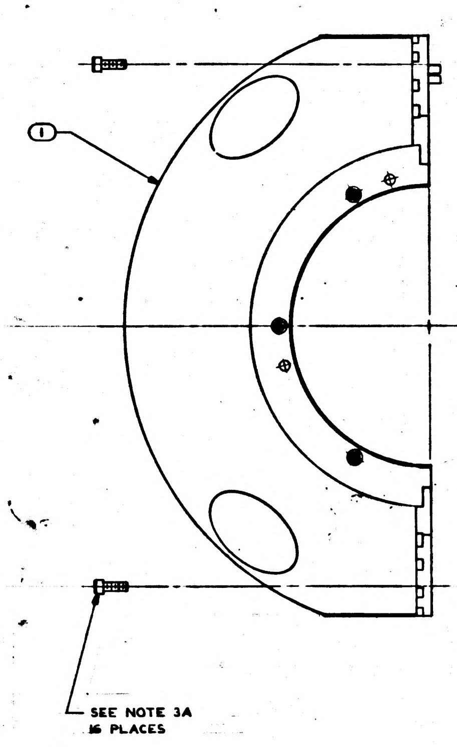
SEE NOTE 3A
6 PLACES

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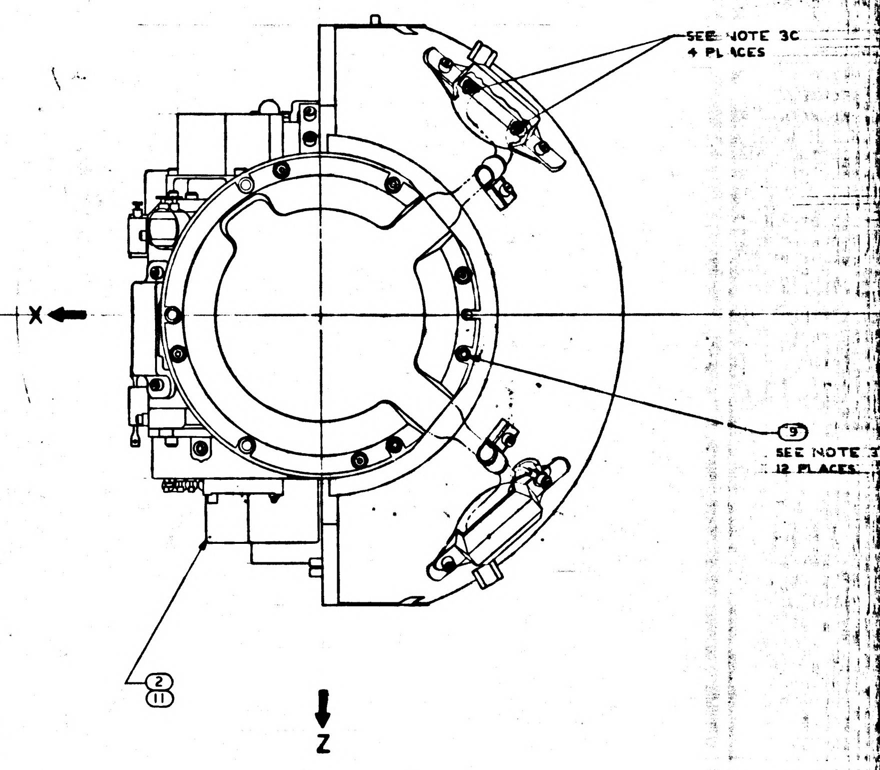
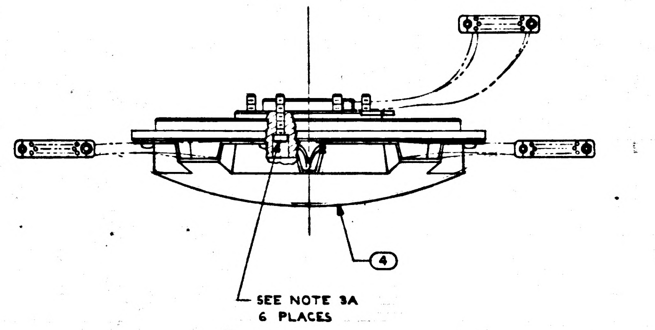
SEE NOTE 3A
16 PLACES


SEE NOTE 3C
4 PLACES
X
⑨
SEE NOTE 3
12 PLACES
②
⑪
Z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SEE NOTE 3A
6 PLACES

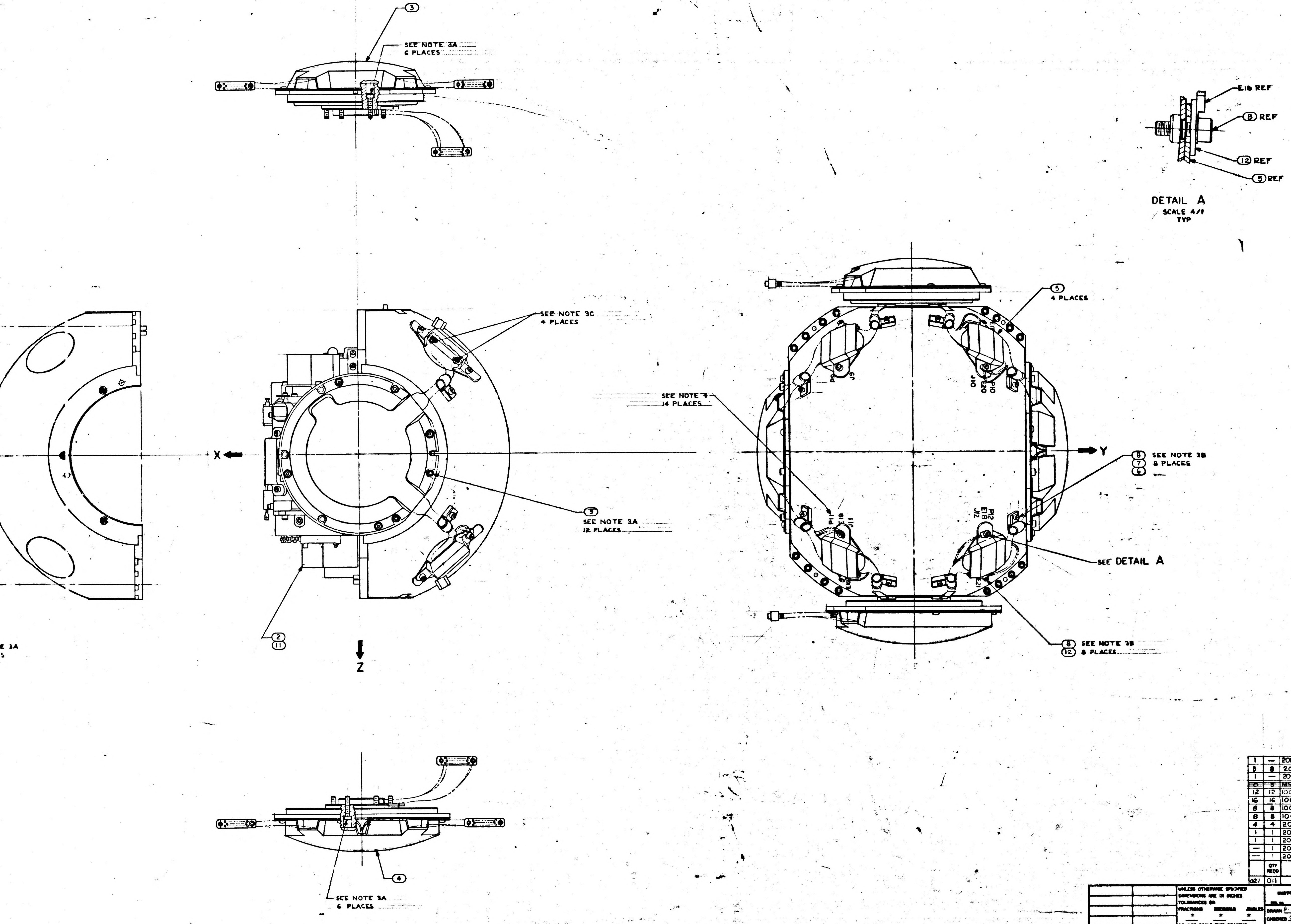
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

3. SCREW TORQUE REQUIREMENTS ±7%
   A. 10.0 IN-LB
   B. 5.0 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM ⑥ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

2018603	REV	SHEET
	R	1

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES TDRR 17086	[illegible]	[illegible]	WK
M	REVISED PER TDRR 19275	2 Jun 65	[illegible]	WK
N	REVISED PER TDRR 20089	22 Jul 65	[illegible]	WK
P	REVISED PER TDRR 21189	22 Jul 65	[illegible]	WK
R	REVISED PER TDRR 22594	28 Sep 65	[illegible]	WK
S	REVISED TDRR 23701	11 Oct 65	[illegible]	WK


4
3
2
D
C
B
A
③
SEE NOTE 3A
6 PLACES
E18 REF
⑧ REF
⑫ REF
⑤ REF
DETAIL A
SCALE 4/1
TYP
SEE NOTE 3C
4 PLACES
⑤
4 PLACES
SEE NOTE 4
14 PLACES
X
Y
Z
⑨
SEE NOTE 3A
12 PLACES
⑧ ⑦ ⑥ SEE NOTE 3B
8 PLACES
SEE DETAIL A
⑥ ⑫ SEE NOTE 3B
8 PLACES
② ⑪
P9
J9
P10
E20
J10
P11
E19
J11
P12
E18
J12
④
SEE NOTE 3A
6 PLACES
MASTER

1	—	2018758-001	MIDDLE GIMBAL HOUSING ASSEMBLY	13
8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMBL	12
1	—	2018604-021	INNER AXIS ASSEMBLY	11
~~8~~	~~8~~	~~MS15795-303~~	~~WASHER, FLAT, METAL, ROUND~~	~~10~~
12	12	1001489-18	SCREW, HEX SOC HD	9
16	16	1001488-1	SCREW, HEX SOC HD	8
8	8	1000223	WASHER, CABLE CLAMP	7
8	8	1000220-SEE NOTE 5	CABLE CLAMP	6
4	4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
1	1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
1	1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
—	1	2018604-011	INNER AXIS ASSEMBLY	2
—	1	2018758	MIDDLE GIMBAL HOUSING ASSY	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

2018602	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN J. Fahey DATE 4 Mar 65
CHECKED G. Quinn 3-1-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL

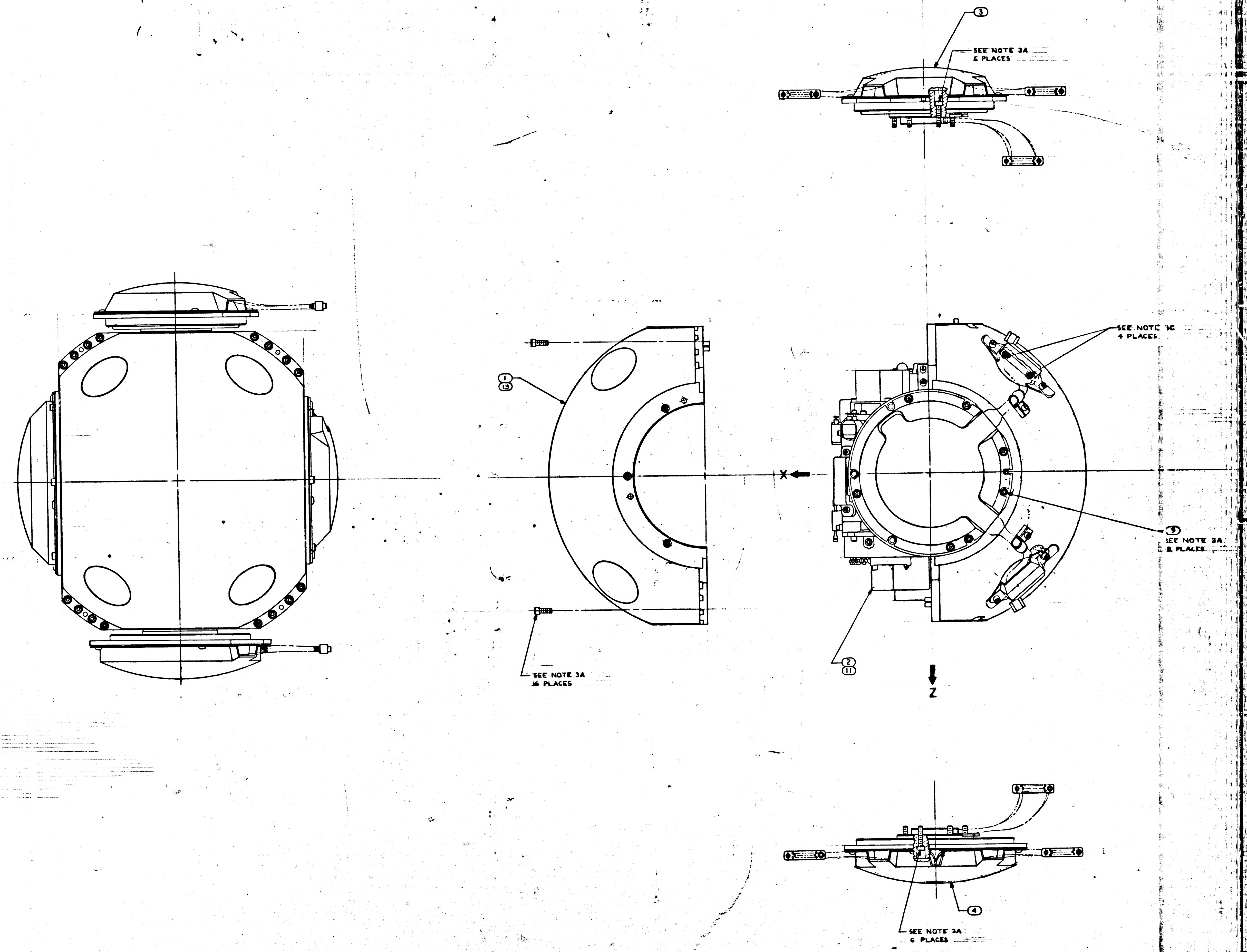
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MIDDLE AXIS ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018603
SCALE 1/1
WT
SHEET 1 OF 1

2018603 S

TABLE I	
CABLE CLAMP ⑥	
PART NO.	DIA REF
1000220-13	5/32
1000220-4	3/16
1000220-14	7/32
1000220-5	1/4
1000220-15	9/32
1000220-6	5/16
1000220-16	11/32
1000220-7	3/8


③
SEE NOTE 3A
6 PLACES
SEE NOTE 3C
4 PLACES
①
⑬
X
⑨
EE NOTE 3A
2 PLACES
SEE NOTE 3A
16 PLACES
②
⑪
Z
④
SEE NOTE 3A
6 PLACES

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

3. SCREW TORQUE REQUIREMENTS ±7%
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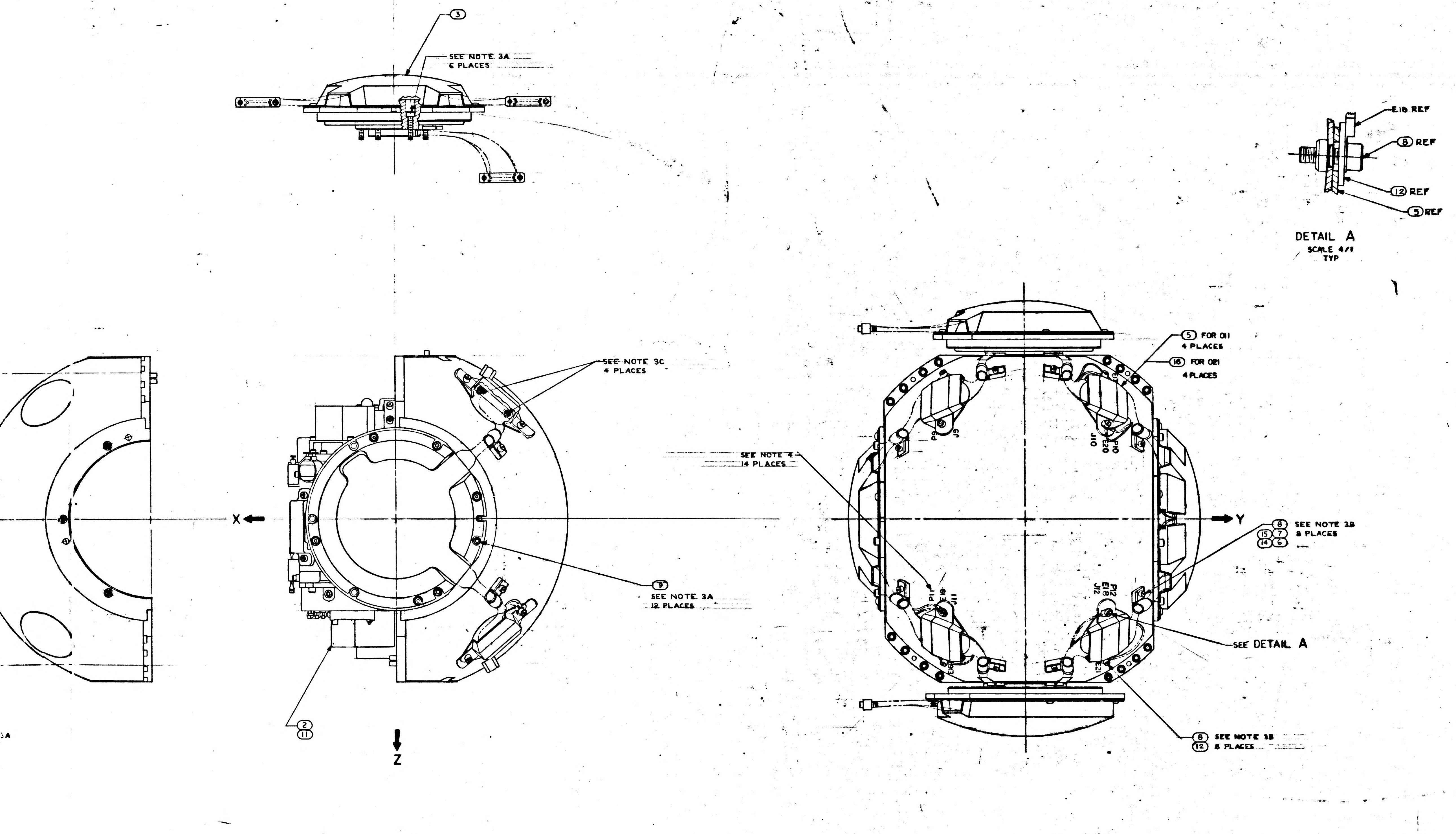
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM ⑥ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

2018603 | S | 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
L	REPLACES REV K WITH CHANGES TDRR 17086		
M	REVISED PER TDRR 19275	2 Jun 65	
N	REVISED PER TDRR 20089	22 Jul 65	
P	REVISED PER TDRR 21189	22 Jul 65	
R	REVISED PER TDRR 22594	25 Sep 65	
S	REVISED TDRR 23701	11 Oct 65	
T	REVISED TDRR 25796	15 Feb 66	
U	REVISED TDRR 26252	15 Feb 66	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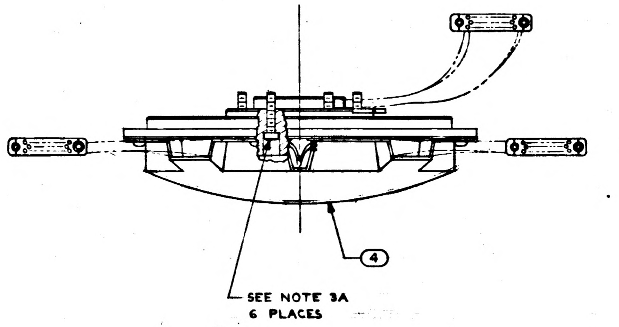
3
2
D
C
B
③
SEE NOTE 3A
6 PLACES
E18 REF
⑧ REF
⑫ REF
⑤ REF
DETAIL A
SCALE 4/1
TYP
SEE NOTE 3C
4 PLACES
X
⑨
SEE NOTE 3A
12 PLACES
②
⑪
Z
SEE NOTE 4
14 PLACES
⑤ FOR 011
4 PLACES
⑯ FOR 021
4 PLACES
J9
J10
P10
E20
Y
⑧ SEE NOTE 3B
⑮ ⑦ 8 PLACES
⑭ ⑥
P11
J11
P12
E19
J12
SEE DETAIL A
⑧ SEE NOTE 3B
⑫ 8 PLACES
3A


④
SEE NOTE 3A
6 PLACES

4	—	2018841	BRACKET, CONN.	16
8	—	MS15795-303	WASHER, FLAT ROUND	15
8	—	2018843 SEE NOTE 5	CABLE, CLAMP	14
1	—	2018758-001	MIDDLE GIMBAL HOUSING ASSEMBLY	13
8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMBL	12
1	—	2018604-021	INNER AXIS ASSEMBLY	11
~~8~~	~~8~~	~~MS15795-303~~	~~WASHER, FLAT, METAL, ROUND~~	~~10~~
12	12	1001489-13	SCREW, HEX SOC HD	9
16	16	1001488-1	SCREW, HEX SOC HD	8
—	8	1000223	WASHER, CABLE CLAMP	7
—	8	1000220-SEE NOTE 5	CABLE CLAMP	6
—	4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
1	1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
1	1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
—	1	2018604-011	INNER AXIS ASSEMBLY	2
—	1	2018758	MIDDLE GIMBAL HOUSING ASSY	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
021	011	LIST OF MATERIALS		

2018603 U

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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MATERIAL
HEAT TREATMENT
FINAL FINISH

2018602	DL2018601
NEXT ASSY	USED ON
APPLICATION	

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN D. Fahey DATE 4 Mar 65
CHECKED T. Quinn 3-1-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MIDDLE AXIS ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018603
SCALE 1/1
WT
SHEET 1 OF 1

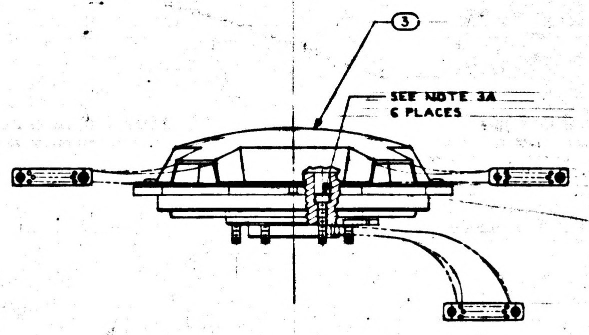
F2

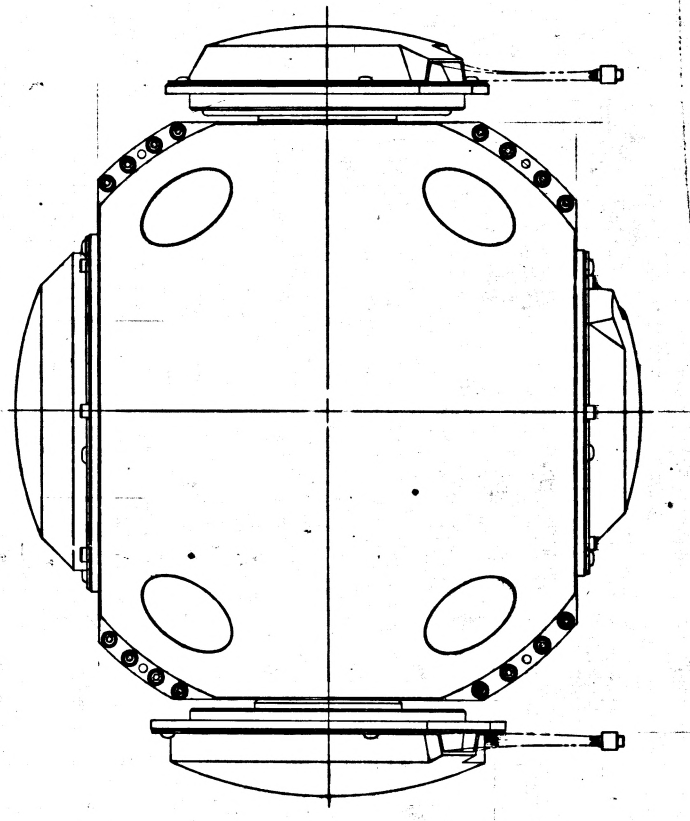
MASTER

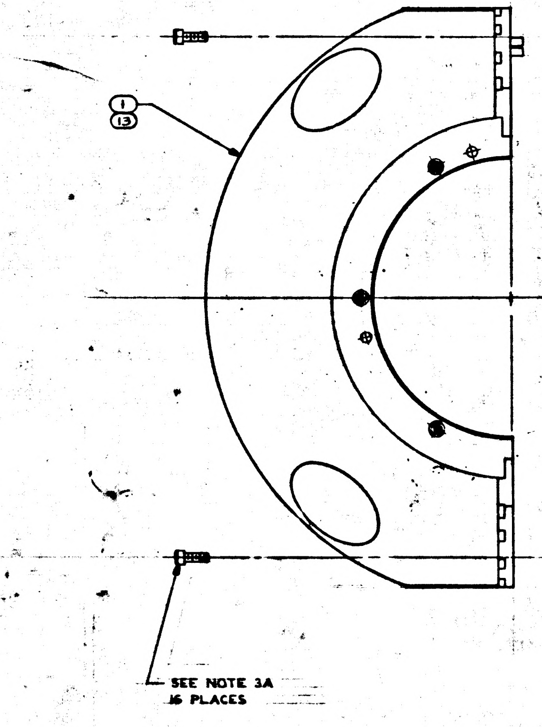
2018603 U 1

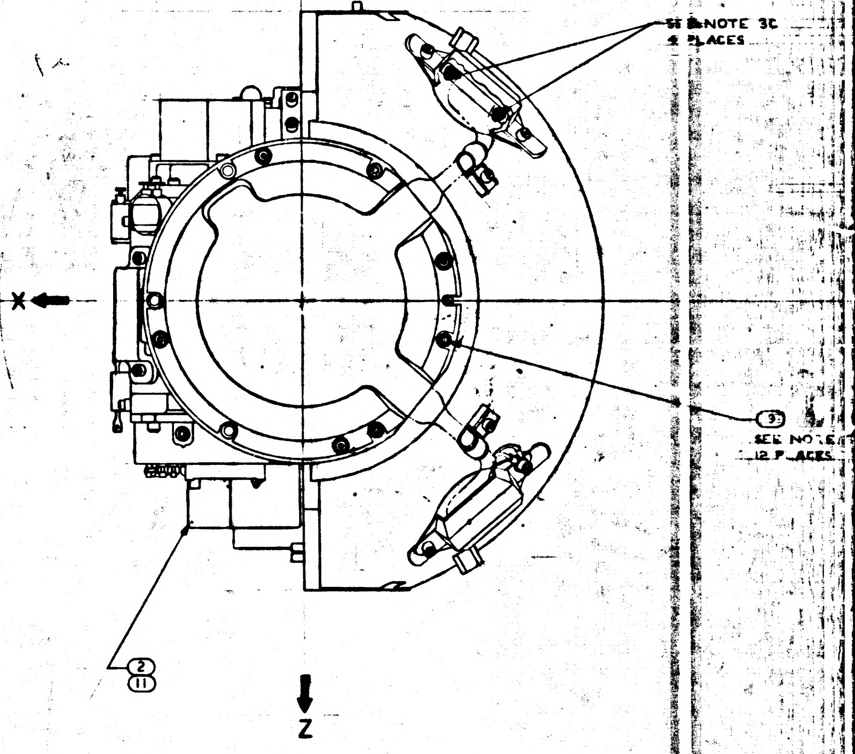
TABLE I

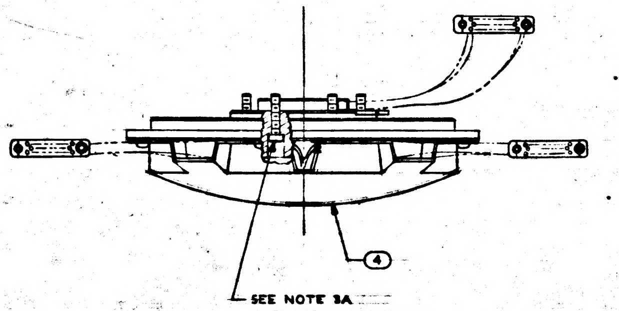
CABLE CLAMP (6)		CABLE CLAMP (14)
PART NO.	DIA REF	DIA REF
1000220-13	5/32	—
1000220-4	3/16	—
1000220-14	7/32	—
1000220-5	1/4	—
1000220-15	9/32	—
1000220-6	5/16	—
1000220-16	11/32	—
1000220-7	3/8	—
2018843-001	—	1/4
2018843-002	—	5/16
2018843-003	-	3/8


3
SEE NOTE 3A
6 PLACES




1
13
SEE NOTE 3A
16 PLACES


SEE NOTE 3C
PLACES
X
9
SEE NOTE
12 PLACES
2
11
Z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SEE NOTE 3A
6 PLACES

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

3. SCREW TORQUE REQUIREMENTS ±7%
   A. 10.0 IN-LB
   B. 5.0 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
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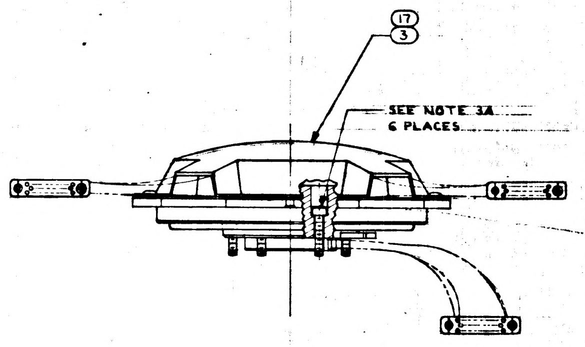
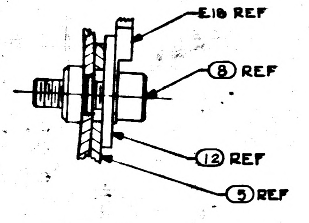
5. ITEM (6) + (14) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES

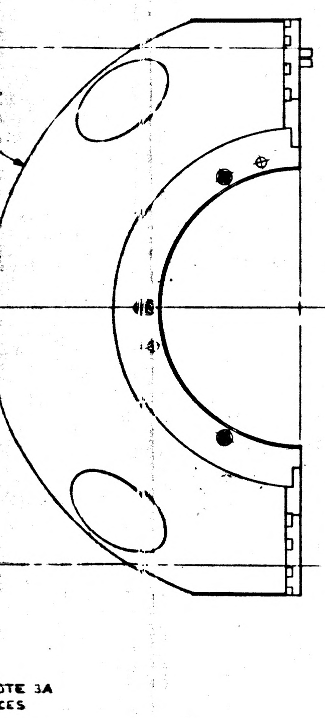
2018603 U 1

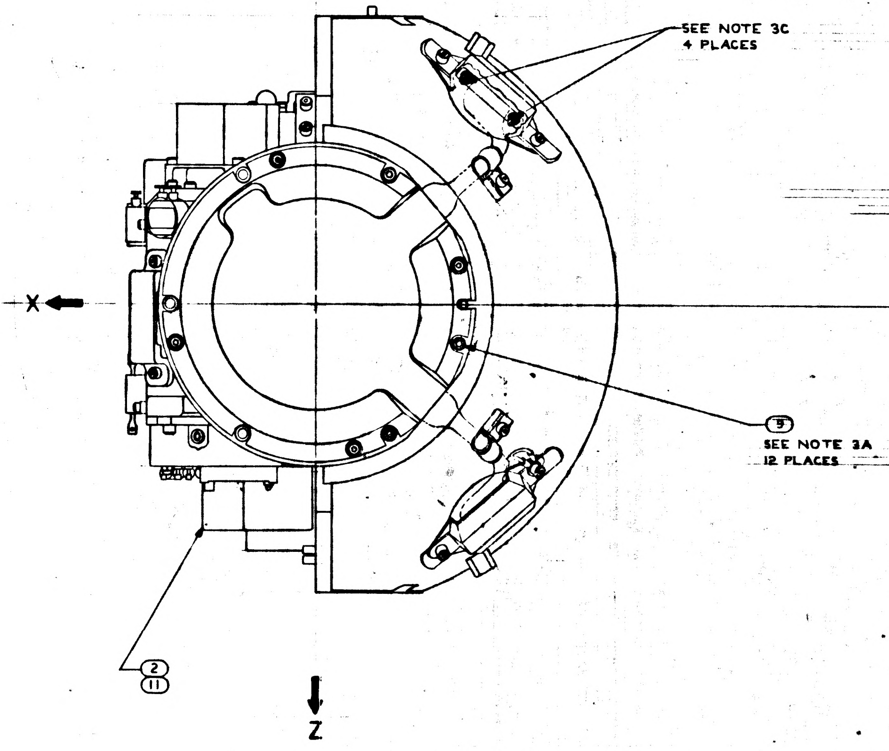
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
L	REPLACES REV K WITH CHANGES TDRR 17086		
M	REVISED PER TDRR 19275	2 Jun 65	WK
N	REVISED PER TDRR 20089	22 Jul 65	agb WK
P	REVISED PER TDRR 21189	22 Jul 65	agb WK
R	REVISED PER TDRR 22594	28 Sep 65	WK
S	REVISED TDRR 23701	19 Oct 65	WK
T	REVISED TDRR 25796	15 Feb 66	WK
U	REVISED TDRR 26252	15 Feb 66	WK
V	REVISED PER TDRR 26598	24 Feb 66	
W	REVISED PER TDRR 27508	3 Mar 66	


17
3
SEE NOTE 3A
6 PLACES


E18 REF
8 REF
12 REF
5 REF

DETAIL A
SCALE 4/1
TYP




SEE NOTE 3C
4 PLACES
X
9
SEE NOTE 3A
12 PLACES
2
11
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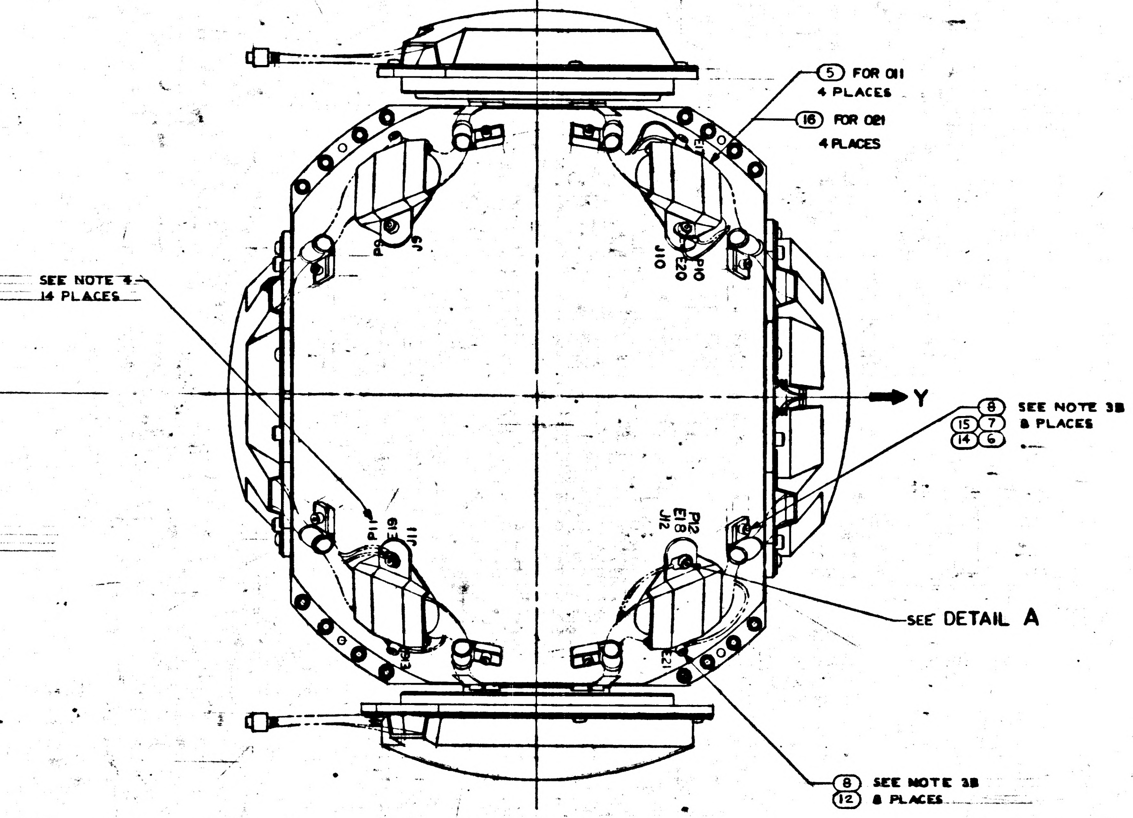
SEE NOTE 4
14 PLACES
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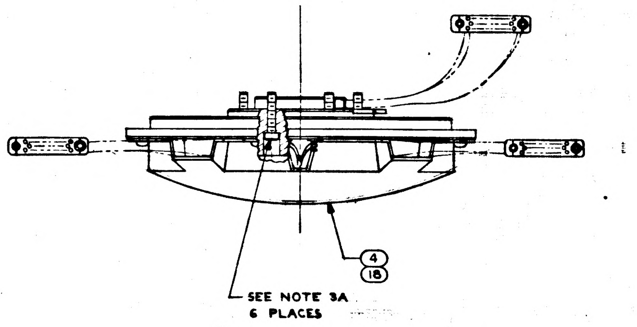
16 FOR 021
4 PLACES
P10
J10
E20
P2
E18
J12
J11
Y
8 SEE NOTE 3B
15 7 8 PLACES
14 6
SEE DETAIL A
8 SEE NOTE 3B
12 8 PLACES


4
18
SEE NOTE 3A
6 PLACES

LIST OF MATERIALS

021	011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	—	2018610-021	IGSA TORQUE MOTOR MIDDLE AXIS	18
1	—	2018613-021	IGSA RESOLVER MIDDLE AXIS	17
4	—	2018841	BRACKET, CONN.	16
8	—	MS15795-803	WASHER, FLAT ROUND	15
8	—	2018843 SEE NOTE 5	CABLE, CLAMP	14
1	—	2018758-001	MIDDLE GIMBAL HOUSING ASSEMBLY	13
8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMBL	12
1	—	2018604-021	INNER AXIS ASSEMBLY	11
~~8~~	~~8~~	~~MS15795-303~~	~~WASHER, FLAT, METAL, ROUND~~	~~10~~
12	12	1001489-18	SCREW, HEX SOC HD	9
16	16	1001488-1	SCREW, HEX SOC HD	8
—	8	1000223	WASHER, CABLE CLAMP	7
—	8	1000220-SEE NOTE 5	CABLE CLAMP	6
—	4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
—	1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
—	1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
—	1	2018604-011	INNER AXIS ASSEMBLY	2
—	1	2018758	MIDDLE GIMBAL HOUSING ASSY	1

2018603 W

NEXT ASSY	USED ON
2018602	DL2018601
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN J. F. [illegible] DATE 11 Feb 65
CHECKED G. QUINN 3-1-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MIDDLE AXIS
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 2018603
SCALE 1/1
WT
SHEET 1 OF 1

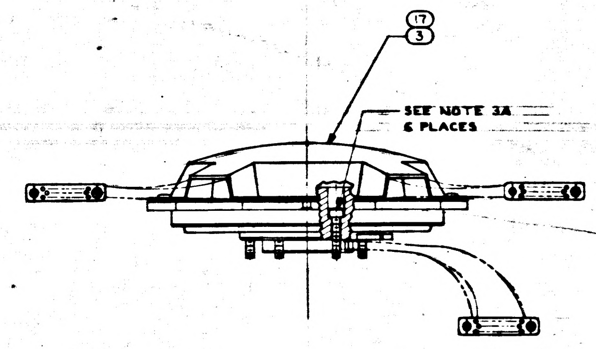
MASTER

2018603	REV W	SH-NT 1

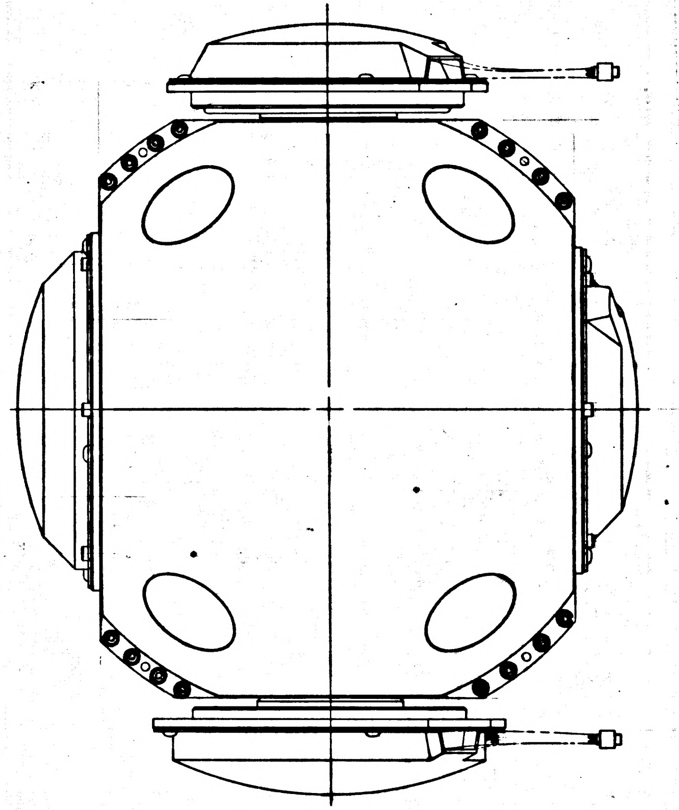
3x

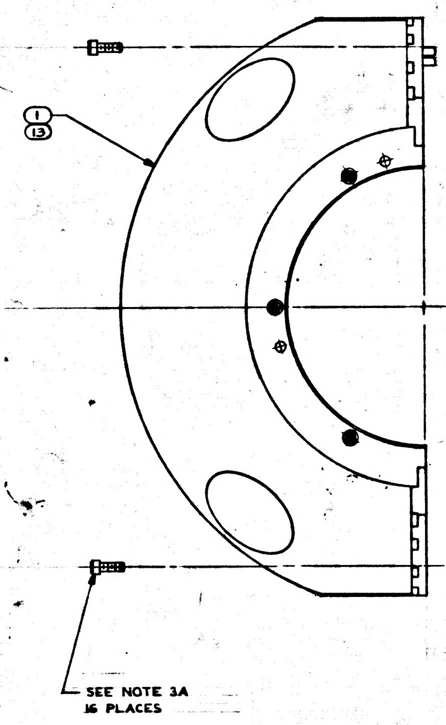
F12

TABLE I		
CABLE CLAMP ⑥		CABLE CLAMP ⑭
PART NO.	DIA REF	DIA REF
1000220-13	5/32	—
1000220-4	3/16	—
1000220-14	7/32	—
1000220-5	1/4	—
1000220-15	9/32	—
1000220-6	5/16	—
1000220-16	11/32	—
1000220-7	3/8	—
2018843-001	—	1/4
2018843-002	—	5/16
2018843-003	-	3/8

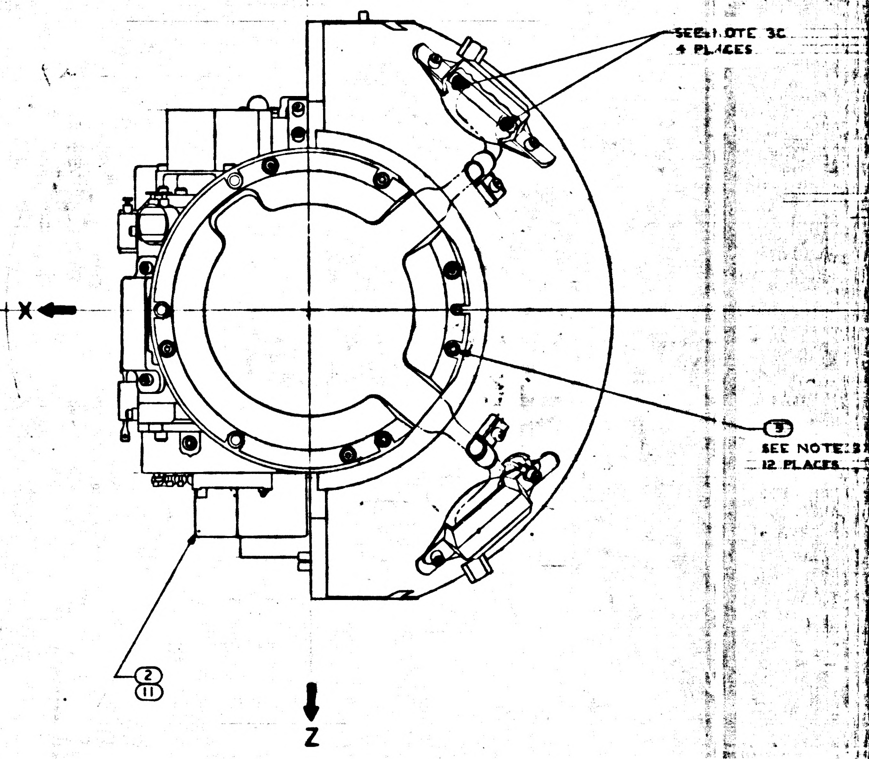


⑰
③
SEE NOTE 3A
6 PLACES





①
⑬
SEE NOTE 3A
16 PLACES

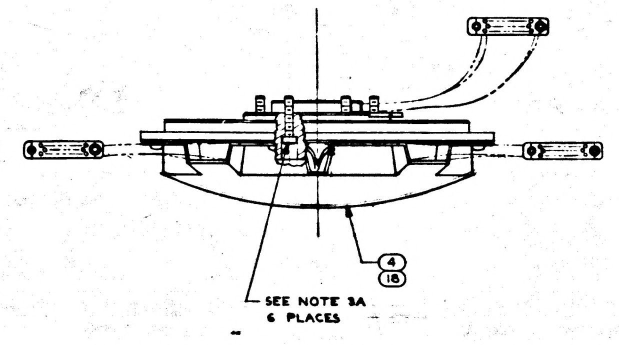


SEE NOTE 3C
4 PLACES
X
⑨
SEE NOTE 3
12 PLACES
②
⑪
Z

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

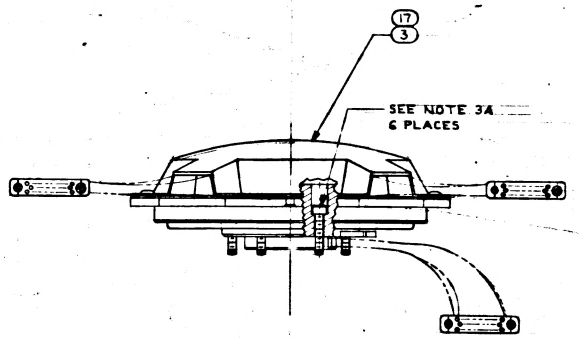
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM ⑥ + ⑭ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES



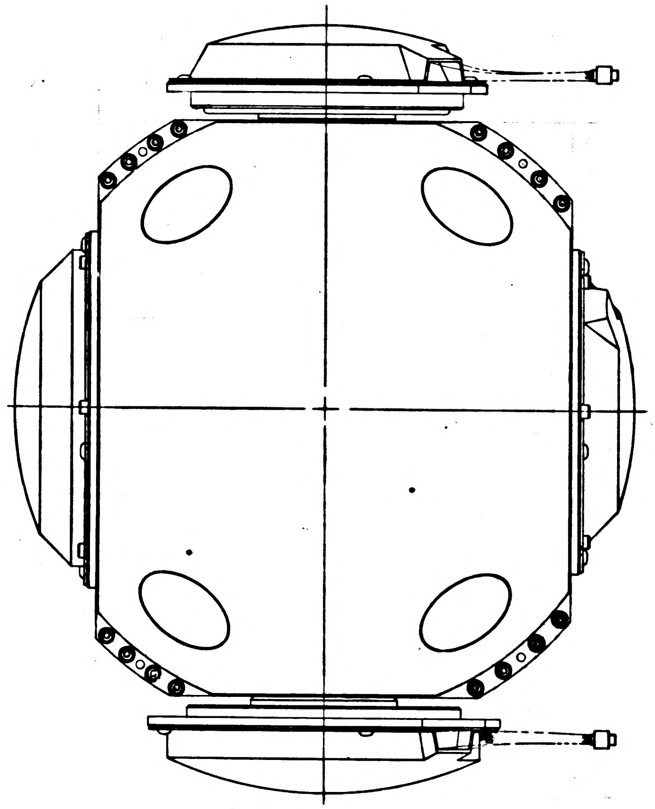
④
⑱
SEE NOTE 3A
6 PLACES

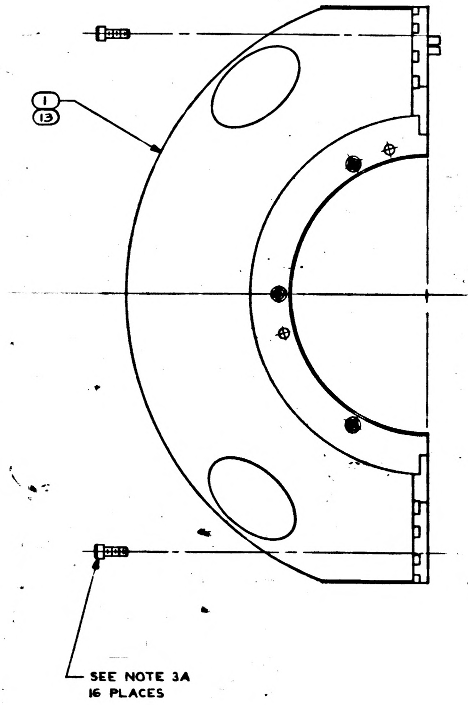
2018603 REV W SHEET 1

TABLE I		
CABLE CLAMP (6)		CABLE CLAMP (14)
PART NO.	DIA REF	DIA REF
1000220-13	5/32	—
1000220-4	3/16	—
1000220-14	7/32	—
1000220-5	1/4	—
1000220-15	9/32	—
1000220-6	5/16	—
1000220-16	11/32	—
1000220-7	3/8	—
2018843-001	—	1/4
2018843-002	—	5/16
2018843-003	-	3/8

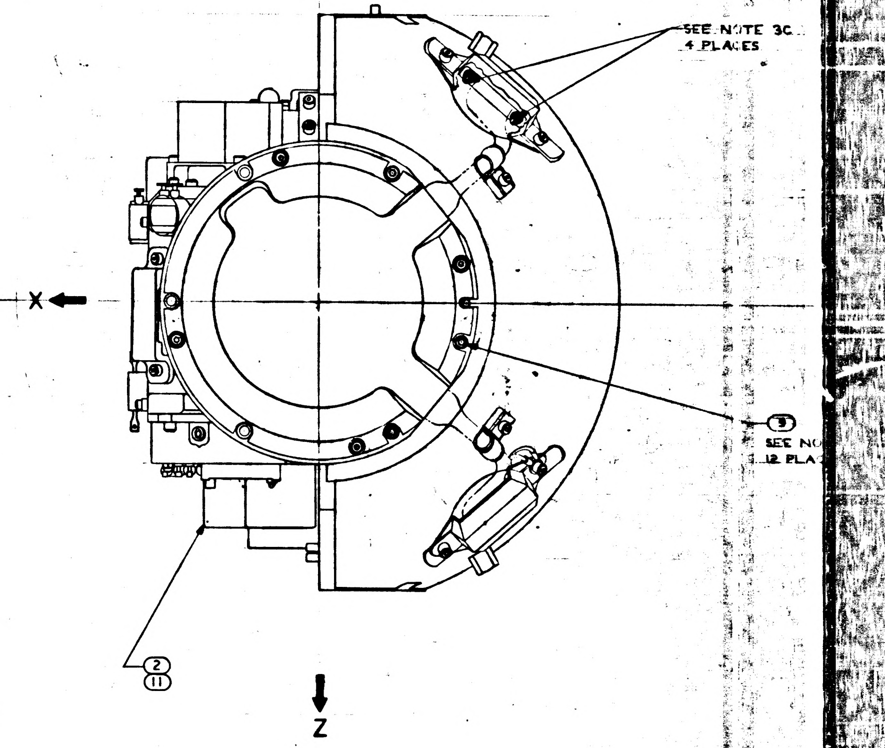


(17)
(3)
SEE NOTE 3A
6 PLACES

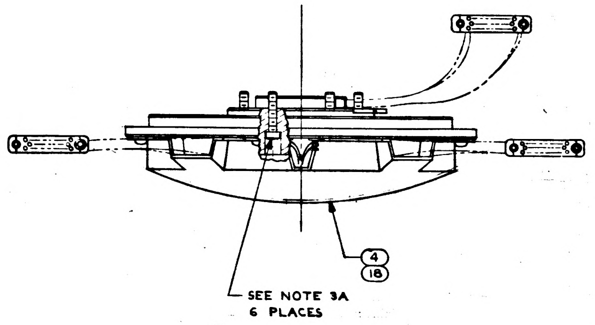




(1)
(13)
SEE NOTE 3A
16 PLACES



X
SEE NOTE 3C
4 PLACES
(9)
SEE NO
12 PLA
(2)
(11)
Z



(4)
(18)
SEE NOTE 3A
6 PLACES

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

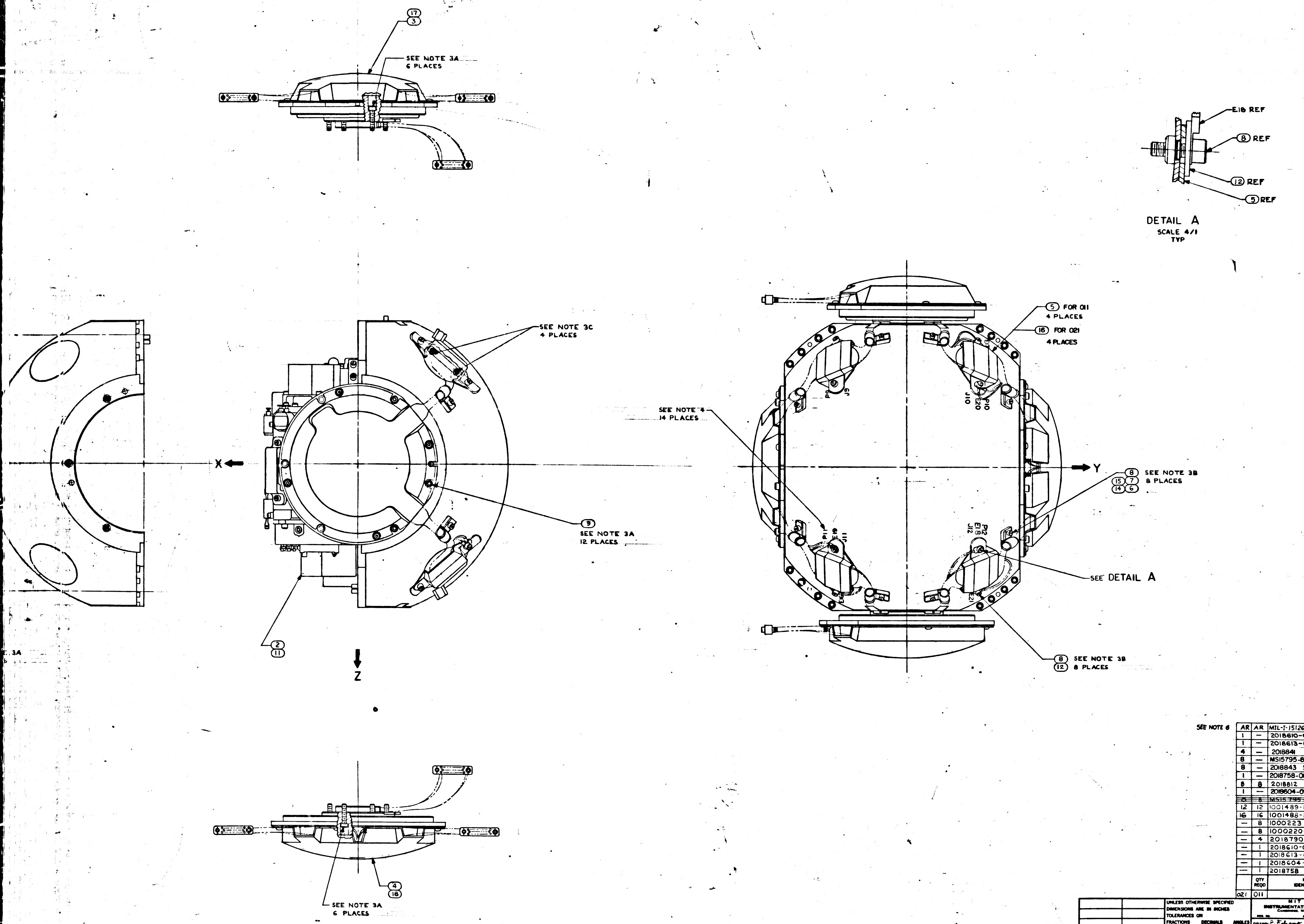
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM (6) + (14) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
6. TAPE (19) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

3H

2018603	REV Y	SHEET 1

1/2018603

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES TDRR 17096	27MAR65		WJ
M	REVISED PER TDRR 19275	2 Jun 65		WJ
N	REVISED PER TDRR 20089	22 Jul 65	agb	WJ
P	REVISED PER TDRR 21189	22 Jul 65	agb	WJ
R	REVISED PER TDRR 22594	28 Sep 65		WJ
S	REVISED TDRR 23701	19 Oct 65		WJ
T	REVISED TDRR 25796	15 Feb 66		WJ
U	REVISED TDRR 26252	15 Feb 66		WJ
V	REVISED PER TDRR 26598	24 Feb 66		WJ
W	REVISED PER TDRR 27508	3 Mar 66		WJ
Y	REVISED PER TDRR 32107	6 DEC 66	E H	ECS


17
3
SEE NOTE 3A
6 PLACES
E18 REF
8 REF
12 REF
5 REF
DETAIL A
SCALE 4/1
TYP
SEE NOTE 3C
4 PLACES
X
Z
9
SEE NOTE 3A
12 PLACES
2
11
5 FOR 011
4 PLACES
16 FOR 021
4 PLACES
SEE NOTE 4
14 PLACES
P9
J9
P10
E20
J10
P11
E19
J11
P12
E18
J12
E21
Y
8 SEE NOTE 3B
15 7 8 PLACES
14 6
SEE DETAIL A
8 SEE NOTE 3B
12 8 PLACES
4
18
SEE NOTE 3A
6 PLACES
3A

SEE NOTE 6

021	011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
AR	AR	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	19
1	—	2018610-021	IGSA TORQUE MOTOR MIDDLE AXIS	18
1	—	2018613-021	IGSA RESOLVER MIDDLE AXIS	17
4	—	2018841	BRACKET, CONN.	16
8	—	MS15795-803	WASHER, FLAT ROUND	15
8	—	2018843 SEE NOTE 5	CABLE, CLAMP	14
1	—	2018758-001	MIDDLE GIMBAL HOUSING ASSEMBLY	13
8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMBL	12
1	—	2018604-021	INNER AXIS ASSEMBLY	11
~~8~~	~~8~~	~~MS15795-303~~	~~WASHER, FLAT, METAL, RUBBER~~	~~10~~
12	12	1001489-18	SCREW, HEX SOC HD	9
16	16	1001488-1	SCREW, HEX SOC HD	8
—	8	1000223	WASHER, CABLE CLAMP	7
—	8	1000220-SEE NOTE 5	CABLE CLAMP	6
—	4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
—	1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
—	1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
—	1	2018604-011	INNER AXIS ASSEMBLY	2
—	1	2018758	MIDDLE GIMBAL HOUSING ASSY	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018602	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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MATERIAL
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MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN J. Falzone DATE 11 FEB 65
CHECKED G. QUINN 3-1-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MIDDLE AXIS ASSEMBLY

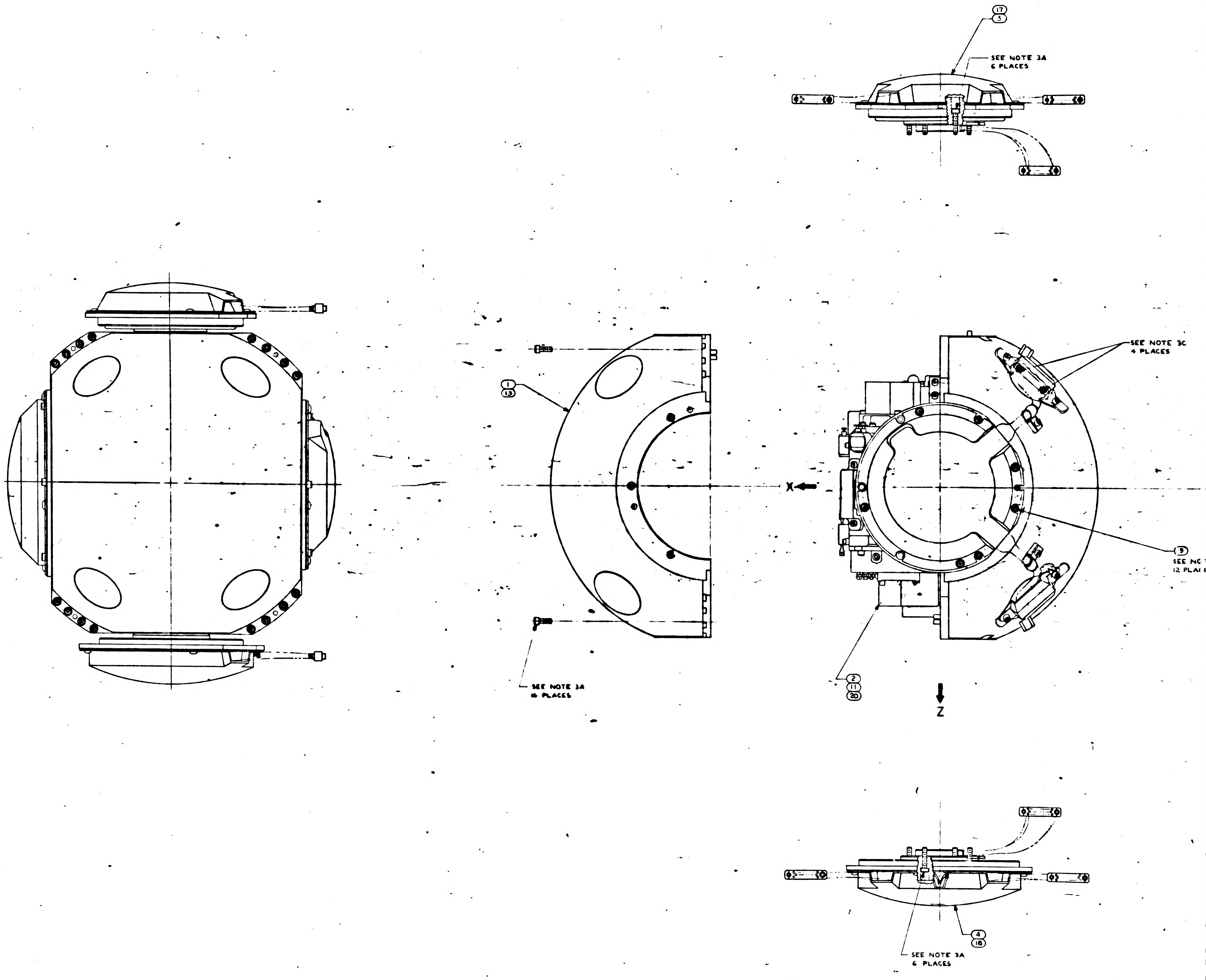
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018603
SCALE 1/1
WT
SHEET 1 OF 1

2018603 Y

018603 | Y | 1

2/2018603

TABLE I		
CABLE CLAMP ⑥		CABLE CLAMP ⑭
PART NO.	DIA REF	DIA REF
1000220-13	5/32	—
1000220-4	3/16	—
1000220-14	7/32	—
1000220-5	1/4	—
1000220-15	9/32	—
1000220-6	5/16	—
1000220-16	11/32	—
1000220-7	3/8	—
2018843-001	—	1/4
2018843-002	—	5/16
2018843-003	-	3/8



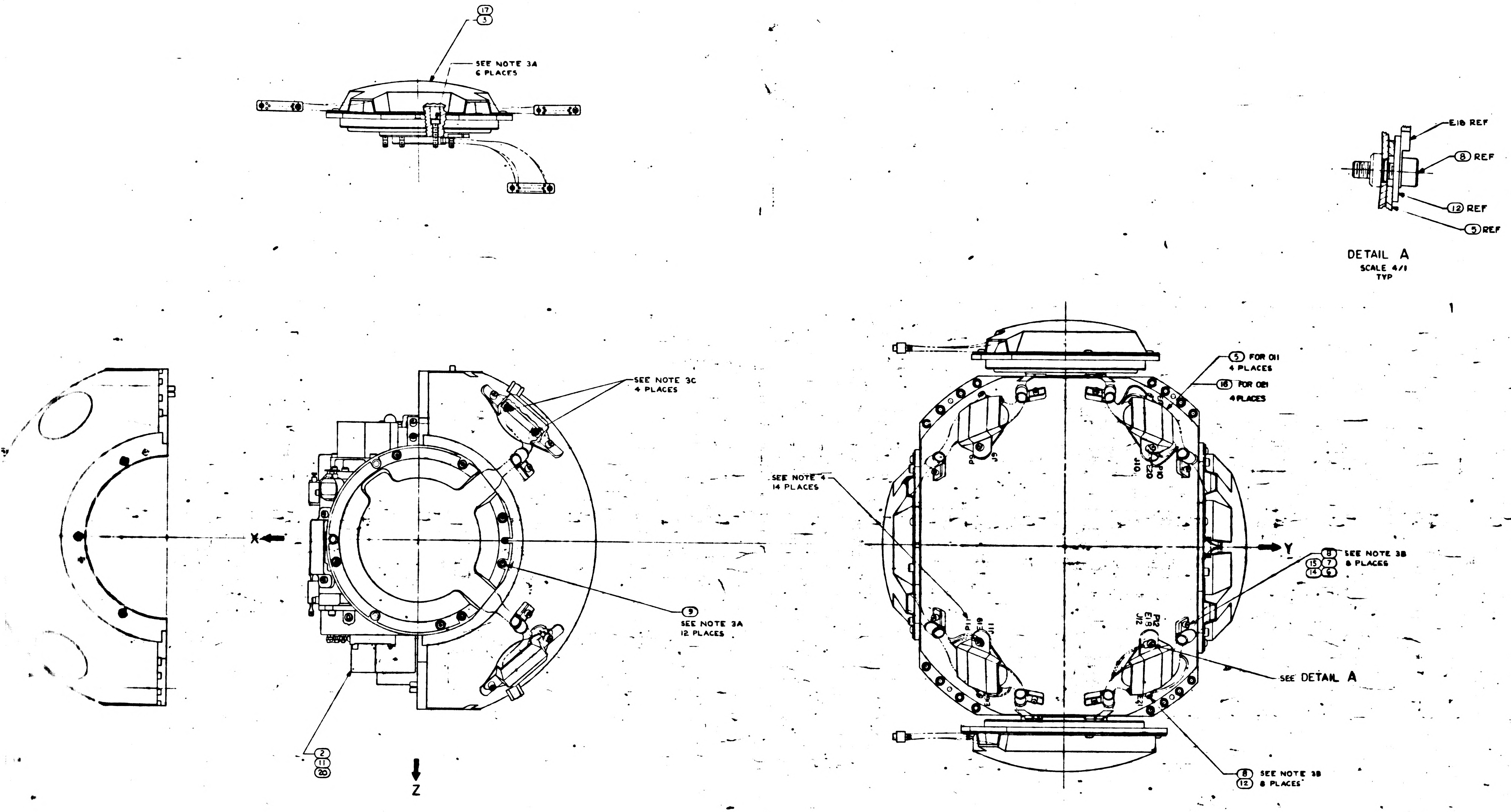
⑰
③
SEE NOTE 3A
6 PLACES
SEE NOTE 3C
4 PLACES
①
⑬
X
⑨
SEE NO
12 PLA
SEE NOTE 3A
16 PLACES
②
⑪
⑳
Z
④
⑱
SEE NOTE 3A
6 PLACES

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

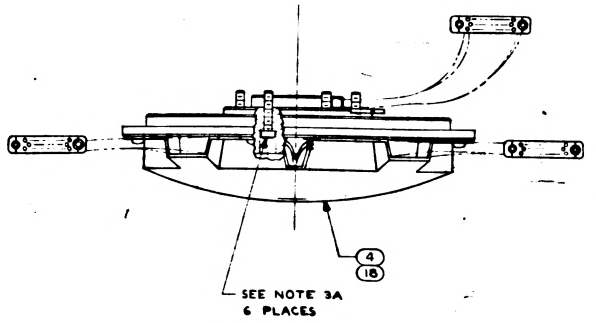
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 10.0 IN-LB
   B. 5.0 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
5. ITEM ⑥ + ⑭ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
6. TAPE ⑲ SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

	REV	SHEET
2018603	Z	1

SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES TDRR 17096	[illegible]	[illegible]	WK
M	REVISED PER TDRR 19275	2 Jun 65	[illegible]	WK
N	REVISED PER TDRR 20089	22 JUL 65	agd	WK
P	REVISED PER TDRR 21189	22 JUL 65	agd	WK
R	REVISED PER TDRR 22594	23 Sep 65	[illegible]	WK
Ⓜ S	REVISED TDRR 23701	19 Oct 65	[illegible]	WK
T	REVISED TDRR 25796	15 Feb 66	[illegible]	WK
U	REVISED TDRR 26252	15 Feb 66	[illegible]	WK
Ⓜ V	REVISED PER TDRR 26598	24 Feb 66	[illegible]	WK
Ⓜ W	REVISED PER TDRR 27508	3 Mar 66	[illegible]	WK
Ⓜ Y	REVISED PER TDRR 32107	6 DEC 66	E H	EFS
Z	REVISED PER TDRR 33316	[illegible]	E.	EFS



⑰ ③
SEE NOTE 3A 6 PLACES
E18 REF
⑧ REF
⑫ REF
⑤ REF
DETAIL A
SCALE 4/1 TYP
SEE NOTE 3C 4 PLACES
X
⑨ SEE NOTE 3A 12 PLACES
② ⑪ ⑳
Z
⑤ FOR 011 4 PLACES
⑱ FOR 021 4 PLACES
SEE NOTE 4 14 PLACES
P1 J9
J10 P2 E20
Y
⑧ SEE NOTE 3B 8 PLACES
⑮ ⑦
⑭ ⑥
P1 E19 J11
P2 E18 J12
SEE DETAIL A
⑧ SEE NOTE 3B
⑫ 8 PLACES



④ ⑱
SEE NOTE 3A 6 PLACES

SEE NOTE 6

1	—	—	2018604-031	INNER AXIS ASSEMBLY	20
AR	AR	AR	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	19
1	1	—	2018610-021	IGSA TORQUE MOTOR MIDDLE AXIS	18
1	1	—	2018613-021	IGSA RESOLVER MIDDLE AXIS	17
4	4	—	2018841	BRACKET, CONN.	16
8	8	—	MS15795-803	WASHER, FLAT ROUND	15
8	8	—	2018843 SEE NOTE 5	CABLE, CLAMP	14
1	1	—	2018758-001	MIDDLE GIMBAL HOUSING ASSEMBLY	13
8	8	8	2018812	WASHER BRACKET, CONN MID & OUTER GMBL	12
—	1	—	2018604-021	INNER AXIS ASSEMBLY	11
~~8~~	~~8~~	~~8~~	~~MS15795-803~~	~~WASHER, FLAT~~ [illegible]	10
12	12	12	1001489-18	SCREW, HEX SOC HD	9
16	16	16	1001488-1	SCREW, HEX SOC HD	8
—	—	8	1000223	WASHER, CABLE CLAMP	7
—	—	8	1000220-SEE NOTE 5	CABLE CLAMP	6
—	—	4	2018790	BRACKET, CONN MIDDLE GIMBAL	5
—	—	1	2018610-011	IGSA TORQUE MOTOR MIDDLE AXIS	4
—	—	1	2018613-011	IGSA RESOLVER MIDDLE AXIS	3
—	—	1	2018604-011	INNER AXIS ASSEMBLY	2
—	—	1	2018758	MIDDLE GIMBAL HOUSING ASSY	1
QTY REQD	QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
031	021	011	LIST OF MATERIALS		

2018602	DL2018601
NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
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DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN [illegible] DATE [illegible] 65
CHECKED G. Quinn 3 1 65
APPROVAL [illegible] 2 Mar 65
APPROVAL
NASA APPROVAL [illegible] 3-4-65
MIT APPROVAL [illegible] 3 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MIDDLE AXIS ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018603
SCALE 1/1
WT
SHEET OF

2018603 Z

4 3 2 1

PART NO.	NOMENCLATURE	QTY REQ'D
2018602	INNER AXIS ASSY	1
1000119	CONNECTOR	2
2018758	HSG ASSY M.G.	1
2018621	BEARING, DUPLEX	2
2018731	CLIP, WIRE RETAINER	3
2018736	HSG, BRG RSVR M.A.	1
2018730	SHAFT, STUB RSVR	1
2018631	RESOLVER	1
2018723	NUT, BRG RET	1
2018733	PLATE, BRG RET	1
2018732	CLIP, WIRE RET.	1
100100-1	TERMINAL	2

ⓡ

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	RELEASE TDRR 10806	7 Jul 64	WK

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018602	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL:

MIT INSTRUMENTATION LAB
CONTRACT NAS 9-153

		DATE
APPROVED		1 July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL	W Kupfer	7/7/64

MIDDLE
AXIS
ASS'Y

SCALE | UNIT WT. | CODE IDENT.

MIT
INSTRUMENTATION LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO. 2018603

SHEET OF

4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

PART NO.	NOMENCLATURE	QTY REQ'D
2018621	BEARING, DUPLEX	2
2018631	RESOLVER	1
2018632	RESOLVER, GYRO ERROR	1
1000119	CONNECTOR, ELECT	2
2018729	HSG BRG	1
2018723	NUT, BRG RETAINER	1
2018722	PLATE, BRG RET	1
2018713	SHAFT, STUB	1
2018715	RETAINER, WIRE	2
100100-1	TERMINAL	2
2018604	STABLE MEMBER ASSY	1
2018746	HOUSING, BEARING TM	1
2018747	PLATE, BEARING RET TM IA	1
2018745	CLIP, RETAINER TM IA&MA	6
2018743	SHAFT, STUB TM IA	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10905	14 JUL 64		WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018603	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED		1 July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL	W Kupfer	7/7/64

INNER
AXIS
ASS'Y

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO.
2018604

SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

2018604

PART NO.	NOMENCLATURE	QTY REQ'D
2018621	BEARING, DUPLEX	2
2018631	RESOLVER	1
2018632	RESOLVER, GYRO ERROR	1
1000119	CONNECTOR, ELECT	2
2018729	HSG BRG	1
2018723	NUT, BRG RETAINER	1
2018722	PLATE, BRG RET	1
2018713	SHAFT, STUB	1
2018715	RETAINER, WIRE	2
100100-1	TERMINAL	2
2018604	STABLE MEMBER ASSY	1
2018746	HOUSING, BEARING TM	1
2018747	PLATE, BEARING RET TM IA	1
2018745	CLIP, RETAINER TM IA&MA	6
2018743	SHAFT, STUB TM IA	1
2018634	SLIP RING ASSY	2

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	R & TDRR 10806		
	A	TI- 10905		
	B	TDRR 11887		

MASTER

QTY REQ'D	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL

NEXT ASSY	USED ON
2018603	

APPLICATION

M I T
INSTRUMENTATION LAB
CONTRACT
NAS 9 153

INITIAL APPROVAL | DATE

INNER
AXIS
ASS'Y

SCALE | UNIT WT. | CODE IDENT.

M I T
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

NASA
MANNED SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO.
2018604

SHEET OF

INCHES

PHOTOGRAPHIC SCALE ONLY

4 3 2 1

PART NO.	NOMENCLATURE	QTY REQ'D
2018621	BEARING, DUPLEX	1
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018632~~	~~RESOLVER, GYRO ERROR~~	~~1~~
1000119	CONNECTOR, ELECT	2
~~2018729~~	~~HSG BRG~~	~~1~~
~~2018723~~	~~NUT, BRG RETAINER~~	~~1~~
~~2018722~~	~~PLATE, BRG RET~~	~~1~~
~~2018713~~	~~SHAFT, STUB~~	~~1~~
~~2018715~~	~~RETAINER, WIRE~~	~~2~~
100100-1	TERMINAL	2
2018604	STABLE MEMBER ASSY	1
2018746	HOUSING, BEARING TM	1
2018747	PLATE, BEARING RET TM IA	1
2018745	CLIP, RETAINER TM IA&MA	6
2018743	SHAFT, STUB TM IA	1
2018634	SLIP RING ASSY	2
2018608	RESOLVER ASSY IA	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10905	14 JUL 64		WK
	B	TDRR 11887	17 AUG 64		WK
	C	TDRR 11993	25 AUG 64		WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018603	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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FRACTIONS DECIMALS ANGLES

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MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED		1 July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		7/7/64

INNER
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

MIT
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SHEET OF

4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

PART NO.	NOMENCLATURE	QTY REQ'D
2018621	BEARING, DUPLEX	1
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018632~~	~~RESOLVER, GYRO ERROR~~	~~1~~
~~1000119~~	~~CONNECTOR, ELECT~~	~~2~~
~~2018729~~	~~HSG BRG~~	~~1~~
~~2018723~~	~~NUT, BRG RETAINER~~	~~1~~
~~2018722~~	~~PLATE, BRG RET~~	~~1~~
~~2018713~~	~~SHAFT, STUB~~	~~1~~
~~2018715~~	~~RETAINER, WIRE~~	~~2~~
100100-1	TERMINAL	2
2018604	STABLE MEMBER ASSY	1
2018746	HOUSING, BEARING TM	1
2018747	PLATE, BEARING RET TM IA	1
2018745	CLIP, RETAINER TM IA&MA	6
2018743	SHAFT, STUB TM IA	1
2018634	SLIP RING ASSY	2
2018608	RESOLVER ASSY IA	1
1000123	CONNECTOR ELECT	4

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10905	14 JUL 64		WK
	B	TDRR 11887	17 AUG 64		WK
	C	TDRR 11993	25 AUG 64	AJB	WK
	D	TDRR 12639	10 SEP 64		

MASTER

2018603	
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APPLICATION	

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LIST OF PARTS AND MATERIALS

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
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DRAWN	JCF	
APPROVED FOR MSC.		7/7/64
MIT/IL APPROVAL	W.C. Cuffer	7/7/64

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SHEET 1 OF 1

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PART NO.	NOMENCLATURE	QTY REQ'D
2018621	BEARING, DUPLEX	1
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018632~~	~~RESOLVER, GYRO ERROR~~	~~1~~
~~1000119~~	~~CONNECTOR, ELECT~~	~~2~~
~~2018729~~	~~HSG BRG~~	~~1~~
~~2018723~~	~~NUT, BRG RETAINER~~	~~1~~
~~2018722~~	~~PLATE, BRG RET~~	~~1~~
~~2018713~~	~~SHAFT, STUB~~	~~1~~
~~2018715~~	~~RETAINER, WIRE~~	~~2~~
100100-1	TERMINAL	2
2018605	STABLE MEMBER ASSY	1
2018746	HOUSING, BEARING TM	1
2018747	PLATE, BEARING RET TM IA	1
2018745	CLIP, RETAINER TM IA&MA	6
2018743	SHAFT, STUB TM IA	1
2018634	SLIP RING ASSY	2
2018608	RESOLVER ASSY IA	1
1000123	CONNECTOR ELECT	4
1000119-001	CONNECTOR	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10905	14 JUL 64	SAH	WK
	B	TDRR 11887	17 AUG 64	SAH	WK
	C	TDRR 11993	25 AUG 64	AJB	WK
	D	TDRR 12639	10 SEP 64	SAH	
	E	TDRR 13164	30 SEP 64	SAH	WK

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018603	

APPLICATION

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MATERIAL:

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CONTRACT
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		DATE
APPROVED	SAHoff	1 July 64
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DRAWN	JCF	
APPROVED FOR MSC		7/7/64
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INNER
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SHEET 1 OF 1

INCHES
0 1 2
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PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018621	BEARING, DUPLEX	1
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018632~~	~~RESOLVER, GYRO ERROR~~	~~1~~
~~1000119~~	~~CONNECTOR, ELECT~~	~~2~~
~~2018729~~	~~HSG BRG~~	~~1~~
~~2018723~~	~~NUT, BRG. RETAINER~~	~~1~~
~~2018722~~	~~PLATE, BRG RET~~	~~1~~
~~2018713~~	~~SHAFT, STUB~~	~~1~~
~~2018715~~	~~RETAINER, WIRE~~	~~2~~
1000100-1	TERMINAL	2
2018605-011	STABLE MEMBER ASSY	1
2018746	HOUSING, BEARING TM	1
2018747	PLATE, BEARING RET TM IA	1
2018745	CLIP. RETAINER TM IA&MA	6
2018743	SHAFT, STUB TM IA	1
2018634	SLIP RING ASSY	2
2018608-011	RESOLVER ASSY IA	1
1000123	CONNECTOR ELECT	4
1000119-001	CONNECTOR	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
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	B	TDRR 11887	17 AUG 64		WK
	C	TDRR 11993	25 AUG 64	AJB	WK
	D	TDRR 12639	10 SEP 64		
	E	TDRR 13164	30 SEP 64		WK
	F	TDRR 14785	15 DEC 64		WK

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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DRAWN	JCF	
APPROVED FOR MSC.	W. S.	7/7/64
MIT/IL APPROVAL	W Kupfer	7/7/64

INNER
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UNIT WT.
CODE IDENT.

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SHEET 1 OF 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
2018621	BEARING, DUPLEX	1
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018632~~	~~RESOLVER, GYRO ERROR~~	~~1~~
~~1000119~~	~~CONNECTOR, ELECT~~	~~2~~
~~2018729~~	~~HSG BRG~~	~~1~~
~~2018723~~	~~NUT, BRG RETAINER~~	~~1~~
~~2018722~~	~~PLATE, BRG RET~~	~~1~~
~~2018713~~	~~SHAFT, STUB~~	~~1~~
~~2018715~~	~~RETAINER, WIRE~~	~~2~~
1000100-1	TERMINAL	2
2018605-011	STABLE MEMBER ASSY	1
2018746	HOUSING, BEARING TM	1
2018747	PLATE, BEARING RET TM IA	1
2018745	CLIP, RETAINER TM IA&MA	6
2018743	SHAFT, STUB TM IA	1
2018634	SLIP RING ASSY	2
2018608-011	RESOLVER ASSY IA	1
1000123	CONNECTOR ELECT	4
1000119-001	CONNECTOR	1
2018781	WIRE GUIDE	1
2018782	WIRE GUIDE	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10905	14 JUL 64		WK
	B	TDRR 11887	17 AUG 64		WK
	C	TDRR 11993	25 AUG 64		WK
	D	TDRR 12639	10 SEP 64		
	E	TDRR 13164	30 SEP 64		WK
	F	TDRR 14785	15 DEC 64		WK
	G	TDRR 15340	4 JAN 65		WK

MASTER

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INNER
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SHEET 1 OF 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
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~~2018631~~	~~RESOLVER~~	~~1~~
~~2018632~~	~~RESOLVER, GYRO ERROR~~	~~1~~
~~1000119~~	~~CONNECTOR, ELECT~~	~~2~~
~~2018729~~	~~HSG BRG~~	~~1~~
~~2018723~~	~~NUT, BRG RETAINER~~	~~1~~
~~2018722~~	~~PLATE, BRG RET~~	~~1~~
~~2018713~~	~~SHAFT, STUB~~	~~1~~
~~2018715~~	~~RETAINER, WIRE~~	~~2~~
1000100-1	TERMINAL	2
2018605-011	STABLE MEMBER ASSY	1
2018746	HOUSING, BEARING TM	1
2018747	PLATE, BEARING RET TM IA	1
2018745	CLIP, RETAINER TM IA&MA	6
2018743	SHAFT, STUB TM IA	1
2018634	SLIP RING ASSY	2
2018608-011	RESOLVER ASSY IA	1
1000123	CONNECTOR ELECT	4
1000119-001	CONNECTOR	1
2018781	WIRE GUIDE	1
2018782	WIRE GUIDE	1
2018623	MOTOR, TORQUE	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
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	C	TDRR 11993	25 AUG 64	AJB	WK
	D	TDRR 12639	10 SEP 64		
	E	TDRR 13164	30 SEP 64		WK
	F	TDRR 14785	15 DEC 64		WK
	G	TDRR 15340	4 JAN 65		WK
	H	TDRR 15714	25 JAN 65		WK

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APPROVED		1 July 64
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DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL	W Kupfer	7/7/64

INNER
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

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2018604

SHEET 1 OF 1

4 3 2 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
~~2018621~~	~~BEARING, DUPLEX~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018632~~	~~RESOLVER, GYRO ERROR~~	~~1~~
~~1000119~~	~~CONNECTOR, ELECT~~	~~2~~
~~2018729~~	~~HSG BRG~~	~~1~~
~~2018723~~	~~NUT, BRG RETAINER~~	~~1~~
~~2018722~~	~~PLATE, BRG RET~~	~~1~~
~~2018713~~	~~SHAFT, STUB~~	~~1~~
~~2018715~~	~~RETAINER, WIRE~~	~~2~~
~~1000100-1~~	~~TERMINAL~~	~~2~~
2018605-011	STABLE MEMBER ASSY	1
~~2018746~~	~~HOUSING, BEARING TM~~	~~1~~
~~2018747~~	~~PLATE, BEARING RET TM IA~~	~~1~~
~~2018745~~	~~CLIP, RETAINER TM IA&MA~~	~~6~~
~~2018743~~	~~SHAFT, STUB TM IA~~	~~1~~
2018634	SLIP RING ASSY	1
2018608-011	RESOLVER ASSY IA	1
1000123	CONNECTOR ELECT	2
1000119-001	CONNECTOR	1
~~2018781~~	~~WIRE GUIDE~~	~~1~~
2018782	WIRE GUIDE	1
~~2018623~~	~~MOTOR, TORQUE~~	~~1~~
2018611-011	IGSA TM IA	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 10905	14 JUL 64	AAH	WK
	B	TDRR 11887	17 AUG 64	AAH	WK
	C	TDRR 11993	25 AUG 64	AJB	WK
	D	TDRR 12639	10 SEP 64	AAH	[illegible]
	E	TDRR 13164	30 SEP 64	AAH	WK
	F	TDRR 14785	15 DEC 64	AAH	WK
	G	TDRR 15340	4 JAN 65	AAH	WK
	H	TDRR 15714	25 JAN 65	AAH	WK
	J	TDRR 16812	24 FEB 65	AAH	[illegible]

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018603	

APPLICATION

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MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED	[illegible]	1 July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC	[illegible]	7/7/64
MIT/IL APPROVAL	W Kupfer	7/7/64

INNER
AXIS
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

MIT
INSTRUMENTATION
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CAMBRIDGE, MASS.

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SPACECRAFT CENTER
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SHEET 1 OF 1

4 3 2 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
~~2018621~~	~~BEARING, DUPLEX~~	~~1~~
~~2018631~~	~~RESOLVER~~	~~1~~
~~2018632~~	~~RESOLVER, GYRO ERROR~~	~~1~~
~~1000119~~	~~CONNECTOR, ELECT~~	~~2~~
~~2018729~~	~~HSG BRG~~	~~1~~
~~2018723~~	~~NUT, BRG RETAINER~~	~~1~~
~~2018722~~	~~PLATE, BRG RET~~	~~1~~
~~2018713~~	~~SHAFT, STUB~~	~~1~~
~~2018715~~	~~RETAINER, WIRE~~	~~2~~
~~1000100-1~~	~~TERMINAL~~	~~2~~
2018605-011	STABLE MEMBER ASSY	1
~~2018746~~	~~HOUSING, BEARING TM~~	~~1~~
~~2018747~~	~~PLATE, BEARING RET TM IA~~	~~1~~
~~2018745~~	~~CLIP, RETAINER TM IA & MA~~	~~6~~
~~2018743~~	~~SHAFT, STUB TM IA~~	~~1~~
2018634	SLIP RING ASSY	1
2018608-011	RESOLVER ASSY IA	1
1000123	CONNECTOR ELECT	2
1000119-001	CONNECTOR	1
~~2018781~~	~~WIRE GUIDE~~	~~1~~
2018782	WIRE GUIDE	1
~~2018623~~	~~MOTOR, TORQUE~~	~~1~~
2018611-011	IGSA TM IA	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
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	D	TDRR 12639	10 SEP 64		
	E	TDRR 13164	30 SEP 64		WK
	F	TDRR 14785	15 DEC 64		WK
	G	TDRR 15340	4 JAN 65		WK
	H	TDRR 15714	25 JAN 65		WK
Ⓜ	J	TDRR 16812	24 FEB 65		
	K	REPLACED BY REV. L WITH	23 MAR 65		
		CHANGES TDRR 17749			WK

REPLACED BY REV. L WITH CHANGES.

MASTER

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LIST OF PARTS AND MATERIALS

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APPLICATION

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MIT/IL APPROVAL	W C	7/7/64

INNER
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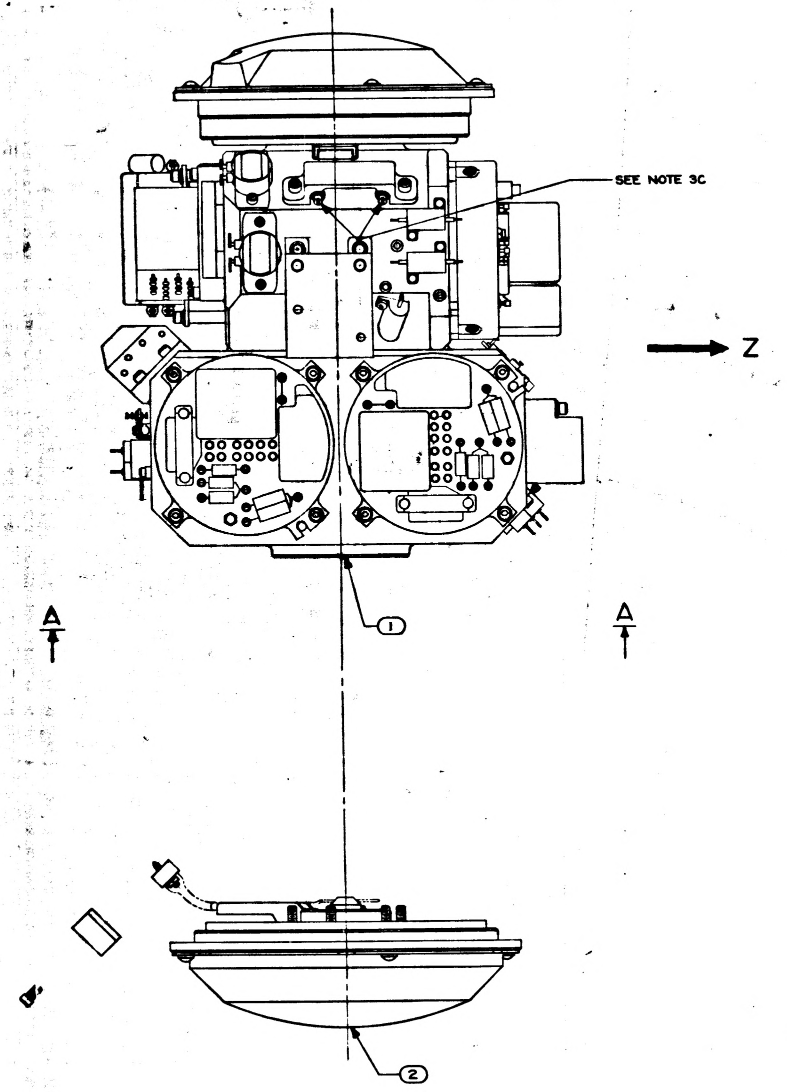
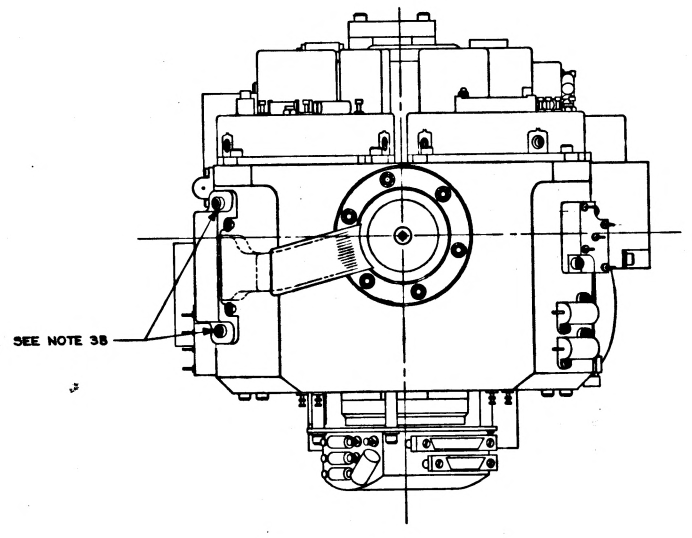
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
L	REPLACES REV K WITH CHANGES PER TDRR 17749	23Mar65	WK





VIEW A-A

REPLACES REV K
WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	2018614-011	IGSA RESOLVER, INNER AXIS	3
1	2018611-011	IGSA TORQUE MOTOR, INNER AXIS	2
1	2018605-011	STABLE MEMBER ASSEMBLY	1
011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018603	DL2018601
APPLICATION	

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APPROVAL 23Mar65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23Mar65

MANNED SPACECRAFT CENTER
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INNER AXIS
ASSEMBLY

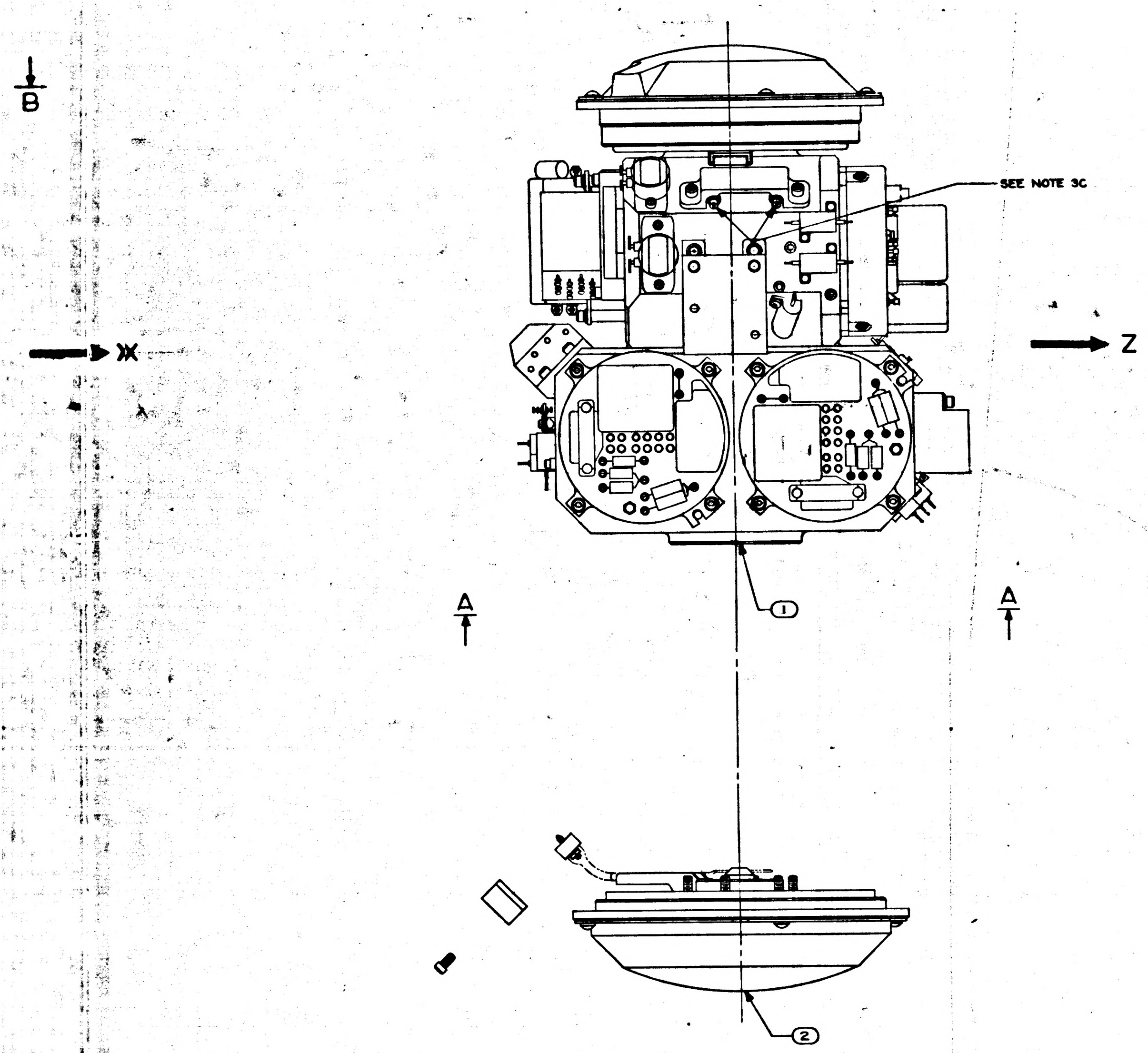
CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018604
SCALE 1/1
WT
SHEET 1 OF 1

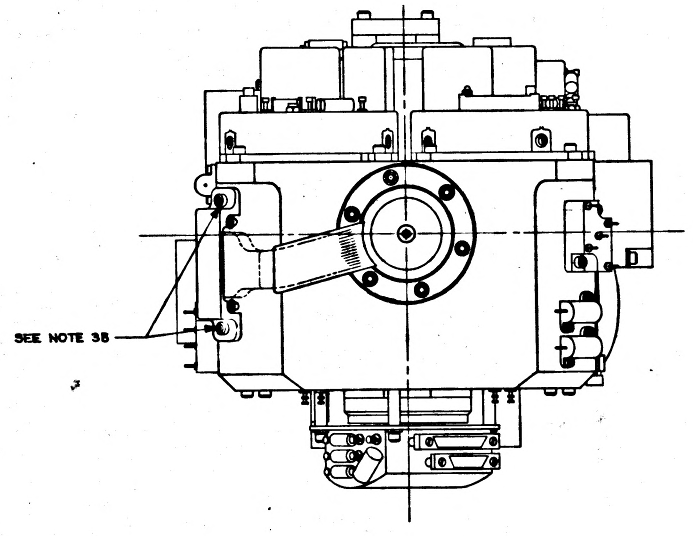
MASTER

2018604 REV L SHT 1

2018604 L

SYM	DESCRIPTION	DATE	APPROVAL
L	REPLACES REV K WITH CHANGES PER TDRR 1749	23FEB65	





VIEW A-A

REPLACES REV K
WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
1	2018614-011	16SA RESOLVER, INNER AXIS
1	2018611-011	16SA TORQUE MOTOR, INNER AXIS
1	2018605-011	STABLE MEMBER ASSEMBLY
011	LIST OF MATERIALS	

NEXT ASSY	USED ON
2018608	DL2018601

APPLICATION

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FRACTIONS ± — DECIMALS ± — ANGLES ± —
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APPROVAL 23Feb65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23Feb65

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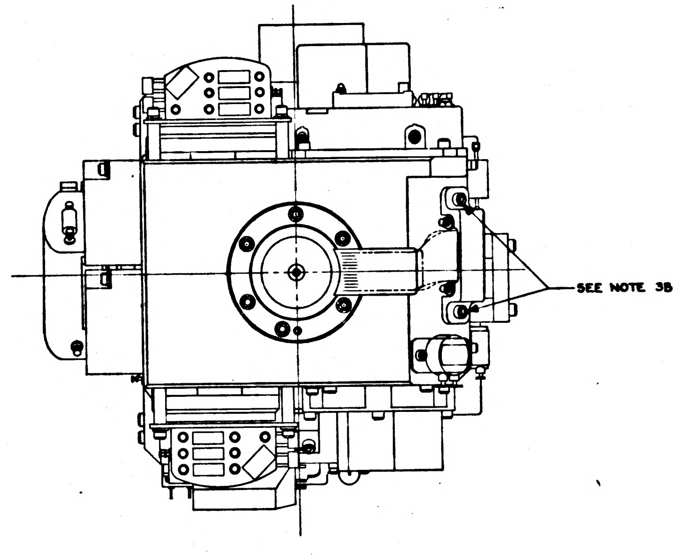
INNER AXIS
ASSEMBLY

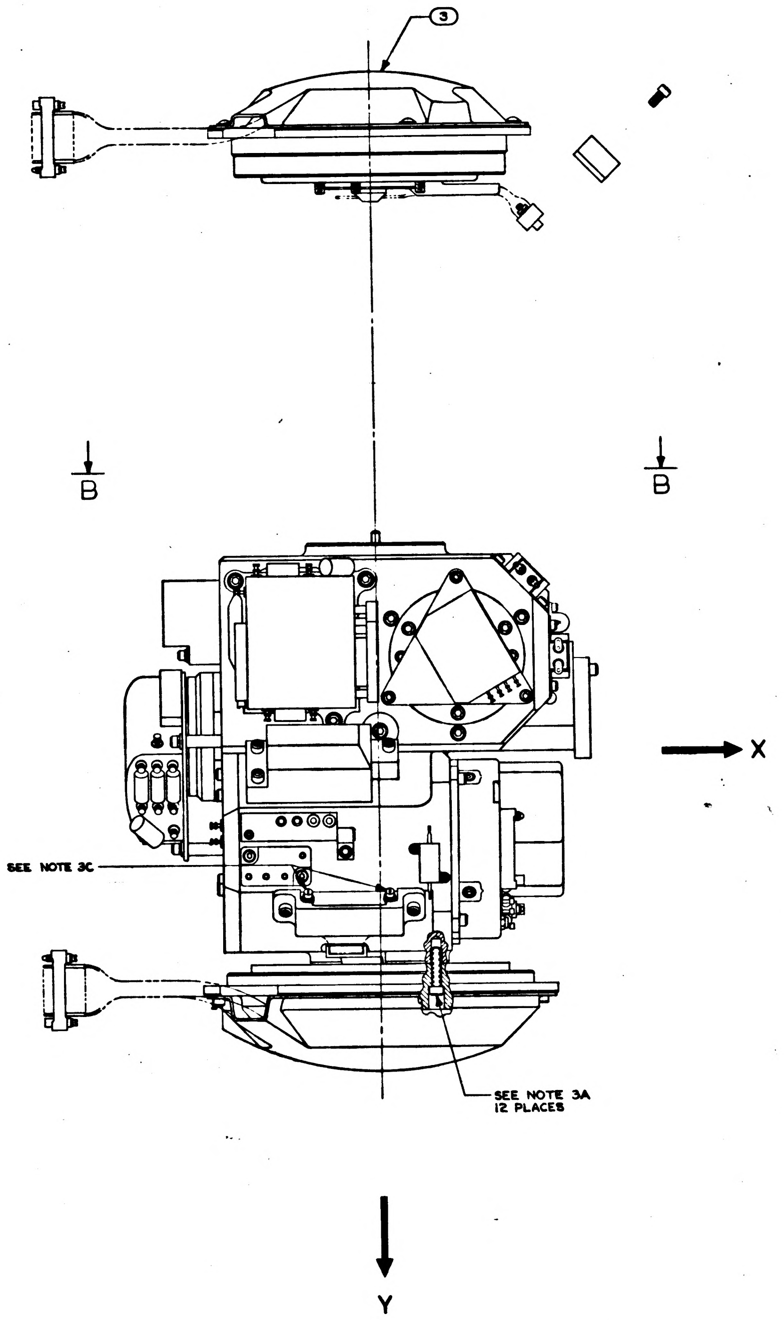
CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018604
SCALE 1/1
WT
SHEET 1

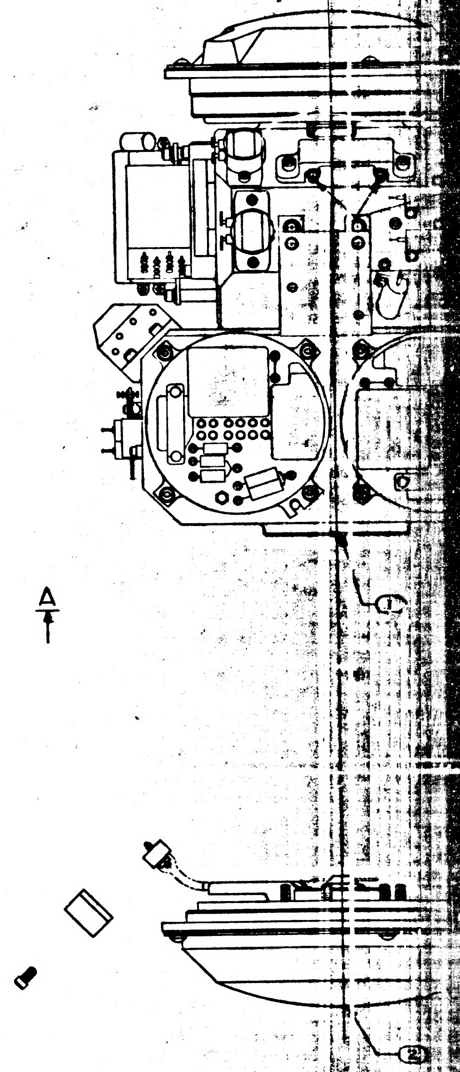
MASTER

2018604	REV L	SHT 1



VIEW B-B


3
B
B
X
SEE NOTE 3C
SEE NOTE 3A
12 PLACES
Y



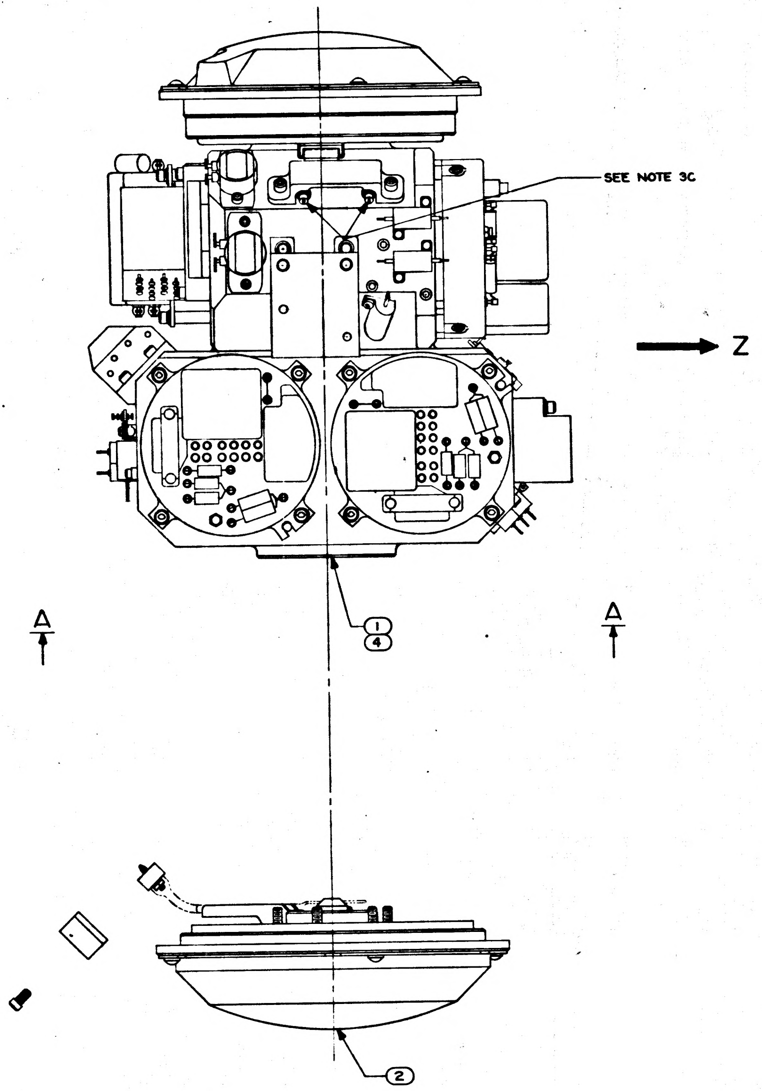
NOTES

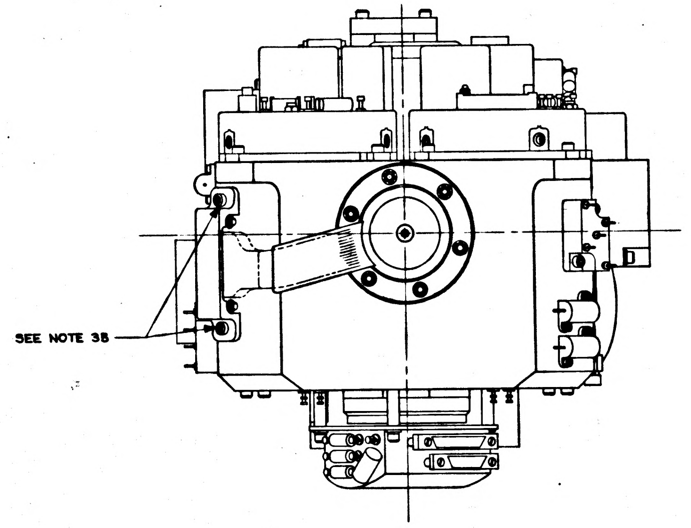
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS 2007203
3. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS

3H

	REV	SHT
2018604	L	1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
L	REPLACES REV K WITH CHANGES PER TDRR 17749	23MAR65	WK
M	REVISED PER TDRR 19275	2 Jun 65	WK





VIEW A-A

REPLACES REV K
WITH CHANGES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	—	2018605-021	STABLE MEMBER ASSEMBLY	4
1	1	2018614-011	IGSA RESOLVER, INNER AXIS	3
1	1	2018611-011	IGSA TORQUE MOTOR, INNER AXIS	2
—	1	2018605-011	STABLE MEMBER ASSEMBLY	1
021	011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018603	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG. NO. CONTRACT
DRAWN RES DATE 1-25-65
CHECKED
APPROVAL 23Mar65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23Mar65

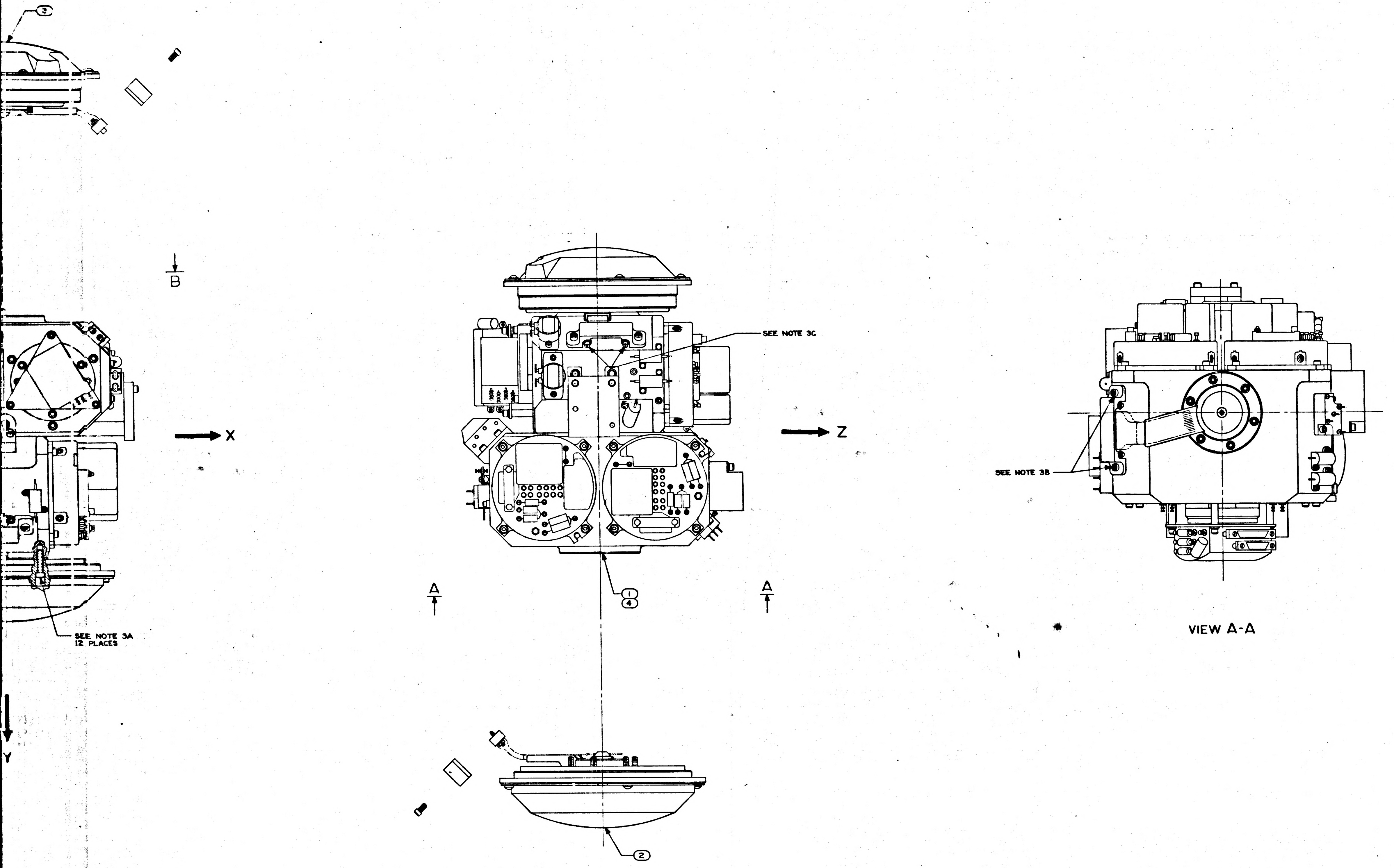
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INNER AXIS
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018604
SCALE 1/1
WT
SHEET 1 OF 1

MASTER

L	REPLACES CHANGES
M	REVISED P



3
B
X
SEE NOTE 3C
Z
SEE NOTE 3B
A
A
1
4
SEE NOTE 3A
12 PLACES
Y
2
VIEW A-A

REPLACES REV K
WITH CHANGES

	QTY REQD	PART OR IDENTIFYING NO.	
i	—	20 5605 -02	STAB
i	1	2018614 -011	IGSA
i	1	2018611 -011	IGSA
—	1	2018601 -011	STAB

LIST OF

2018608	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.

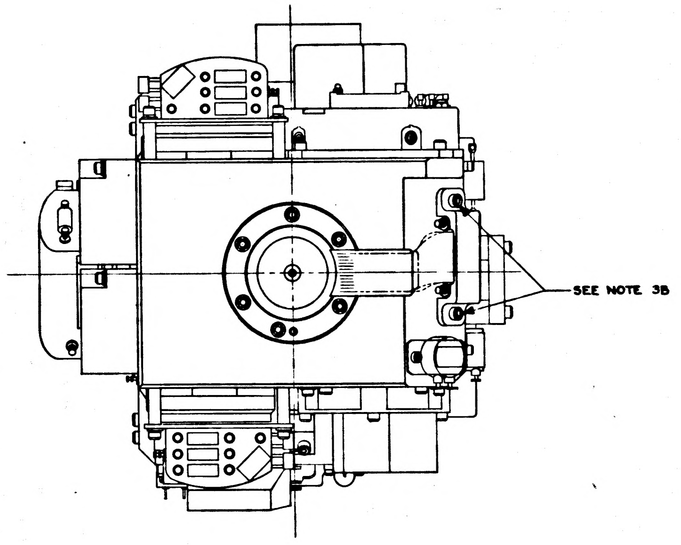
DRAWN RES DATE 1-25-6
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

CODE IDENT NO.
80230
SCALE 1/1

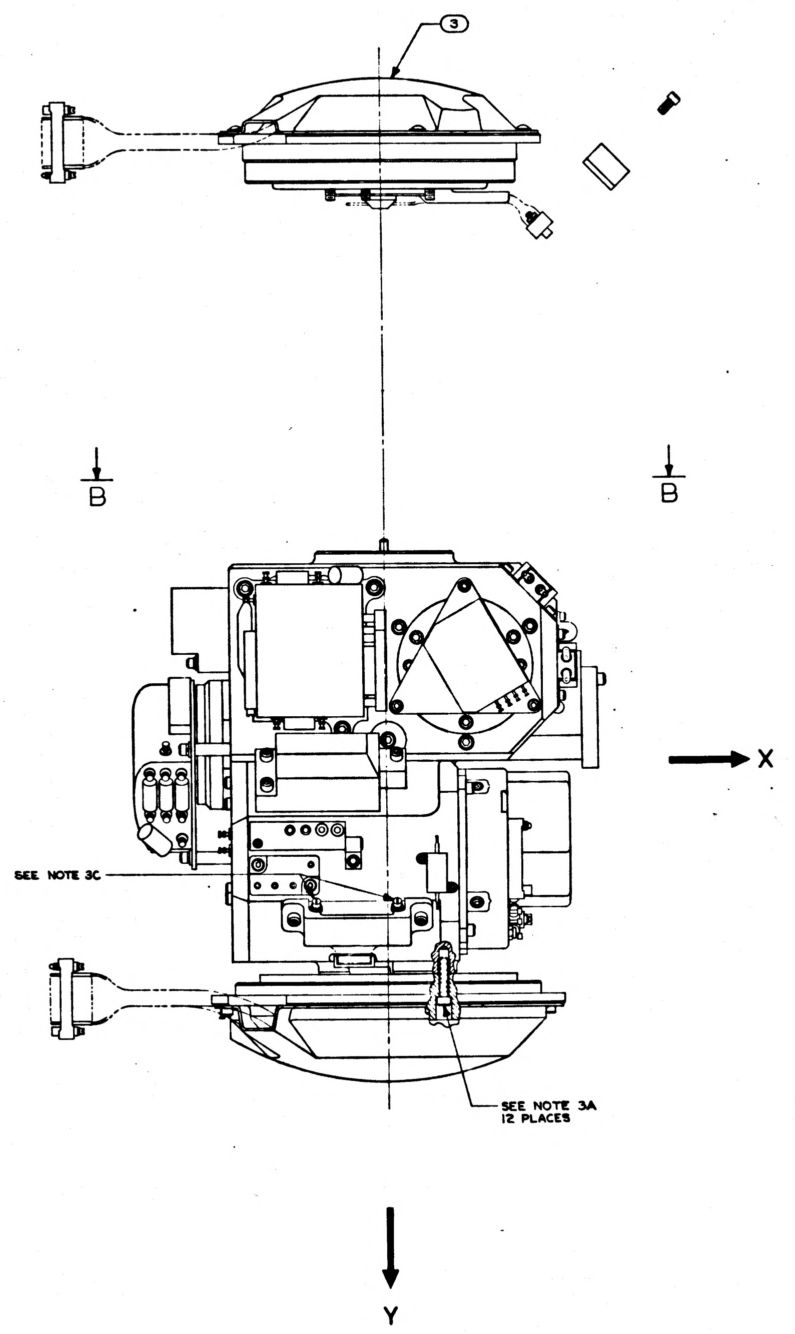
2018604 REV M SHT 1

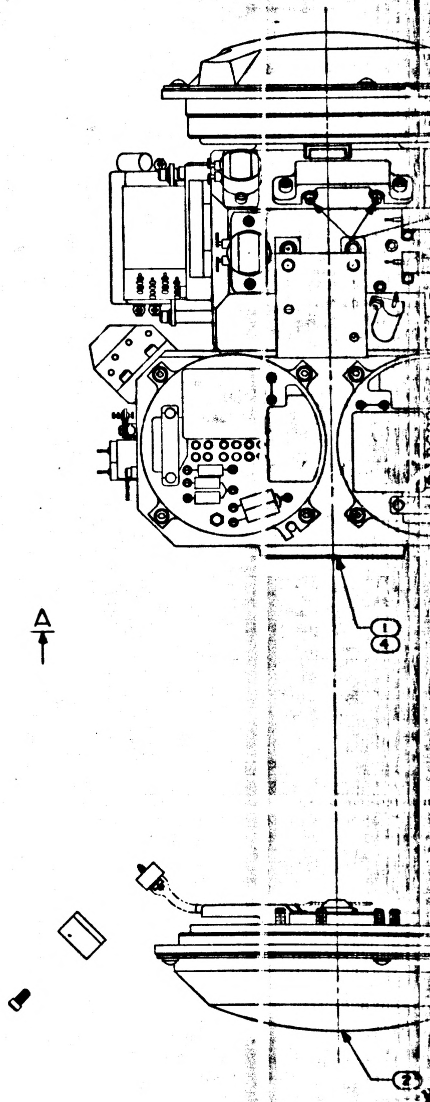
MASTER

E-2



VIEW B-B


3
B
B
X
SEE NOTE 3C
SEE NOTE 3A
12 PLACES
Y



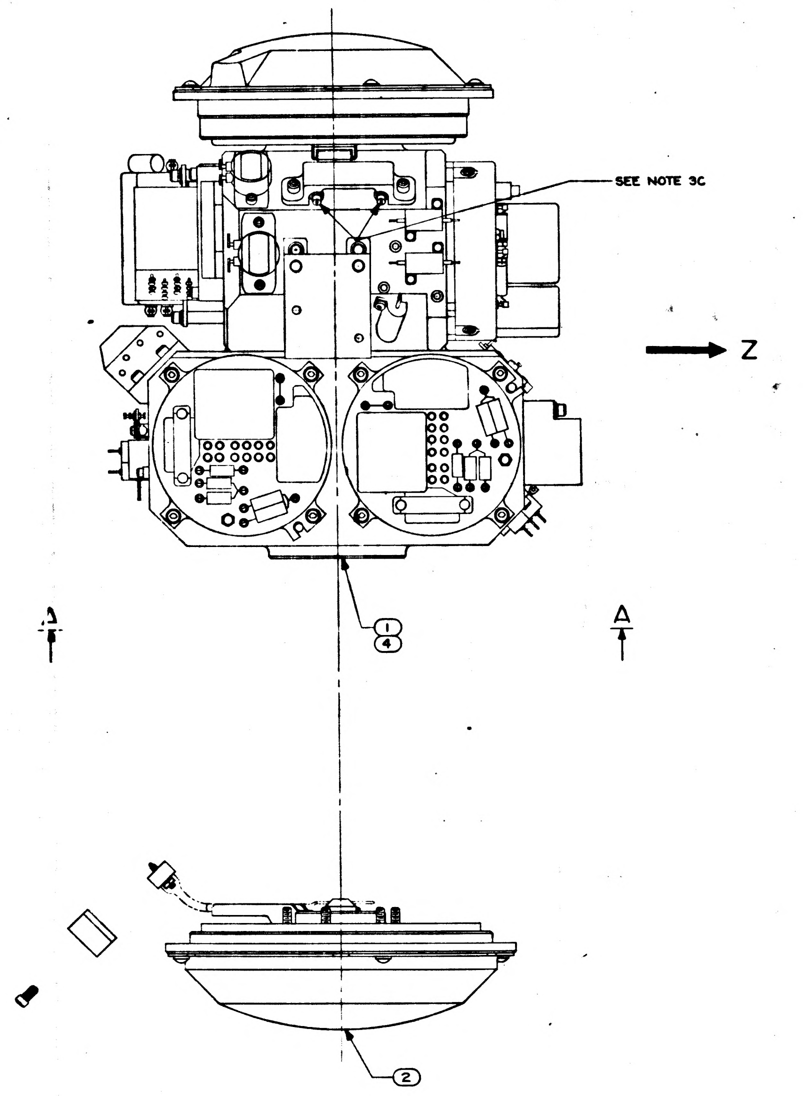
NOTES

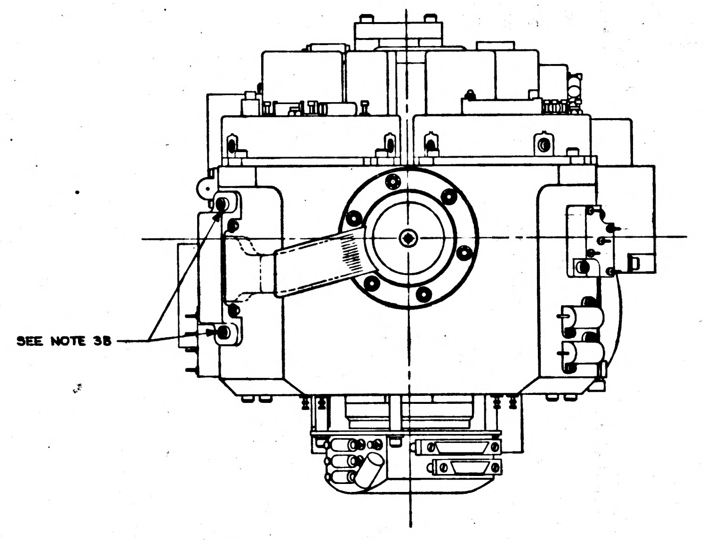
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

3. SCREW TORQUE REQUIREMENTS ±7%
    - A. 10.0 IN-LB
    - B. 5.0 IN-LB
    - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS

	REV	SHT
2018604	M	1

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES PER TDRR 17749	[illegible]	[illegible]	WK
M	REVISED PER TDRR 19275	2 Jun 65	[illegible]	WK
N	REVISED PER TDRR 26248	2 Feb 65	[illegible]	WK





VIEW A-A

REPLACES REV K
WITH CHANGES

3/11

1	—	2018611-021	IGSA TORQUE MOTOR INNER AXIS	5
1	—	2018605-021	STABLE MEMBER ASSEMBLY	4
1	1	2018614-011	IGSA RESOLVER, INNER AXIS	3
—	1	2018611-011	IGSA TORQUE MOTOR, INNER AXIS	2
—	1	2018605-011	STABLE MEMBER ASSEMBLY	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

2018608	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
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CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 3-3-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INNER AXIS
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018604
SCALE 1/1
WT
SHEET 1 OF 1

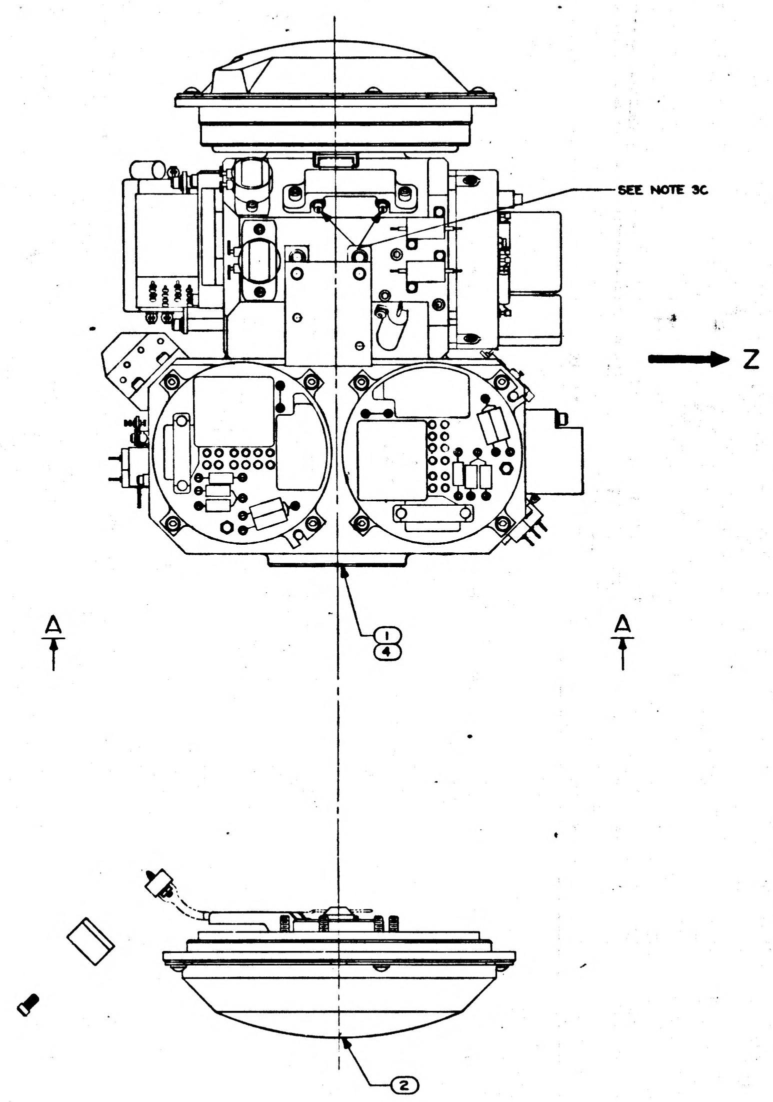
2018604 N

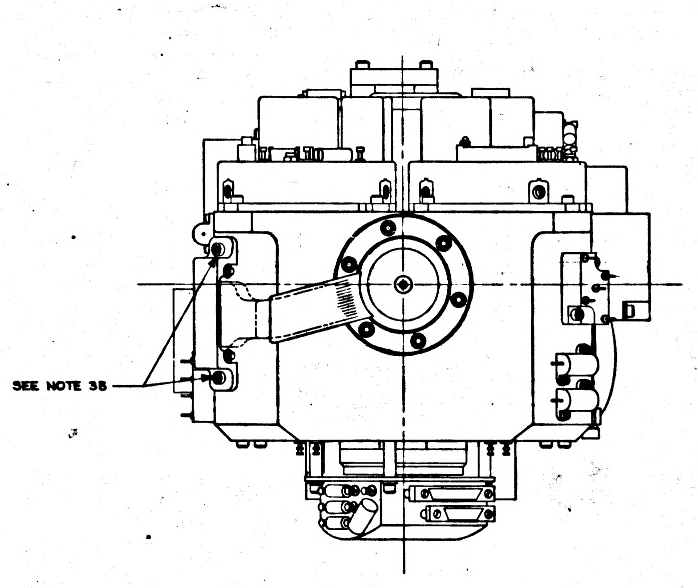
F3

MASTER

	REV	SHT
018604	N	1

SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES PER TDRR 17749	23 Mar 65		
M	REVISED PER TDRR 19275	3 Jun 65		
N	REVISED PER TDRR 26248	2 Feb 66		





VIEW A-A

REPLACES REV K
WITH CHANGES

1	—	2018611-021	IGSA TORQUE MOTOR INNER AXIS	5
1	—	2018605-021	STABLE MEMBER ASSEMBLY	4
1	1	2018614-011	IGSA RESOLVER, INNER AXIS	3
—	1	2018611-011	IGSA TORQUE MOTOR, INNER AXIS	2
—	1	2018605-011	STABLE MEMBER ASSEMBLY	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY	USED ON
2018608	DL2018601
APPLICATION	

MIT
INSTRUMENTATION LAB
Cambridge, Mass.
DRAWN RES DATE 1-25-6
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INNER AXIS
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018604
SCALE 1/1
WT
SHEET 1 OF

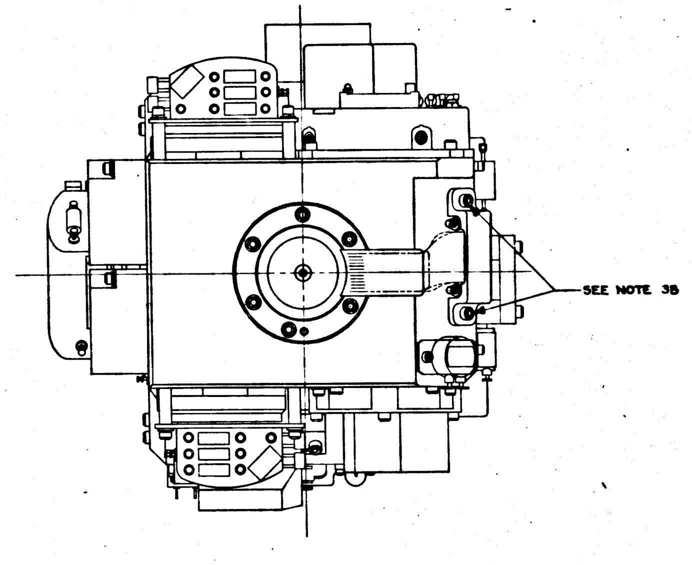
F-2

MASTER

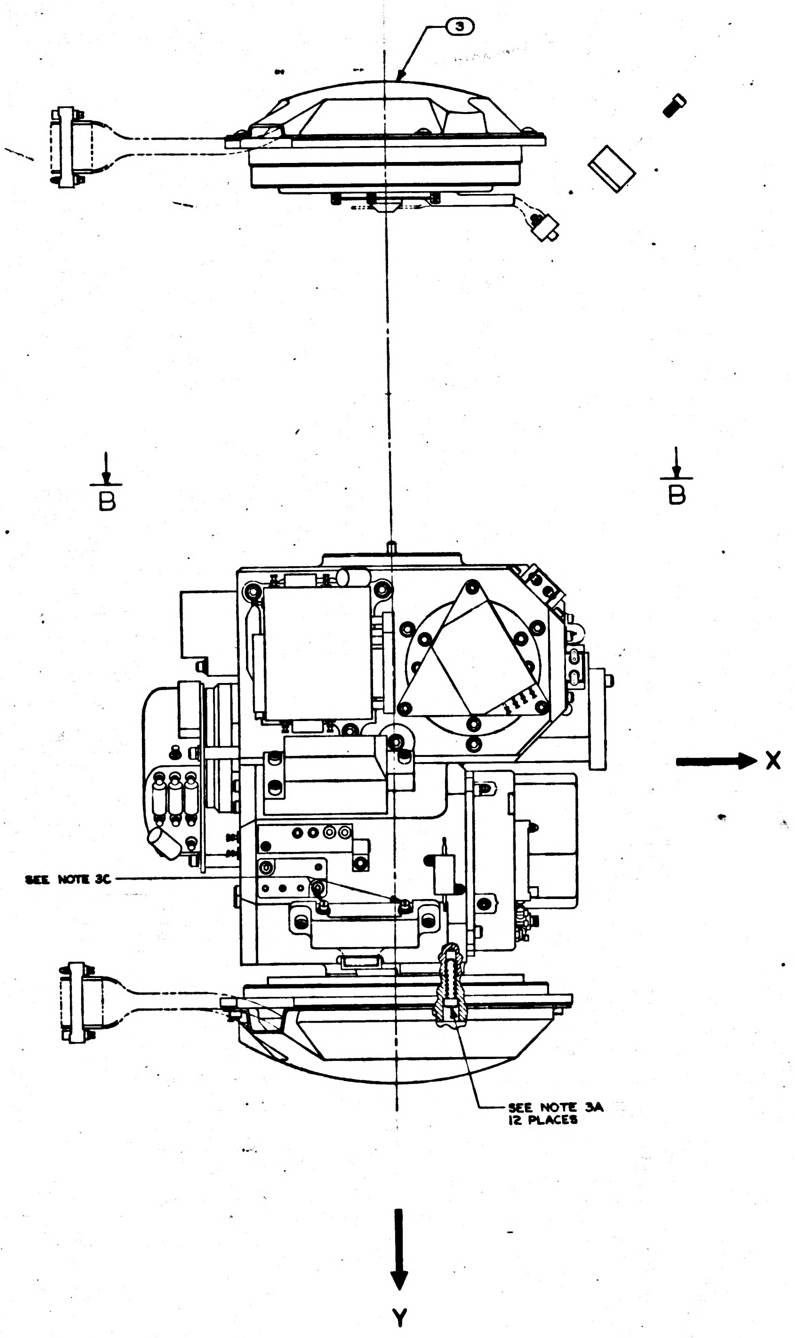
3H

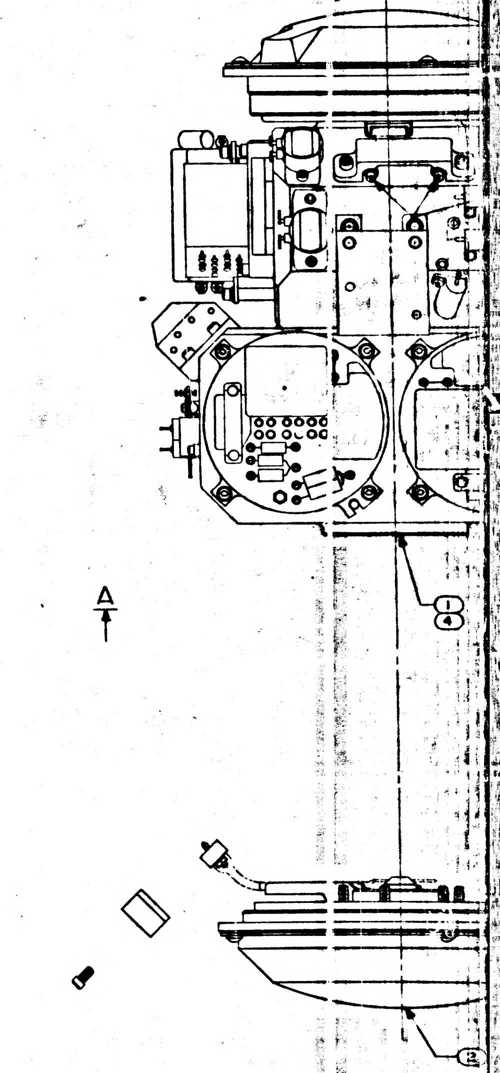
2018604 N

2018604	REV N	SHT 1


SEE NOTE 3B
C
B

VIEW B-B


3
B
B
X
SEE NOTE 3C
SEE NOTE 3A
12 PLACES
Y



NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

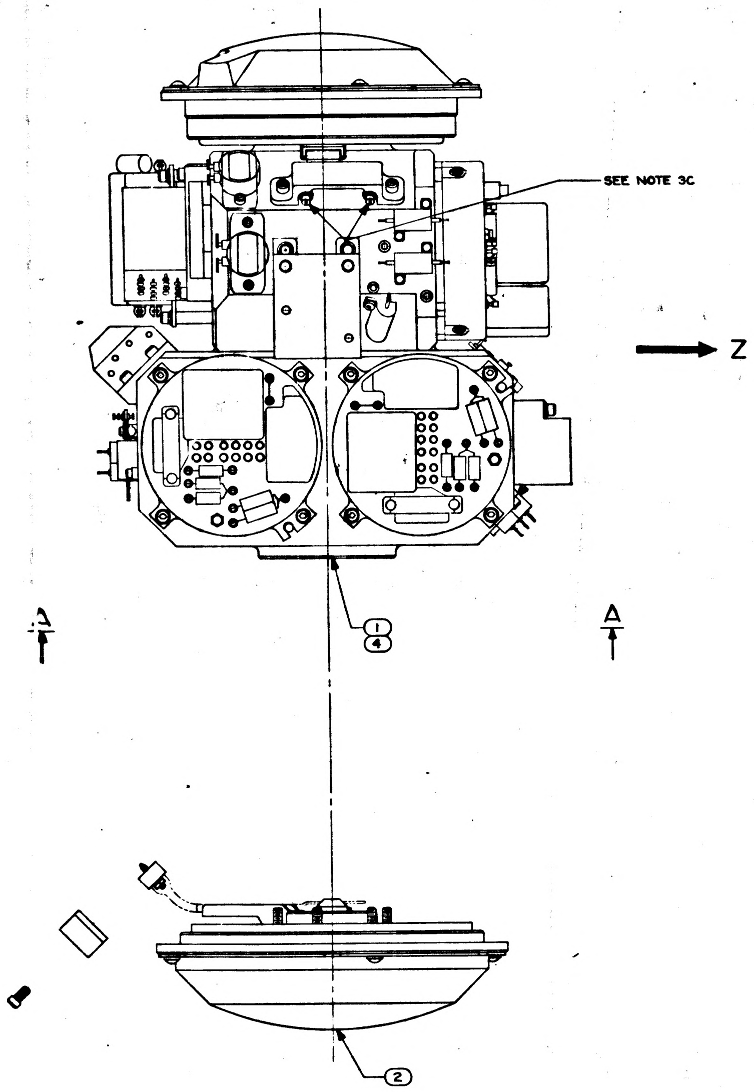
3. SCREW TORQUE REQUIREMENTS ± 7%
    - A. 10.0 IN-LB
    - B. 5.0 IN-LB
    - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS

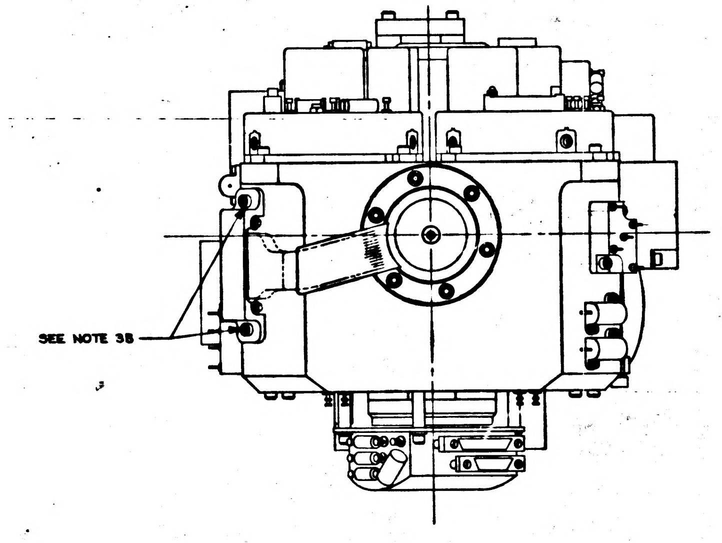
31'

F-1

2018604	REV	SHT
	N	1

SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES PER TDRR 17749	[illegible]	[illegible]	WK
M	REVISED PER TDRR 19275	2 Jun 65	[illegible]	WK
N	REVISED PER TDRR 26248	2 Feb 65	[illegible]	WK
P	REVISED PER TDRR 26599	24 Feb 65	[illegible]	WK.





VIEW A-A

REPLACES REV K
WITH CHANGES

1	—	2018614-021	IGSA RESOLVER, INNER AXIS	6
1	—	2018611-021	IGSA TORQUE MOTOR INNER AXIS	5
1	—	2018605-021	STABLE MEMBER ASSEMBLY	4
—	1	2018614-011	IGSA RESOLVER, INNER AXIS	3
—	1	2018611-011	IGSA TORQUE MOTOR, INNER AXIS	2
—	1	2018605-011	STABLE MEMBER ASSEMBLY	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018608	DL2018604

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN RES DATE 1-25-6
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INNER AXIS
ASSEMBLY

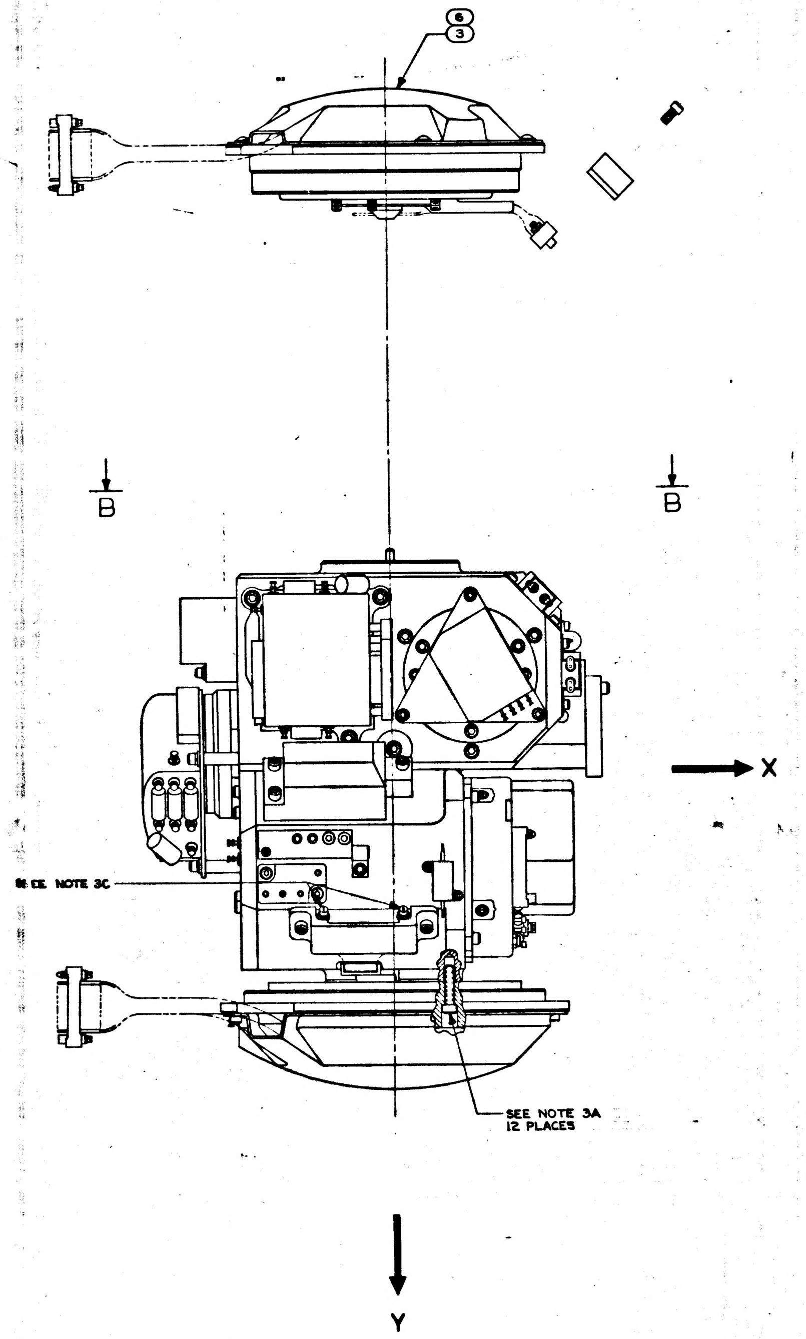
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018604
SCALE 1/1
WT
SHEET 1 OF 1

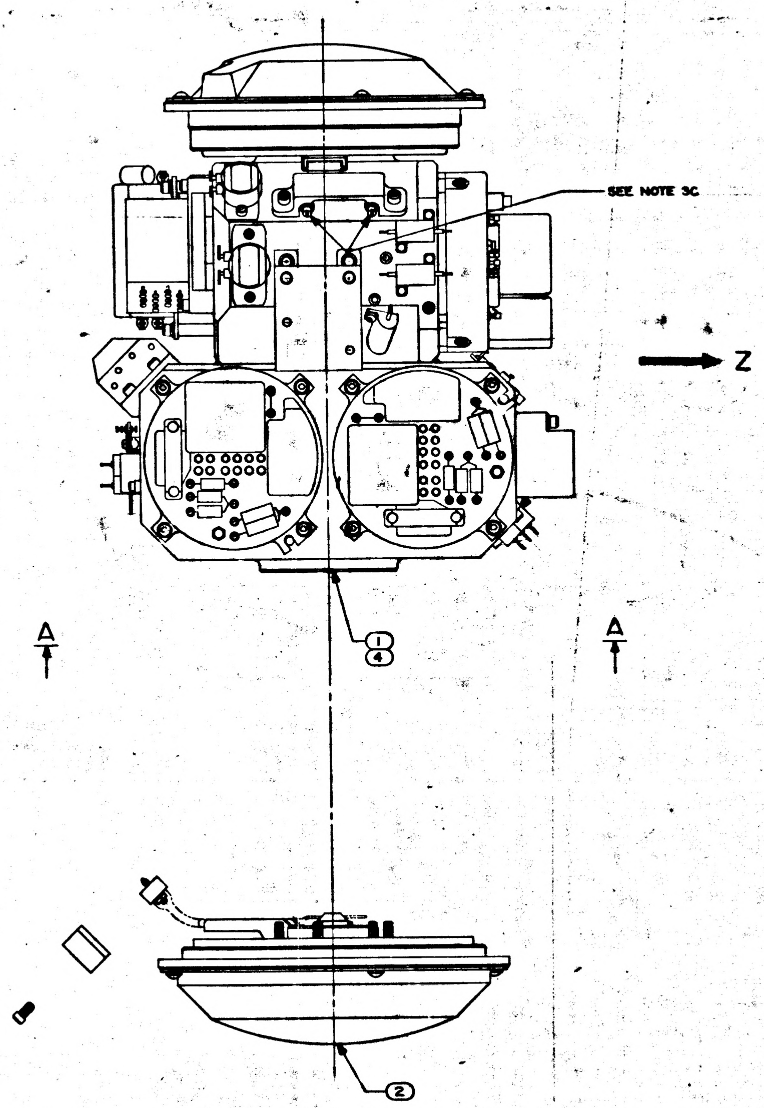
2018604 P

2018604 REV P SHT 1

MASTER

3/11


6
3
B
B
X
SEE NOTE 3C
SEE NOTE 3A
12 PLACES
Y


SEE NOTE 3C
Z
1
4
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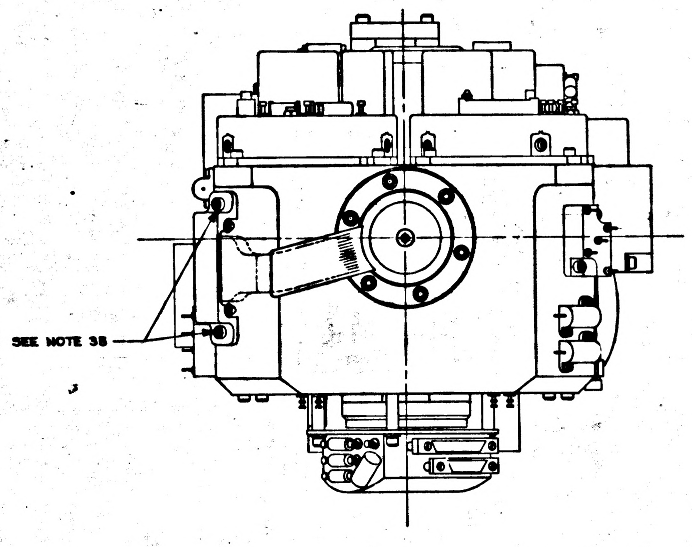
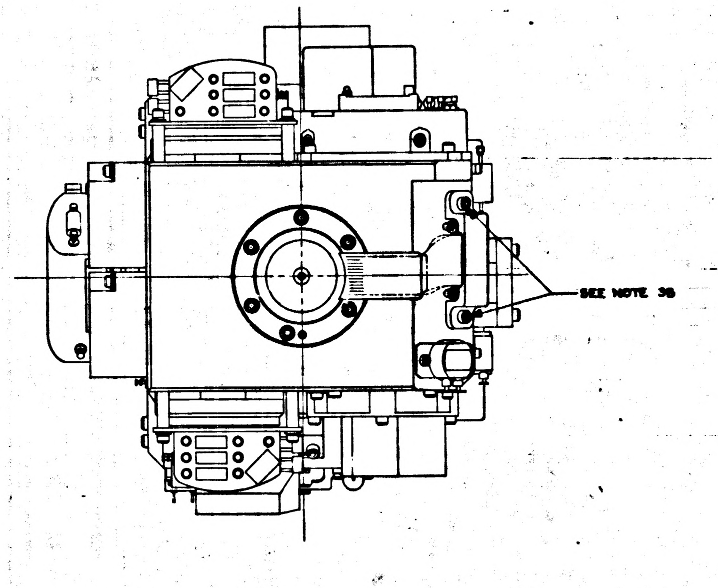
2



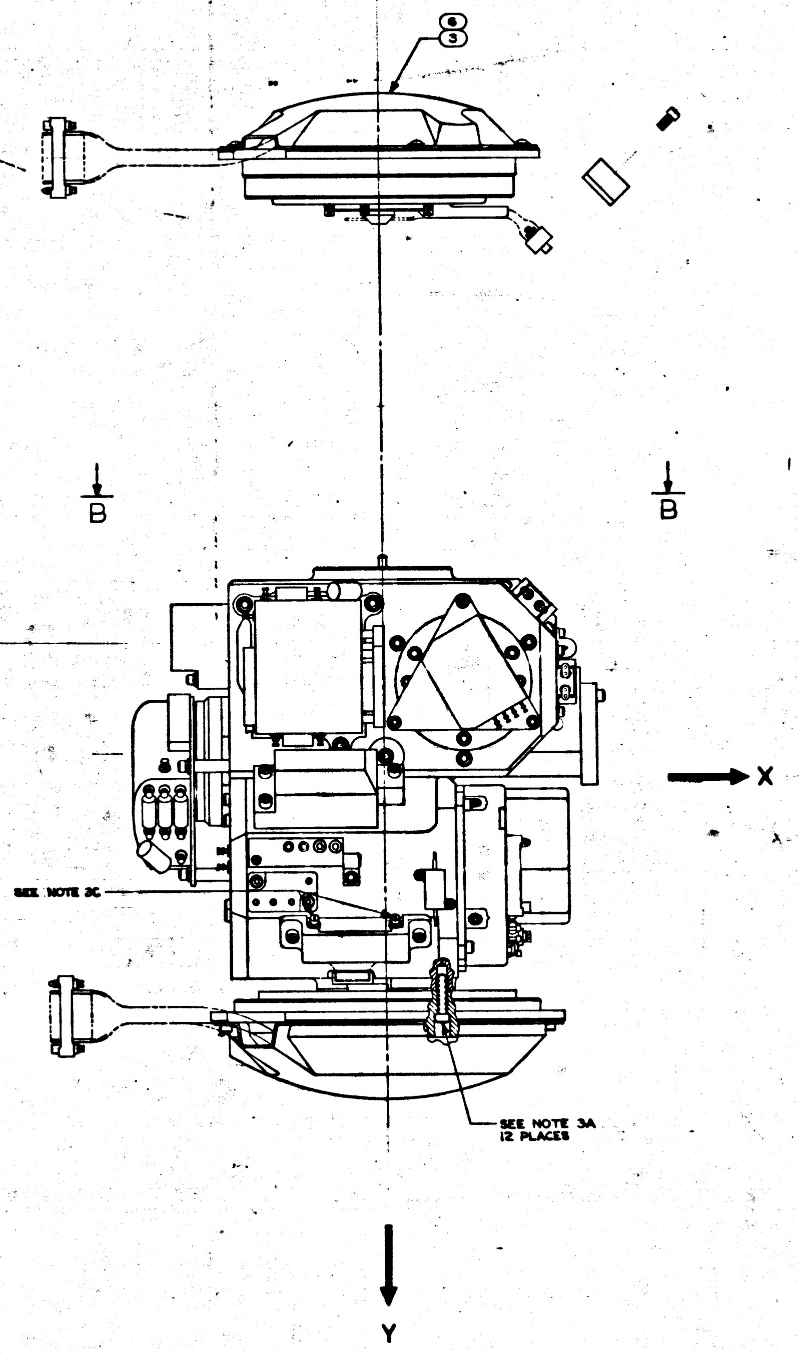
VIEW A-A

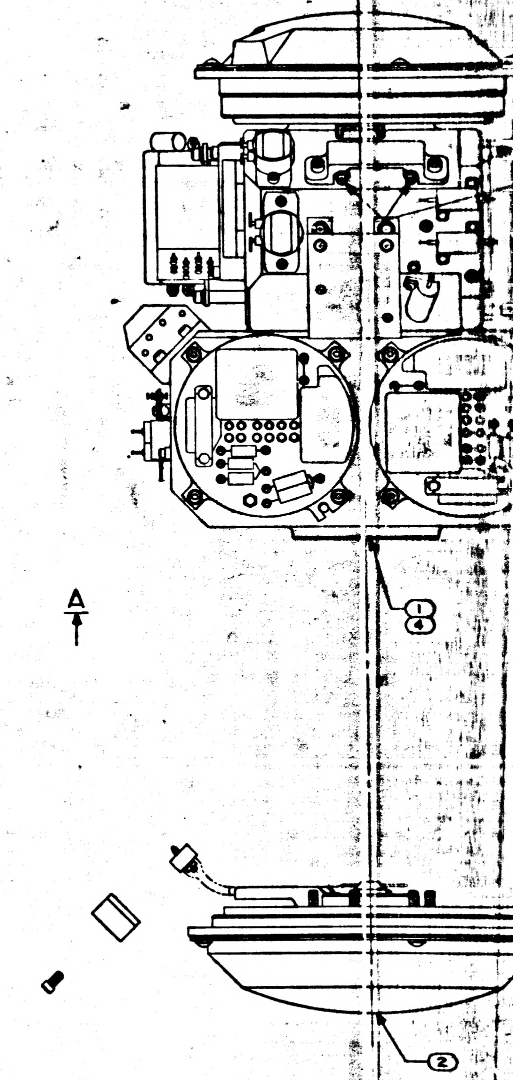
REPLACES
WITH CHA

MASTER



VIEW B-B


6
3
B
B
X
SEE NOTE 3C
SEE NOTE 3A
12 PLACES
Y



NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

3. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS

2018604	REV P	SHT 1

8 7 6 5

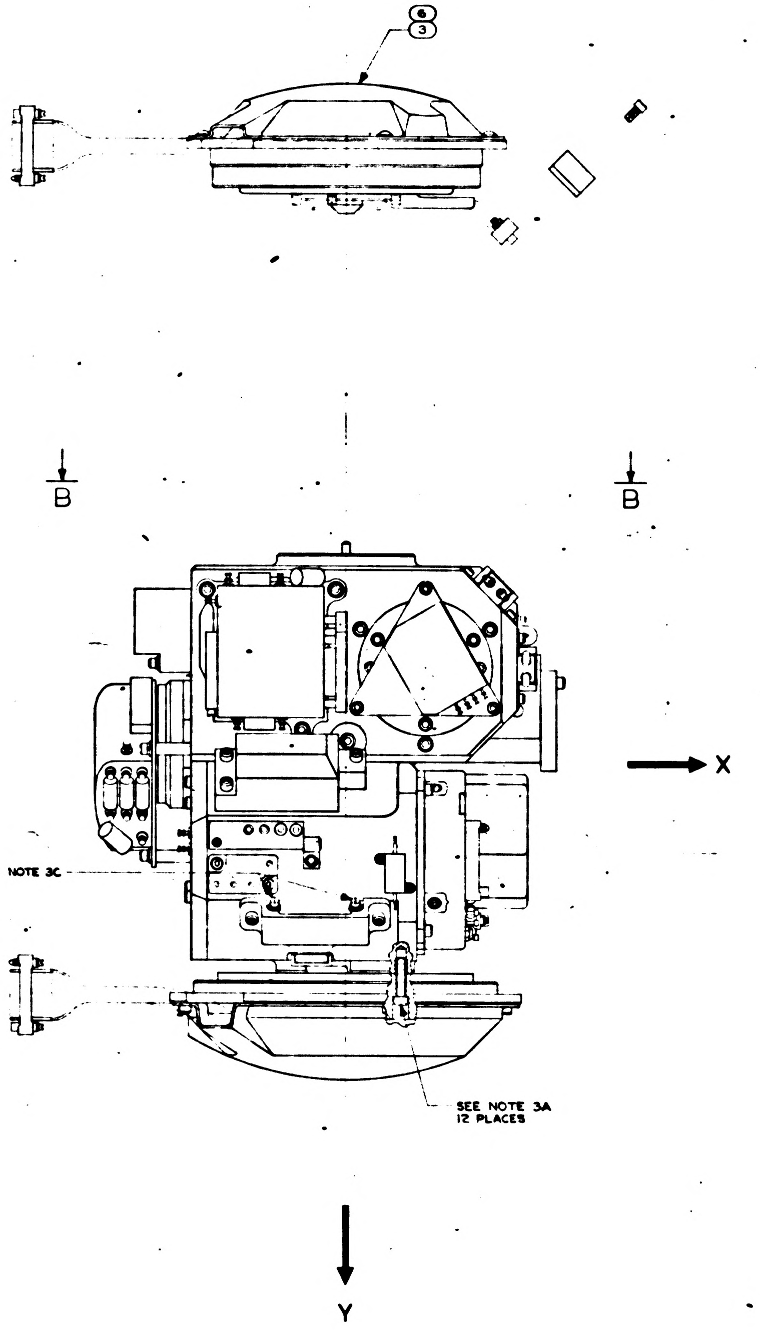
D

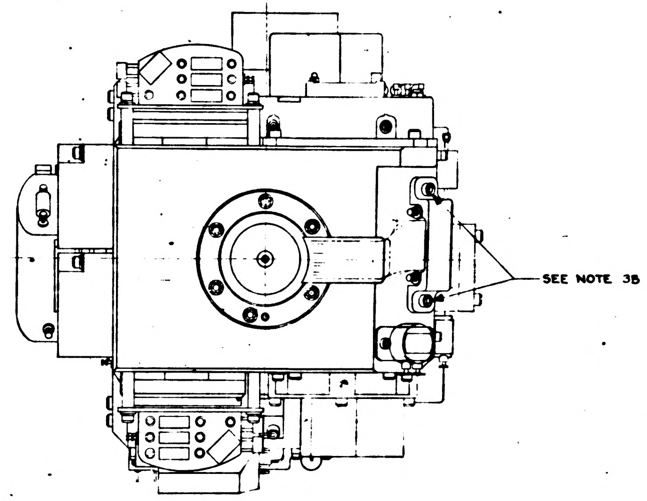
C

B

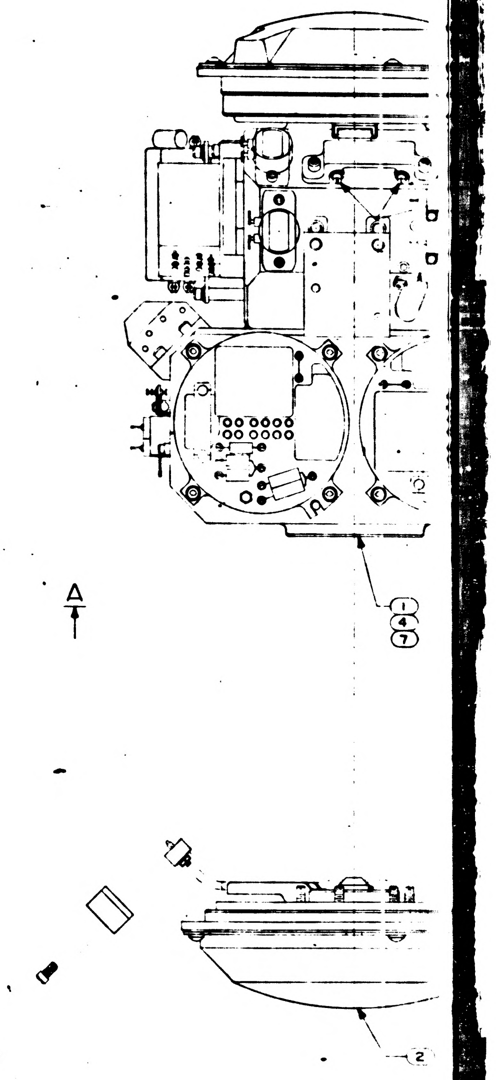
A

3H


6
3
B
B
X
SEE NOTE 3C
SEE NOTE 3A
12 PLACES
Y



VIEW B-B



NOTES

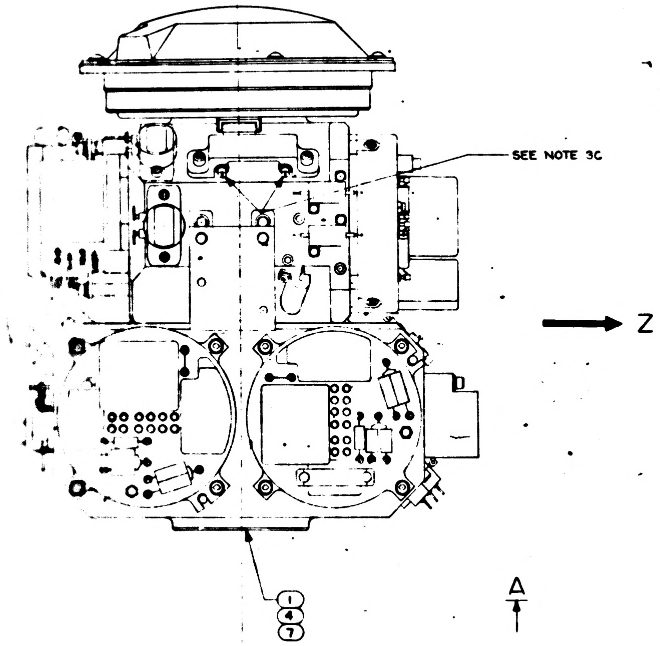
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

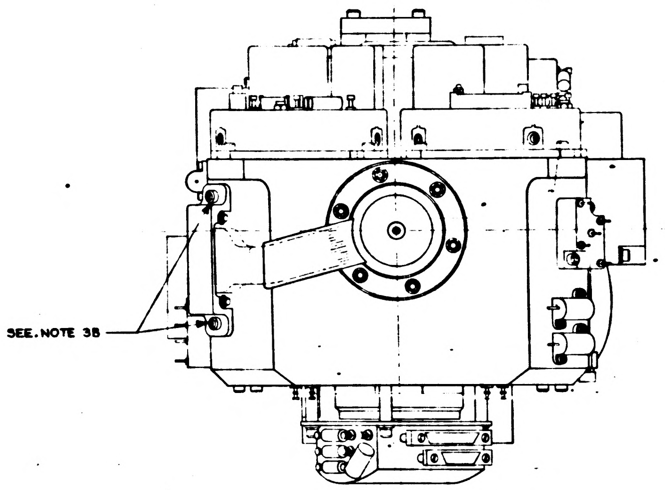
3. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS

2018604	RFV	SHT
	R	1

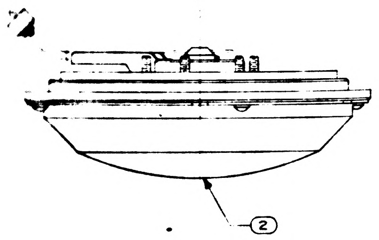
8 7 6 5

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
L	REPLACES REV K WITH CHANGES PER TDRR 17749	23Mar65	WK
M	REVISED PER TDRR 19275	2 Jun 65	WK
N	REVISED PER TDRR 26248	2 Feb 65	WK
P	REVISED PER TDRR 26599	24 Feb 66	WK
R	REVISED PER TDRR 33319	5APR67	LEE





VIEW A-A



REPLACES REV K
WITH CHANGES

QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	–	–	2018605-031	STABLE MEMBER ASSEMBLY	7
1	1	–	2018614-021	IGSA RESOLVER, INNER AXIS	6
1	1	–	2018611-021	IGSA TORQUE MOTOR INNER AXIS	5
–	1	–	2018605-021	STABLE MEMBER ASSEMBLY	4
–	–	1	2018614-011	IGSA RESOLVER, INNER AXIS	3
–	–	1	2018611-011	IGSA TORQUE MOTOR, INNER AXIS	2
–	–	1	2018605-011	STABLE MEMBER ASSEMBLY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
2018603	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN RES DATE 1-25-65
CHECKED
APPROVAL 23Mar65
APPROVAL
NASA APPROVAL 6-3-65
MIT APPROVAL W Ruffer 23Mar65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INNER AXIS
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018604
SCALE 1/1
WT
SHEET 1 OF 1

2018604 R

3/1

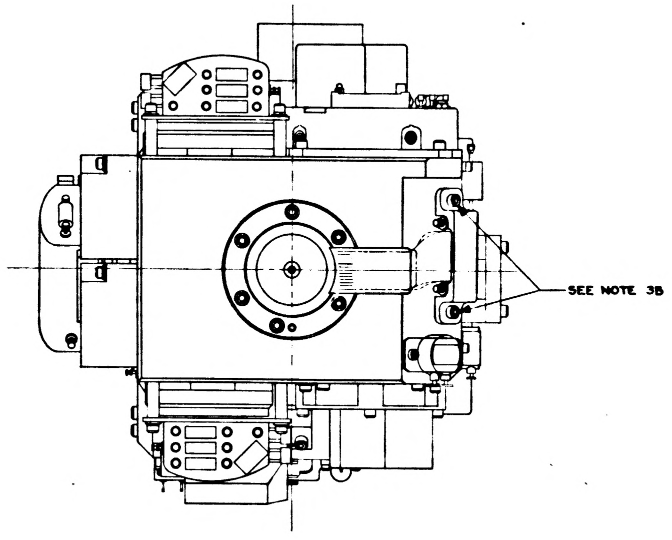
2/2018604

D

C

B

A



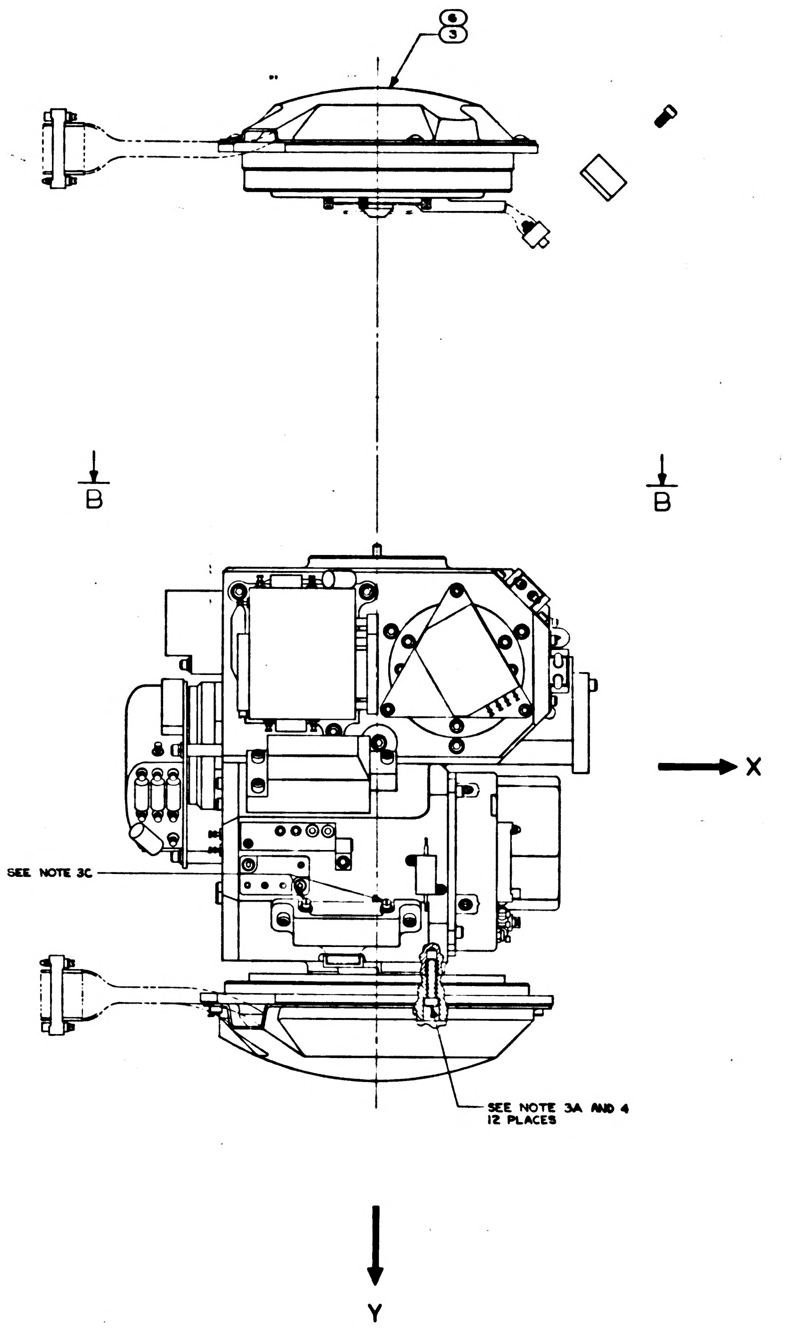
VIEW B-B

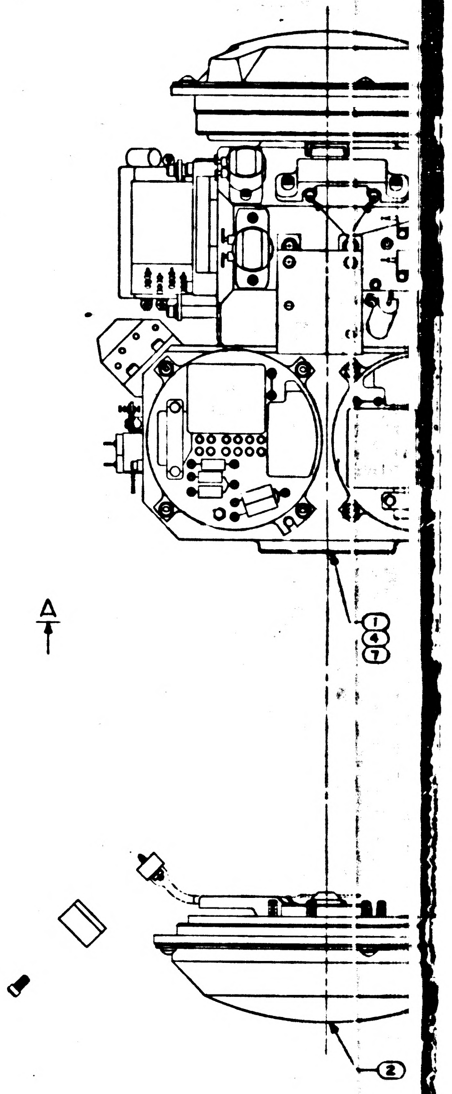
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

3. SCREW TORQUE REQUIREMENTS ± 7%
    - A. 10.0 IN-LB
    - B. 5.0 IN-LB
    - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS

4. APPLY A UNIFORM THIN FILM OF ITEM ⑧ TO SCREW THREADS.

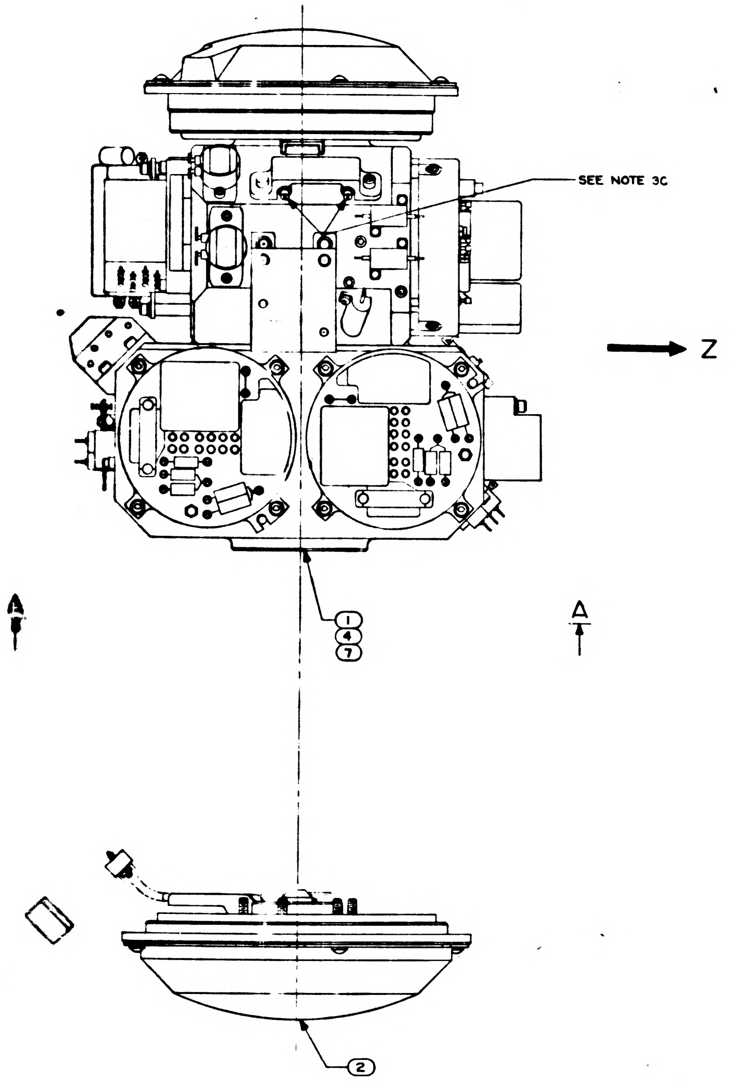

6
3
B
B
X
SEE NOTE 3C
SEE NOTE 3A AND 4
12 PLACES
Y

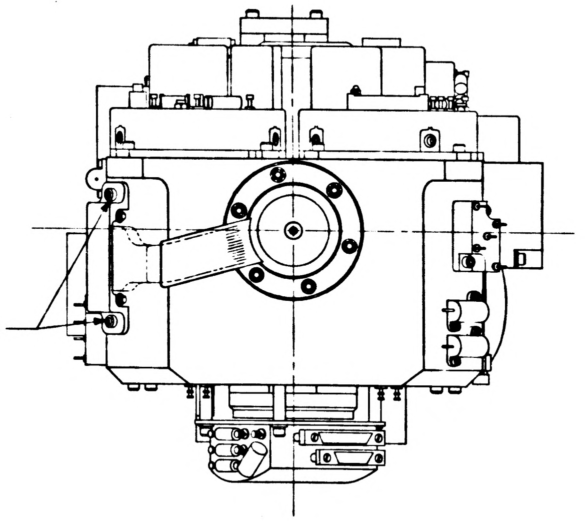


3A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES PER TDRR 17749	[illegible]	[illegible]	WK
M	REVISED PER TDRR 19275	2 Jun 65	[illegible]	WK
N	REVISED PER TDRR 26248	2 Feb 66	[illegible]	WK
P	REVISED PER TDRR 26598	24 Feb 66	[illegible]	WK.
R	REVISED PER TDRR 33319	5APR67	LEE	[illegible]
S	REVISED PER TDRR 33356	5APR67	LEE	[illegible]





VIEW A-A

REPLACES REV K
WITH CHANGES

QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	3
1	–	–	2018605-031	STABLE MEMBER ASSEMBLY	–
1	1	–	2018614-021	IGSA RESOLVER, INNER AXIS	6
1	1	–	2018611-021	IGSA TORQUE MOTOR INNER AXIS	5
–	1	–	2018605-021	STABLE MEMBER ASSEMBLY	4
–	–	1	2018614-011	IGSA RESOLVER, INNER AXIS	3
–	–	1	2018611-011	IGSA TORQUE MOTOR, INNER AXIS	2
–	–	1	2018605-011	STABLE MEMBER ASSEMBLY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
2018603	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
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MATERIAL
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INSTRUMENTATION LAB
CAMBRIDGE MASS
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CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

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HOUSTON TEXAS

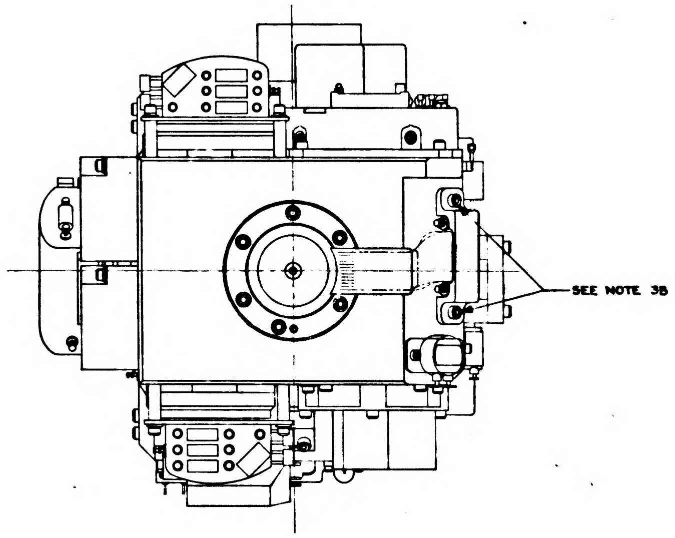
INNER AXIS
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 2018604
SCALE 1/1
WT
SHEET 1 OF 1

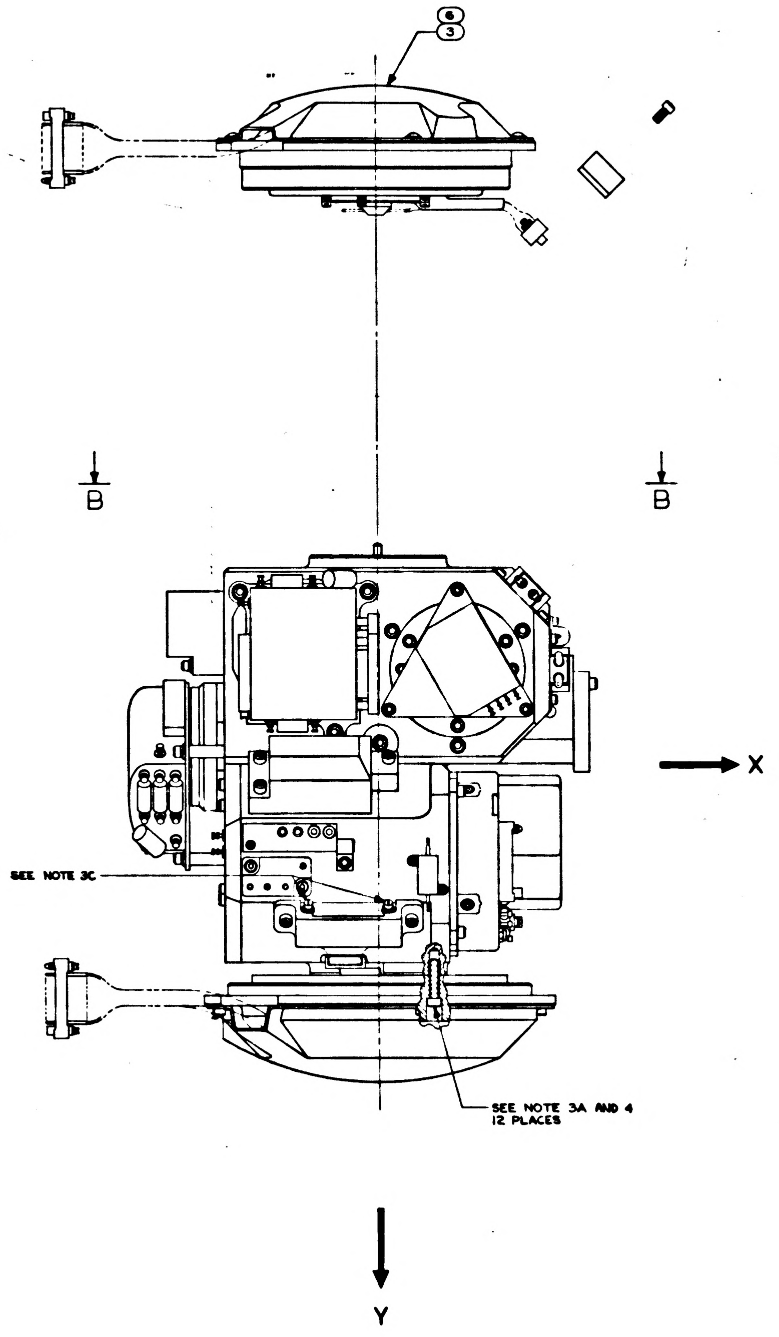
2018604 S

3/1

2/2018604



VIEW B-B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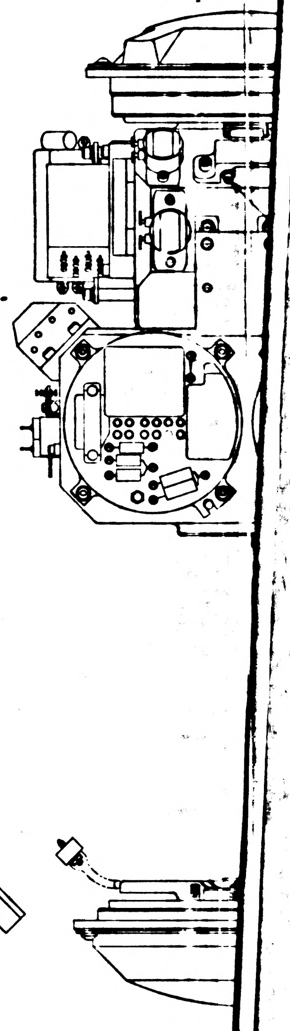
SEE NOTE 3C
SEE NOTE 3A AND 4
12 PLACES
Y



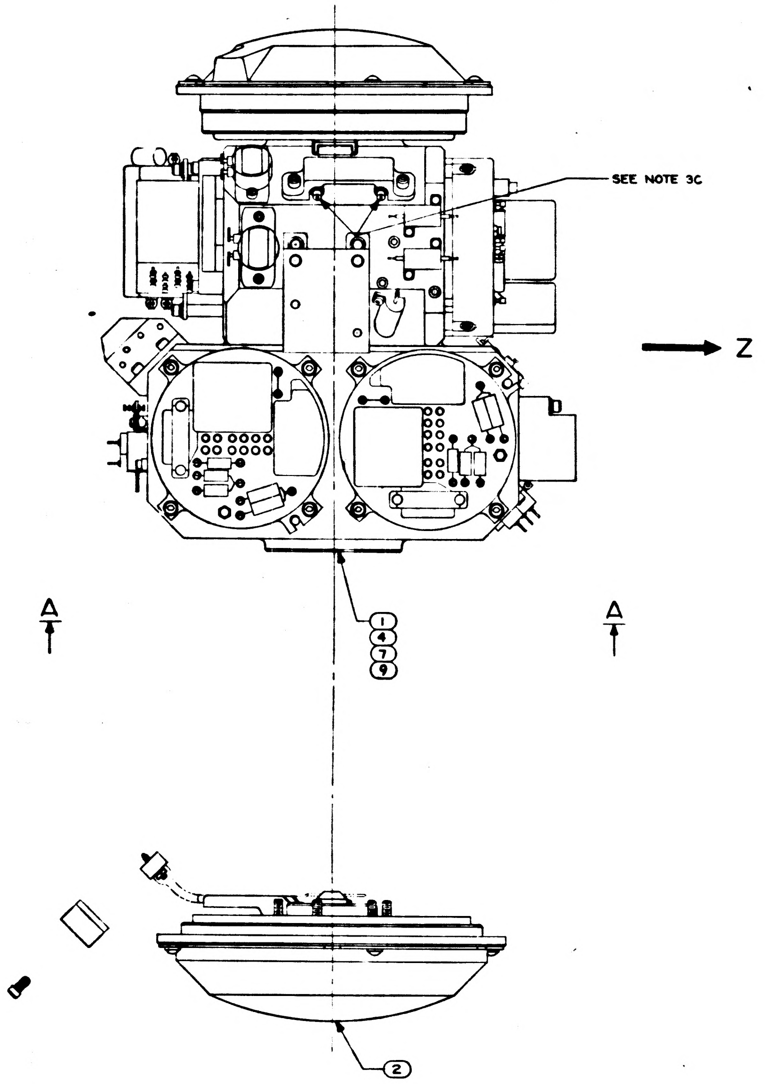
NOTES

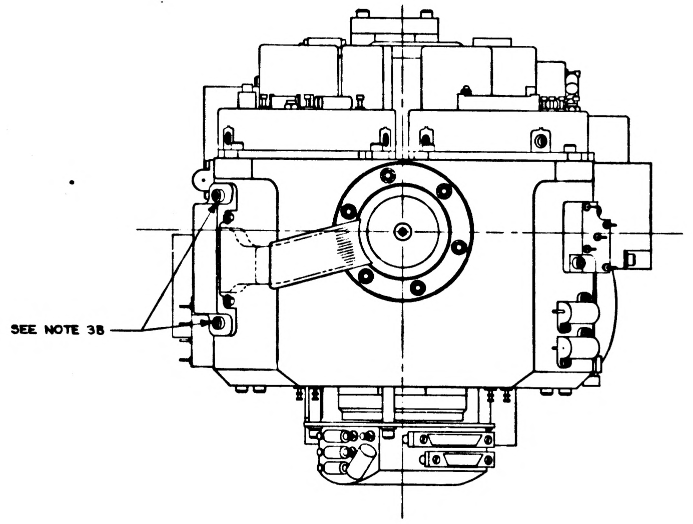
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
3. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 10.0 IN-LB
   - B. 5.0 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. APPLY A UNIFORM THIN FILM OF ITEM [illegible] TO SCREW THREADS.

3H

2018604	REV T	SHT 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
L	REPLACES REV K WITH CHANGES PER TDRR 17749	[illegible]	UK
M	REVISED PER TDRR 19275	2 Jun 65	UK
N	REVISED PER TDRR 26248	2 Feb 66	UK
P	REVISED PER TDRR 26598	24 Feb 66	UK.
R	REVISED PER TDRR 333.9	5 APR 67	LEE
S	REVISED PER TDRR 33356	5 APR 67	LEE
T	REVISED PER TDRR 34723	3 OCT 67	PHG





VIEW A-A

REPLACES REV K
WITH CHANGES

1	–	–	–	2018605-041	STABLE MEMBER ASSEMBLY	9
AR	A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	8
–	1	–	–	2018605-031	STABLE MEMBER ASSEMBLY	7
1	1	1	–	2018614-021	IGSA RESOLVER, INNER AXIS	6
1	1	1	–	2018611-021	IGSA TORQUE MOTOR INNER AXIS	5
–	–	1	–	2018605-021	STABLE MEMBER ASSEMBLY	4
–	–	–	1	2018614-011	IGSA RESOLVER, INNER AXIS	3
–	–	–	1	2018611-011	IGSA TORQUE MOTOR, INNER AXIS	2
–	–	–	1	2018605-011	STABLE MEMBER ASSEMBLY	1
QTY REQD	QTY REQD	QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
041	031	021	011	LIST OF MATERIALS		

2018603	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
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HEAT TREATMENT
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APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INNER AXIS
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018604
SCALE 1/1 WT SHEET 1 OF 1

2018604 T

3/1

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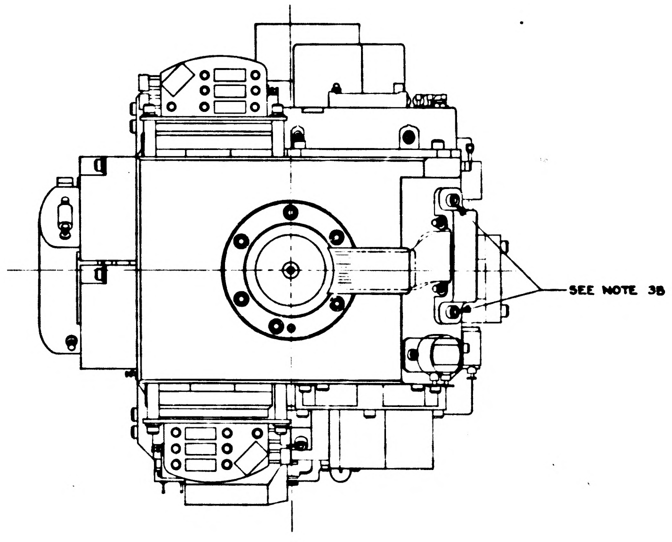
2/2018604



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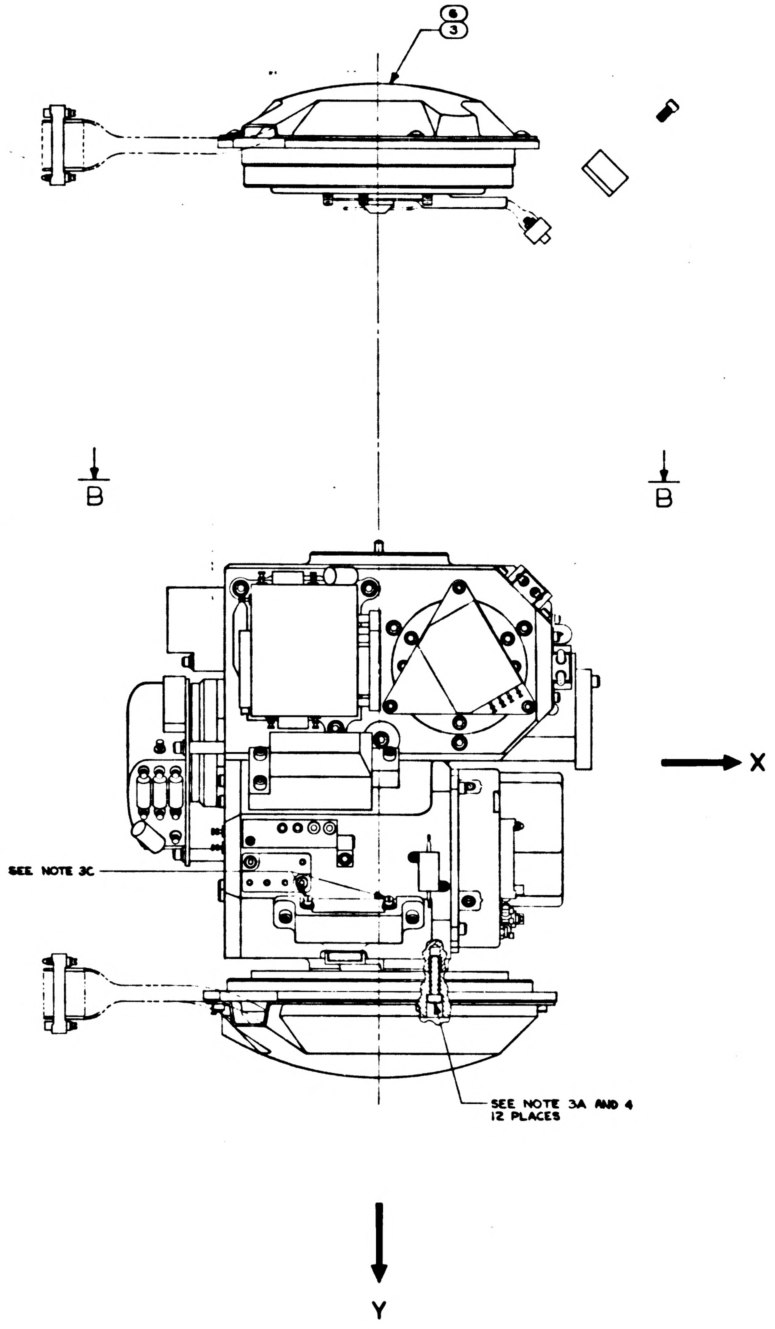
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SEE NOTE 3C
SEE NOTE 3A AND 4
12 PLACES
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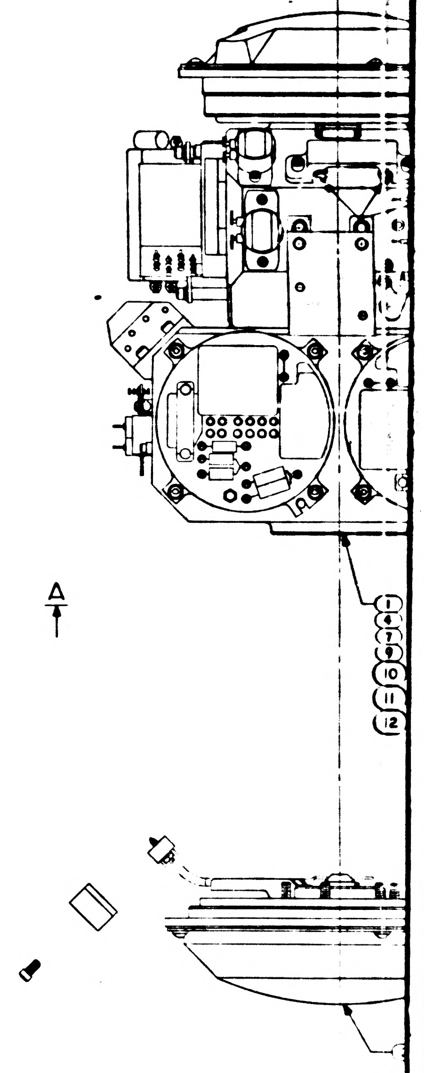
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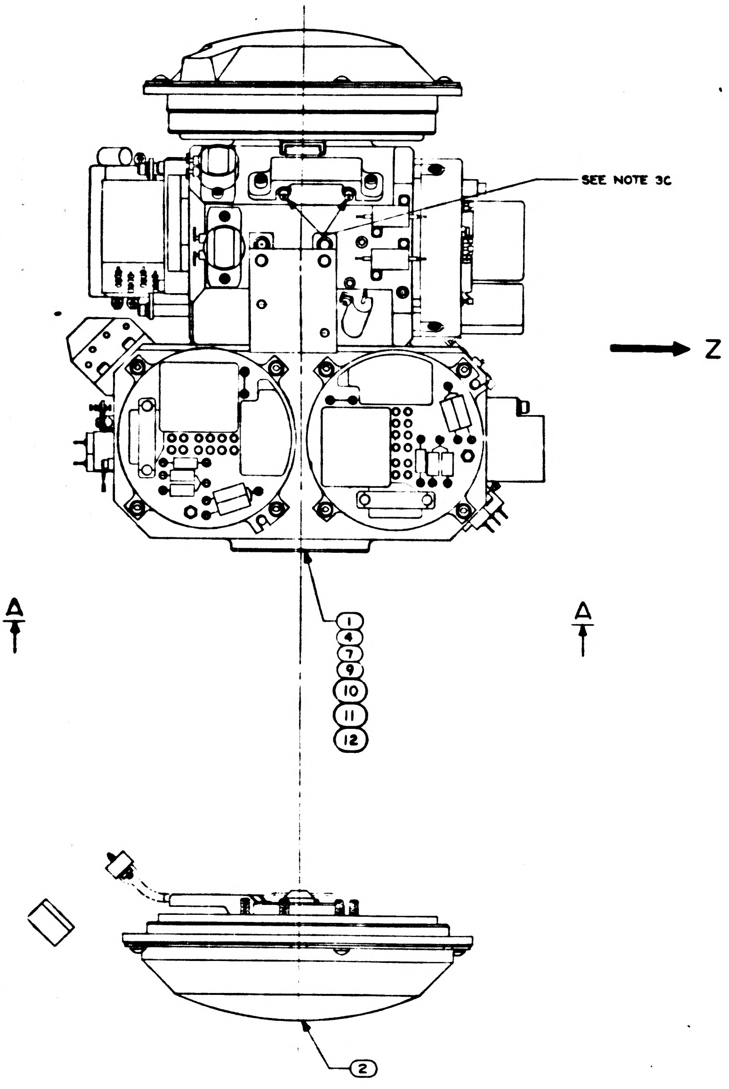
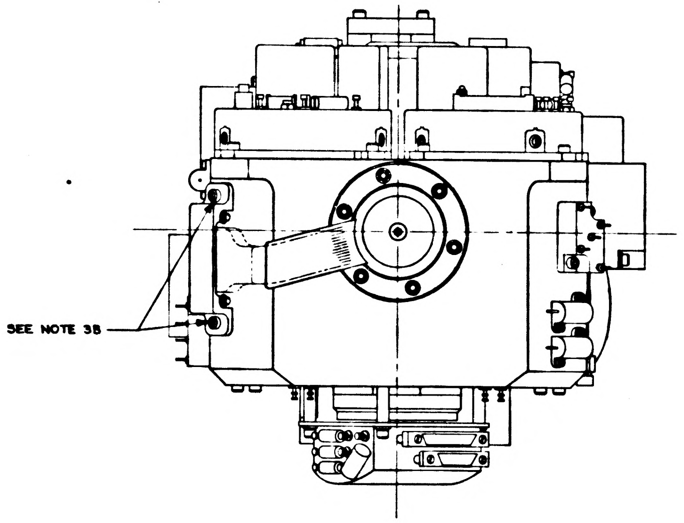
NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
3. SCREW TORQUE REQUIREMENTS ± 7%
   A. 10.0 IN-LB
   B. 5.0 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
4. APPLY A UNIFORM THIN FILM OF ITEM [illegible] TO SCREW THREADS.

3#

	REV	SHT
2018604	U	1

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
L	REPLACES REV K WITH CHANGES PER TDRR 17749	[illegible]	[illegible]	WK
M	REVISED PER TDRR 19275	2 Jun 65	[illegible]	WK
N	REVISED PER TDRR 26248	2 Feb 66	[illegible]	WK
P	REVISED PER TDRR 26599	21 Feb 66	[illegible]	WK
R	REVISED PER TDRR 33319	5APR67	LEE	[illegible]
S	REVISED PER TDRR 33356	5APR67	LEE	[illegible]
T	REVISED PER TDRR 34723	3 OCT 67	PHG	[illegible]
U	REVISED PER TDRR 35725	28 FEB 68	JL	[illegible]





VIEW A-A

REPLACES REV K
WITH CHANGES

QTY REQD 071	QTY REQD 061	QTY REQD 051	QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	-	-	-	-	-	-	2018605-071	STABLE MEMBER ASSEMBLY	12
-	1	-	-	-	-	-	2018605-061	STABLE MEMBER ASSEMBLY	11
-	-	1	-	-	-	-	2018605-051	STABLE MEMBER ASSEMBLY	10
-	-	-	1	-	-	-	2018605-041	STABLE MEMBER ASSEMBLY	9
AR	AR	AR	AR	A/R	A/R	A/R	1008930	GREASE, MOLYBDENUM DISULFIDE	8
-	-	-	-	1	-	-	2018605-031	STABLE MEMBER ASSEMBLY	7
1	1	1	1	1	1	-	2018614-021	IGSA RESOLVER, INNER AXIS	6
1	1	1	1	1	1	-	2018611-021	IGSA TORQUE MOTOR INNER AXIS	5
-	-	-	-	-	1	-	2018605-021	STABLE MEMBER ASSEMBLY	4
-	-	-	-	-	-	1	2018614-011	IGSA RESOLVER, INNER AXIS	3
-	-	-	-	-	-	1	2018611-011	IGSA TORQUE MOTOR, INNER AXIS	2
-	-	-	-	-	-	1	2018605-011	STABLE MEMBER ASSEMBLY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
2018603	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
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INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN RES DATE 1-25-65
CHECKED
APPROVAL 25 Mar 65
APPROVAL
NASA APPROVAL 3-25-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

INNER AXIS
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 2018604
SCALE 1/1
WT
SHEET 1 OF 1

REV U
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2018604 U

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PART NO.	NOMENCLATURE	QTY REQ'D
2018621	BEARING, DUPLEX	2
2018631	RESOLVER	1
2018632	RESOLVER, GYRO ERROR	1
1000119	CONNECTOR, ELECT	2
2018729	HSG BRG	1
2018723	NUT, BRG. RETAINER	1
2018722	PLATE, BRG RET	1
2018713	SHAFT, STUB	1
2018715	RETAINER, WIRE	2
100100-1	TERMINAL	2
2018604	STABLE MEMBER ASSY	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	RELEASE TDRR 10806	7 JUL 64	WK

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018603	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

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MATERIAL:

MIT INSTRUMENTATION LAB
CONTRACT NAS 9-153

		DATE
APPROVED		1 July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		7/7/64

INNER
AXIS
ASS'Y

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

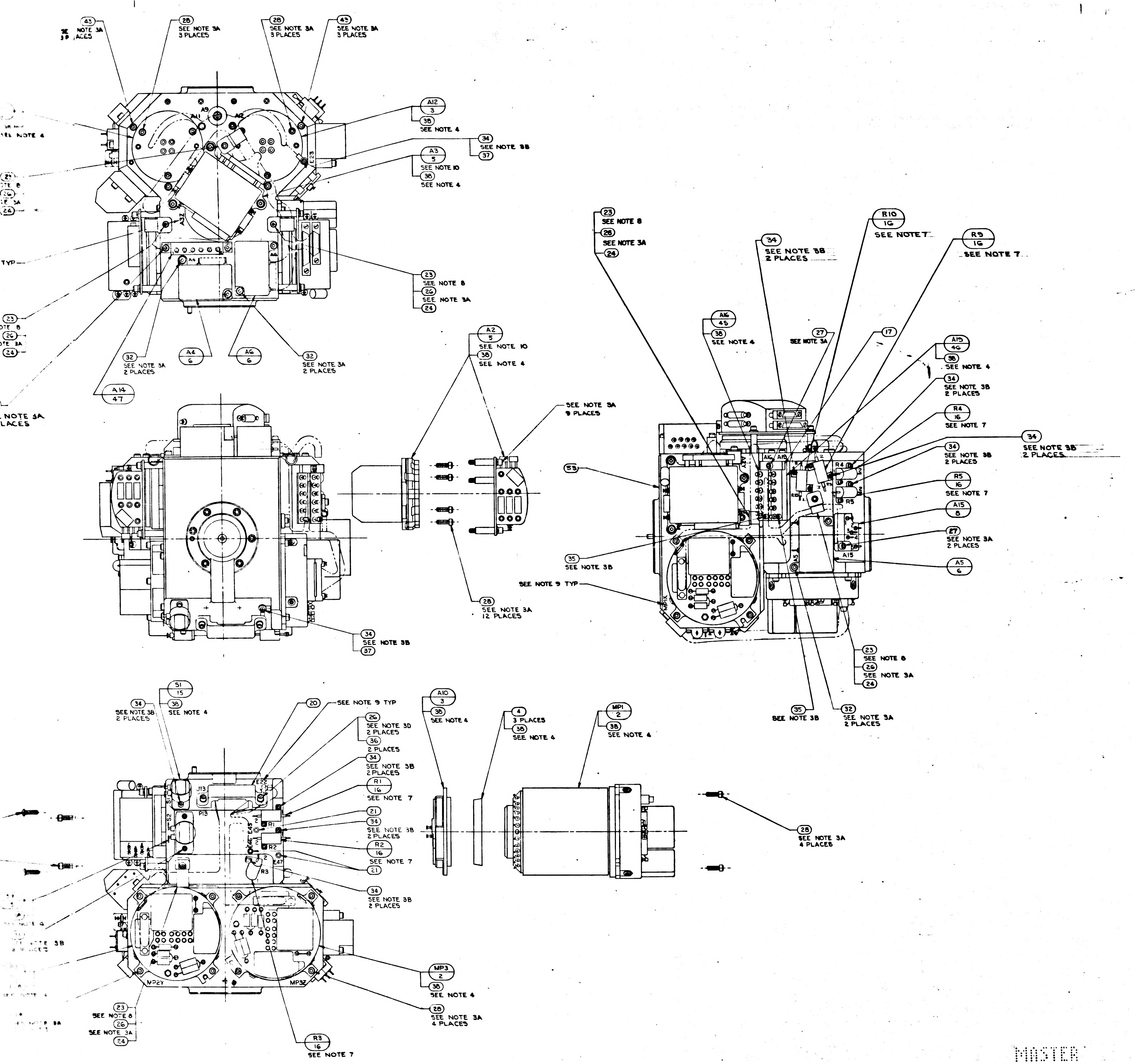
NASA DRAWING NO.
2018604

SHEET OF

2018604

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

SYM	REVISIONS TDRR 17755 DESCRIPTION	DATE	APPROVAL	
M	REPLACES REV L WITH CHANGES TDRR 17755	23Mar65		WK
N	REVISED PER TDRR 18608	20APR65		WK
P	REVISED PER TDRR 19266	25May65		WK
R	REVISED PER TDRR 19267	25May65		WK
S	REVISED PER TDRR 20088	7/21/65	AJB	WK
T	REVISED PER TDRR 21190	7/23/65	AJB	WK
U	REVISED PER TDRR 21671	8-31-65		WK
V	REVISED PER TDRR 21686	8-31-65		WK
W	REVISED PER TDRR 22791	28Sep65		WK
Y	REVISED PER TDRR 23046	19Oct65		WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	19Oct65		WK
AA	REVISED PER TDRR 23862	19Nov65		WK
AB	REVISED PER TDRR 24308	14Dec65		



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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
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A12
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SEE NOTE 4
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SEE NOTE 3B
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A3
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SEE NOTE 10
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SEE NOTE 4
SEE NOTE 4
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SEE NOTE 8
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SEE NOTE 3A
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SEE NOTE 3A
2 PLACES
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A6
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SEE NOTE 3A
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NOTE 3A
PLACES
A2
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SEE NOTE 10
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SEE NOTE 3A
9 PLACES
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SEE NOTE 3B
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SEE NOTE 7
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SEE NOTE 3A
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4 PLACES
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SEE NOTE 8
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SEE NOTE 3A
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SEE NOTE 7
J13
P13
MP2Y
MP3Z

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
—	3	2021500 SEE NOTE 11	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S/M.~~	~~42~~
~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M.~~	~~41~~
~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M.~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
A/R	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-[illegible]~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
8	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
2	2	1001488-5	SCREW, HEX., SOC. HD., SELF-LOCKING	29
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2016796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
1	1	2018780	BRACKET, CONN. 34 PIN	20
1	1	2018779	BRACKET, CONN. 44 PIN	19
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	6	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-031 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
—	1	2018750	HOUSING STABLE MEMBER	1
021	011	LIST OF MATERIALS		

2018604	DL 2018601	
NEXT ASSY	USED ON	
APPLICATION		

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23Mar65
APPROVAL
NASA APPROVAL W. J. 3-23-65
MIT APPROVAL 23Mar65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605

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MASTER

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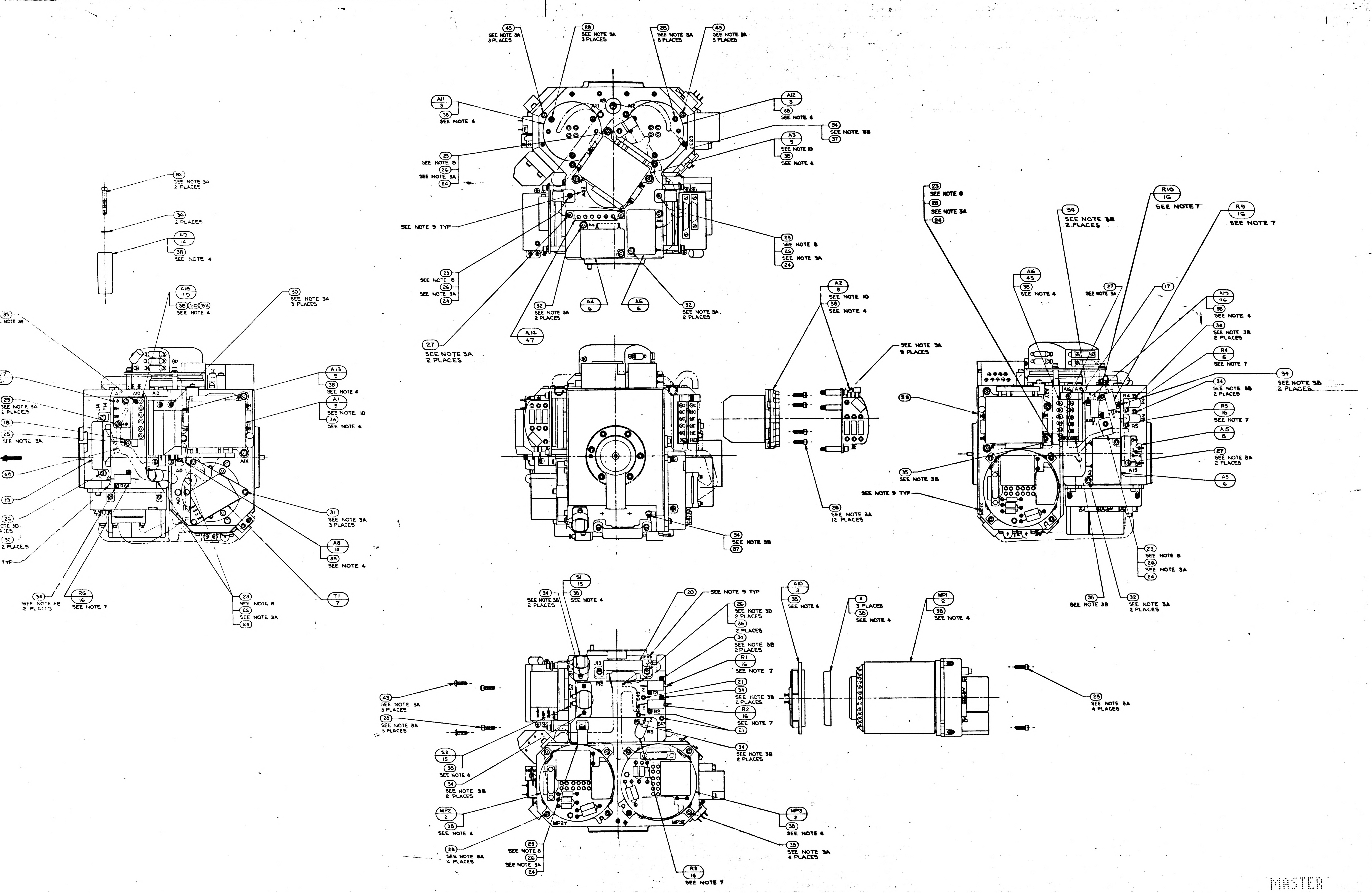
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SEE NOTE 3A
17
A19
46
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A5
6
53
35
SEE NOTE 3B
SEE NOTE 9 TYP
R4
R5
A15
23
SEE NOTE 8
26
SEE NOTE 3A
24
35
SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
34
SEE NOTE 3B
2 PLACES
S1
15
38
SEE NOTE 4
20
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
2
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
J13
P13
R1
R2
R3
E47
S2
15
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
MP2
2
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3A
24
MP2Y
MP3Z
MP3
2
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
16
SEE NOTE 7

MASTER

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

2018605 REV AB SHEET 1

F2

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2	↑	↑
2-1	A8-BLU	A10-3	│	│
2-2	A8-BLU	A1C-4	│	│
3-1	A9-RED	A11-1	│	│
3-2	A9-RED	A11-2	│	│
4-1	A9-BLU	A11-3	↓	↓
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

CABLE CLAMP (23)

PART NO.	DIA REF
1000220-13	5/32
↑ -4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
↓ -11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1 & R2

PART NO.	VALUE Ω
1010928-289	100
↑ -287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-215	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
↓ -126	2.0
1010928-097	1.0

TABLE III

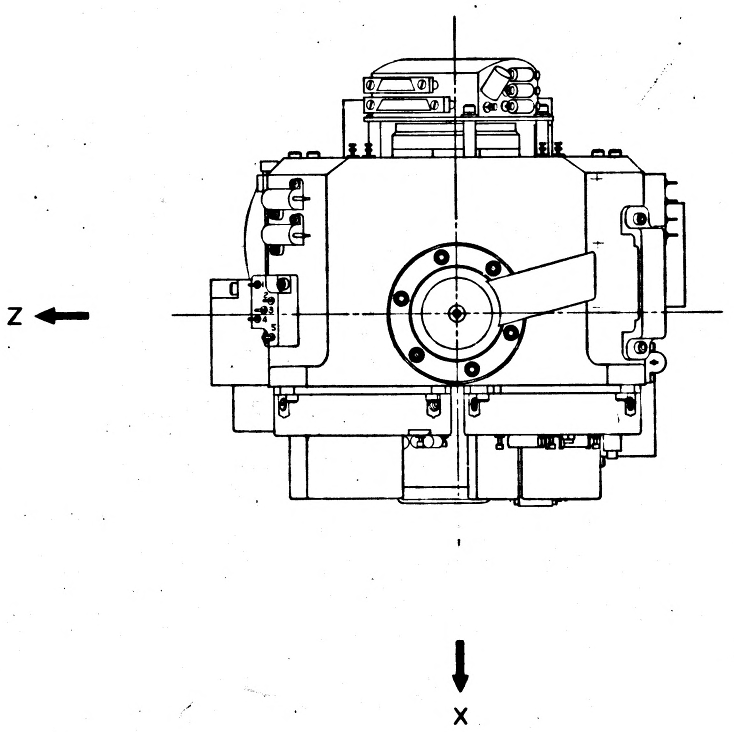
RESISTOR R3

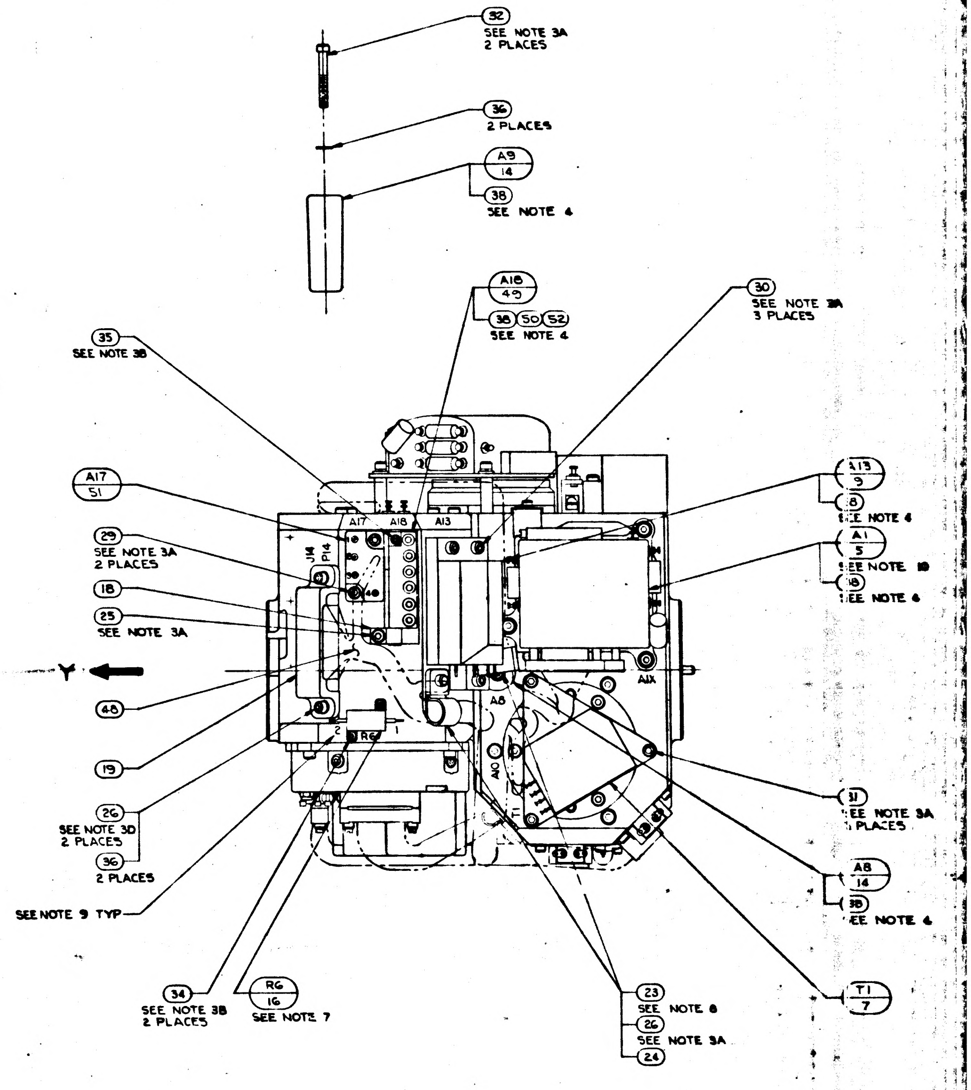
PART NO.	VALUE Ω
1010928-400	1430
↑ -349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
↓ -153	3.83
1010928-121	1.78

TABLE IV

RESISTORS R4, R5, R6, R9 & R10

PART NO.	VALUE Ω
1010928-386	1020
↑ -369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
-215	16.9
↓ -194	10.2
1010928-164	4.99

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SEE NOTE 4
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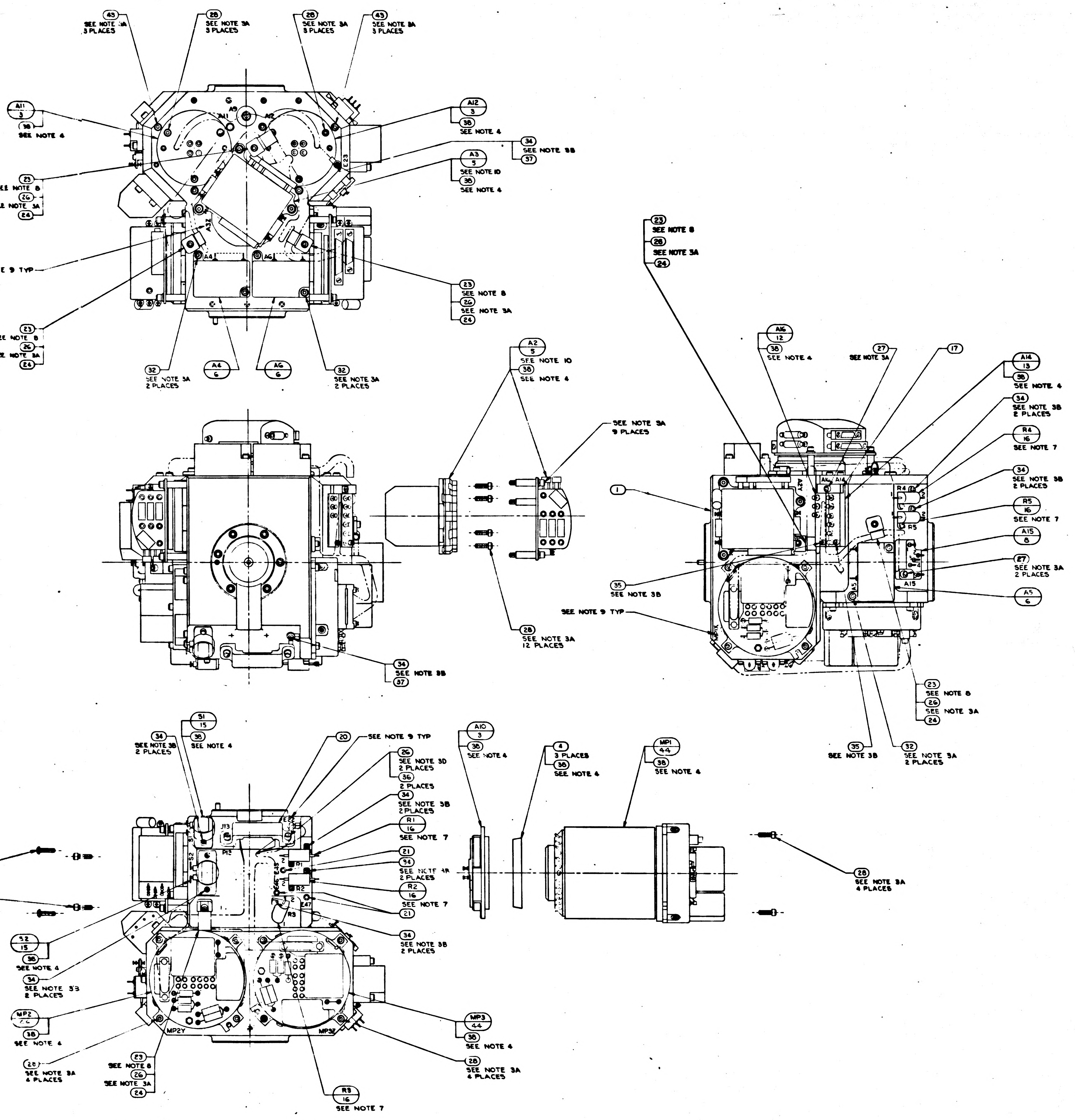
SEE NOTE 3A
3 PLACES
35
SEE NOTE 3B
A17
51
A17
A18
A13
J14
P14
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
48
19
R6
A8
A10
A1X
A13
9
8
SEE NOTE 4
A1
5
SEE NOTE 10
18
SEE NOTE 4
31
SEE NOTE 3A
PLACES
A8
14
38
SEE NOTE 4
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3A
24
T1
7

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14) & (15), BETWEEN ITEM (2) AND ITEM (3) AND BETWEEN ITEM (3) AND ITEM (4)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS 2018601
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF AMP NASA DWG. NO. 2007101-011, AC DIFF AMP DWG NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 PER PS 2010603 OR 6007105-011 PER PS 2010607 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSE TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
Z	THIS SHEET ADDED PER TDRR 23699	19Oct65	WK
AA	REVISED PER TDRR 23862	19Nov65	WK
AB	REVISED PER TDRR 24308	19Dec65	WK



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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3 38 SEE NOTE 4
A12 3 38 SEE NOTE 4
34 SEE NOTE 3B 37
A3 5 SEE NOTE 10 38 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3A 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
23 SEE NOTE 8 26 SEE NOTE 3A 24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 5 SEE NOTE 10 38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3A 24
A16 12 38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
S1 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
20 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
A10 3 38 SEE NOTE 4
4 3 PLACES 38 SEE NOTE 4
MP1 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
S2 15 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
34 SEE NOTE 3B 2 PLACES
MP3 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7
A9 A11 A12 A4 A6 A5 A14 A15 R4 R5 J13 P12 R1 R2 R3 S1 S2 MP2Y MP3Z

-011 CONFIGURATION

31+

MASTER

2018604	DL 2018601	
NEXT ASSY	USED ON	
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

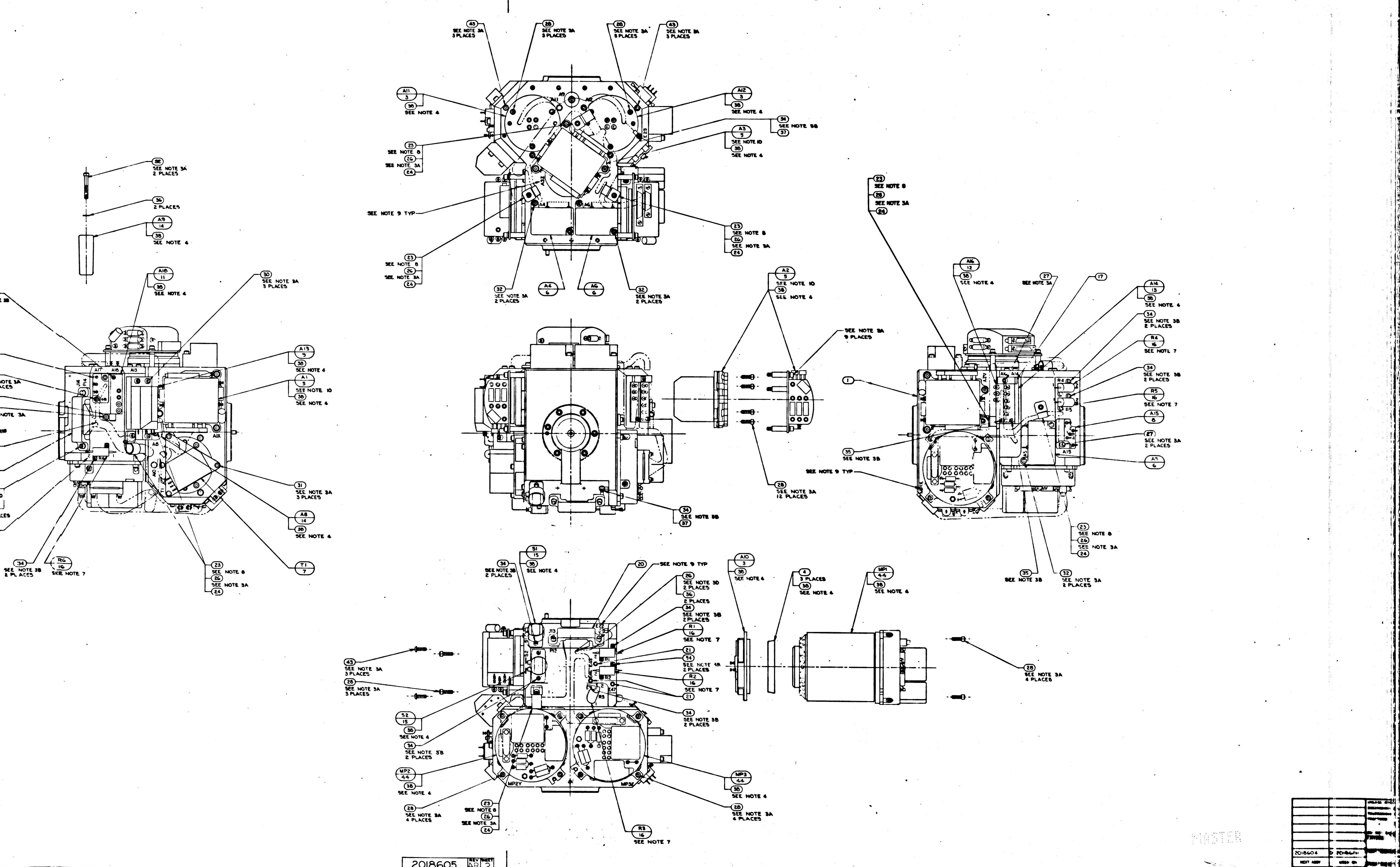
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN L.S.R. DATE
CHECKED
APPROVAL 110365
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL W Kupfer 24Nov65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

CODE IDENT NO 80230 SIZE J NASA DRAWING NO 2018605
SCALE 1/1 WT SHEET 2 OF 2

F-3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SEE NOTE 9 TYP
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A4 6
A6 6
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36 2 PLACES
A9 14 38 SEE NOTE 4
A18 11 38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9 38 SEE NOTE 4
A1 5 SEE NOTE 10 38 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14 38 SEE NOTE 4
T1 7
23 SEE NOTE 8 26 SEE NOTE 3A 24
34 SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
A2 5 SEE NOTE 10 38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
A16 12 38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
51 15 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
20 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 4A 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3 38 SEE NOTE 4
4 3 PLACES 38 SEE NOTE 4
MP1 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
R3 16 SEE NOTE 7
MP3 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P12
MP2Y
MP3Y
A17 A18 A13
A1X

MASTER

2018604

2018605 REV AB SHEET 2

D

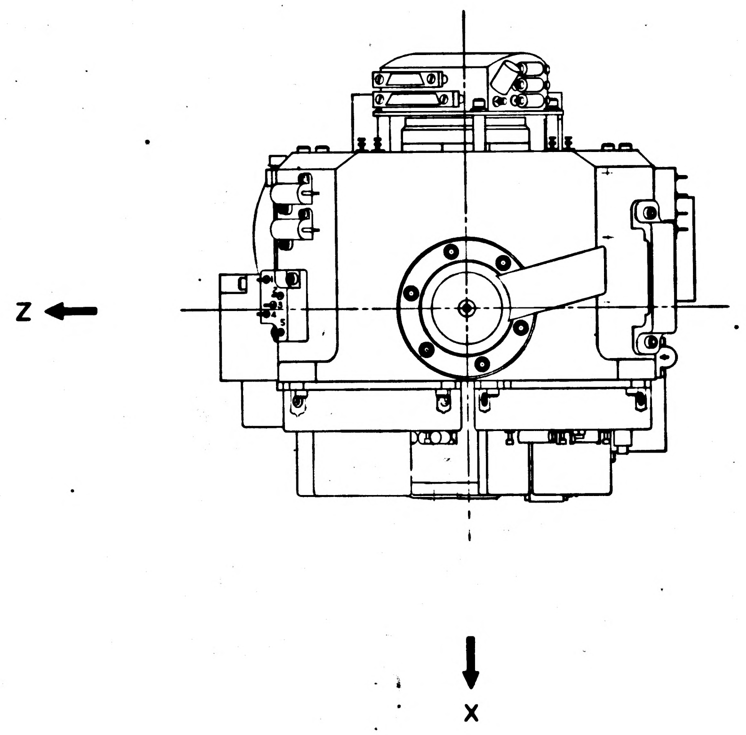
C

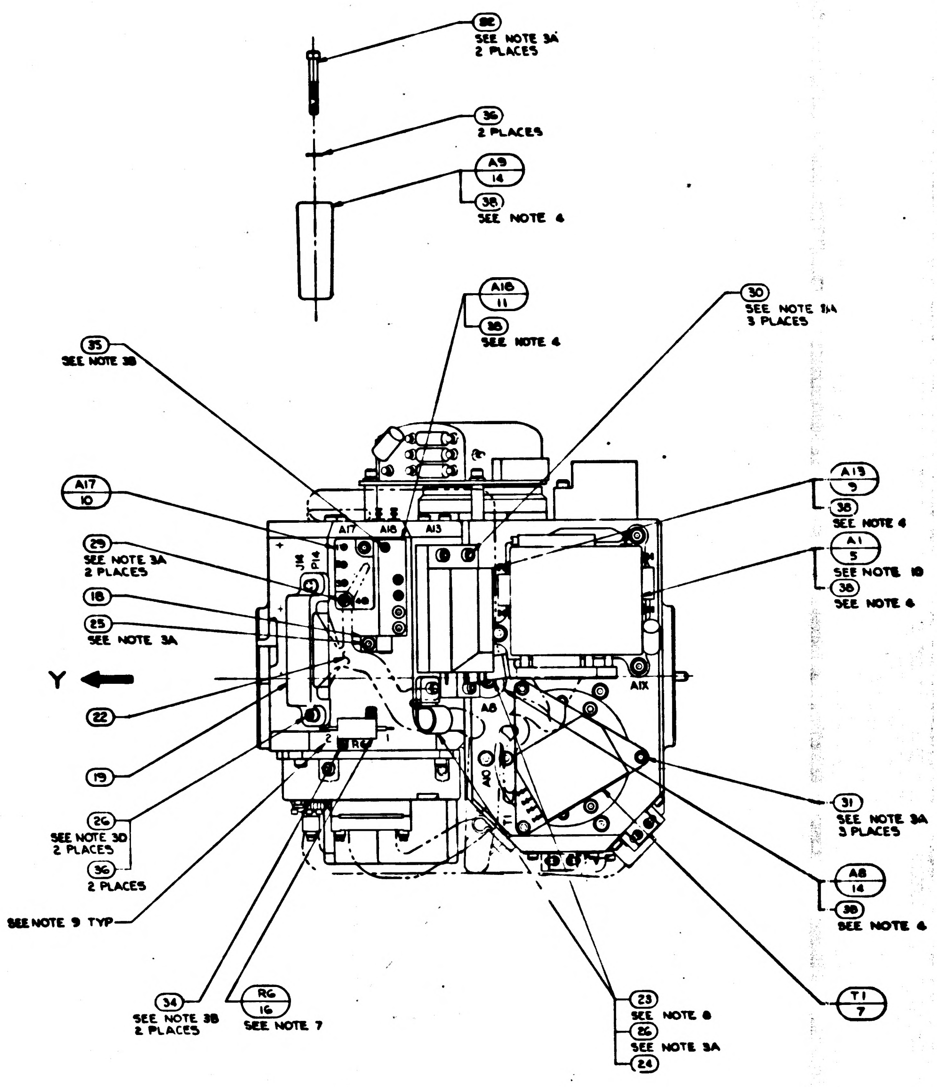
B

A

2018605

31

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SEE NOTE 4
A1
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2 PLACES
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T1
7
A17
A18
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P14
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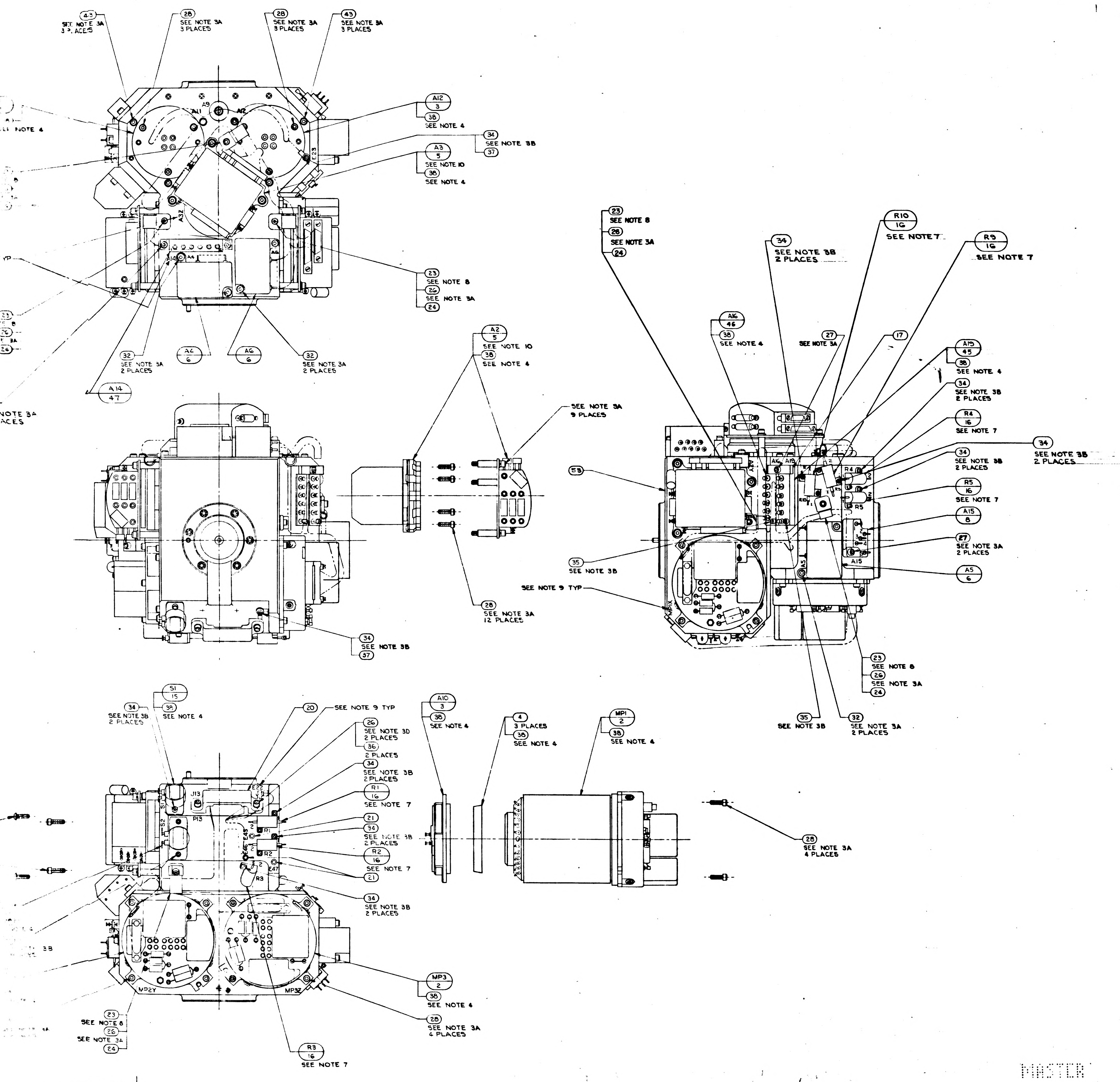
A8
A10
T1
RG
1
2

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

REVISIONS TDRR 17755

SYM	DESCRIPTION	DATE	APPROVAL	
M	REPLACES REV L WITH CHANGES TDRR 17755	23Mar65		WK
N	REVISED PER TDRR 18608	20APR65		WK
P	REVISED PER TDRR 19266	25May65		WK
R	REVISED PER TDRR 19267	25May65		WK
S	REVISED PER TDRR 20088	7/21/65	ajB	WK
T	REVISED PER TDRR 21190	7/23/65	ajB	WK
U	REVISED PER TDRR 21671	8-31-65		WK
V	REVISED PER TDRR 21686	8-31-65		WK
W	REVISED PER TDRR 22791	28Sep65		WK
Y	REVISED PER TDRR 23046	19Oct65		WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	19Oct65		WK
AA	REVISED PER TDRR 23862	19Nov65		WK
AB	REVISED PER TDRR 24308	14Dec65		WK
AC	REVISED PER TDRR 24898	12 NOV 65		WK
AD	REVISED PER TDRR 24899	12 NOV65		WK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A3 5 SEE NOTE 10
38 SEE NOTE 4
A9
A11
A12
E23
J14
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A6 6
A6 6
32 SEE NOTE 3A 2 PLACES
A14 47
A2 5 SEE NOTE 10
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
53
35 SEE NOTE 3B
SEE NOTE 9 TYP
28 SEE NOTE 3A 12 PLACES
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23 SEE NOTE 8
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24
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R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46
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A15 45
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R5 16 SEE NOTE 7
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R4
R5
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R1 16 SEE NOTE 7
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R2 16 SEE NOTE 7
21
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J13
P13
R1
R2
R3
MP2Y
MP3Z
MP3 2
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7
23 SEE NOTE 8
26 SEE NOTE 3A
24
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 2
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	1	1010928-25	RESISTOR FIXED	54
1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
—	3	2021500 SEE NOTE 11	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S/M.~~	~~42~~
~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M.~~	~~41~~
~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M.~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
A/R	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-705	WASHER, FLAT, METAL, ROUND	36
2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-[illegible]~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
8	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
2	2	1001488-5	SCREW, HEX., SOC. HD., SELF-LOCKING	29
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
1	1	2018780	BRACKET, CONN. 34 PIN	20
1	1	2018779	BRACKET, CONN. 44 PIN	19
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-031 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
—	1	2018750	HOUSING STABLE MEMBER	1
021	011			

LIST OF MATERIALS

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG. NO CONTRACT
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23Mar65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23Mar65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

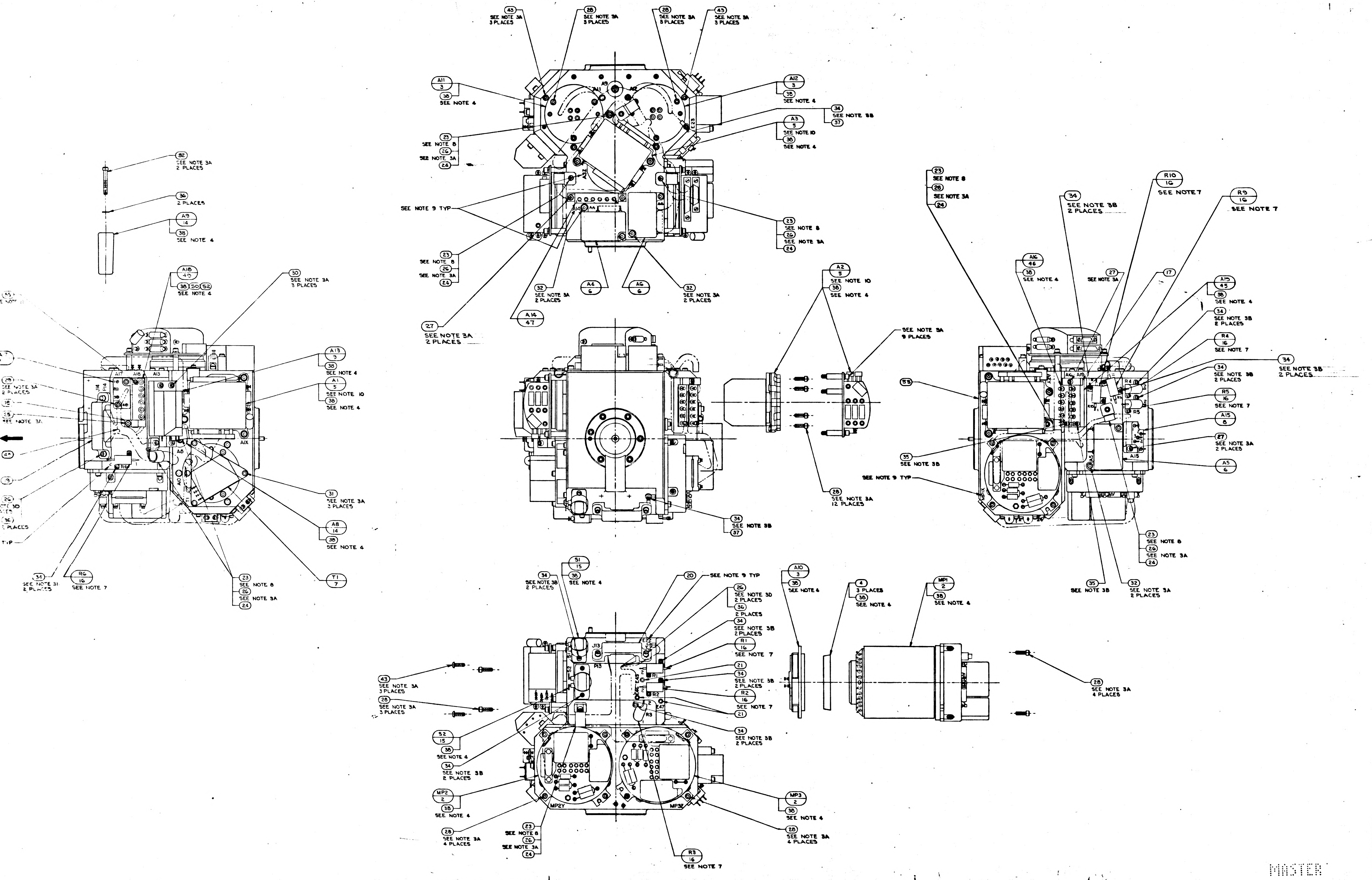
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 AD

MASTER

3H

F-3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SEE NOTE 4
A12
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SEE NOTE 4
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SEE NOTE 3B
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A3
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SEE NOTE 10
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SEE NOTE 4
23
SEE NOTE 8
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SEE NOTE 3A
24
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3A
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SEE NOTE 8
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SEE NOTE 3A
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32
SEE NOTE 3A
2 PLACES
A4
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A6
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SEE NOTE 3A
2 PLACES
A14
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SEE NOTE 3A
2 PLACES
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2 PLACES
A9
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A1
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3 PLACES
A8
14
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SEE NOTE 4
T1
7
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SEE NOTE 8
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SEE NOTE 3A
24
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SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
SEE NOTE 3A
2 PLACES
SEE NOTE 3A
SEE NOTE 3D
2 PLACES
TYP
A2
5
SEE NOTE 10
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
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SEE NOTE 3A
12 PLACES
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SEE NOTE 3B
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SEE NOTE 8
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SEE NOTE 3A
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2 PLACES
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SEE NOTE 7
R9
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SEE NOTE 7
A16
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SEE NOTE 4
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A15
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SEE NOTE 3B
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SEE NOTE 7
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R5
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SEE NOTE 7
A15
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2 PLACES
A5
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35
SEE NOTE 3B
SEE NOTE 9 TYP
23
SEE NOTE 8
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SEE NOTE 3A
24
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SEE NOTE 3B
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SEE NOTE 3A
2 PLACES
S1
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SEE NOTE 3B
2 PLACES
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SEE NOTE 4
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SEE NOTE 9 TYP
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R1
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SEE NOTE 7
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SEE NOTE 7
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3 PLACES
S2
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
MP2
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
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SEE NOTE 8
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SEE NOTE 3A
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R3
16
SEE NOTE 7
MP3
2
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
A10
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SEE NOTE 4
4
3 PLACES
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SEE NOTE 4
MP1
2
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
A9
A10
A11
A12
A2
A14
E23
A17
A18
A13
J14
P14
A1X
A8
R6
A16
A15
R4
R5
A5
J13
P13
S1
S2
R1
R2
R3
E25
E47
MP2Y
MP3Z

MASTER

2018605	REV AD	SHEET 1

NEXT ASSY
USED ON
APPLICATION

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2	↑	↑
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3	↓	↓
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

CABLE CLAMP (23)

PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1 & R2

PART NO.	VALUE Ω
1010928-289	100
-287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-215	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
-126	2.0
1010928-097	1.0

TABLE III

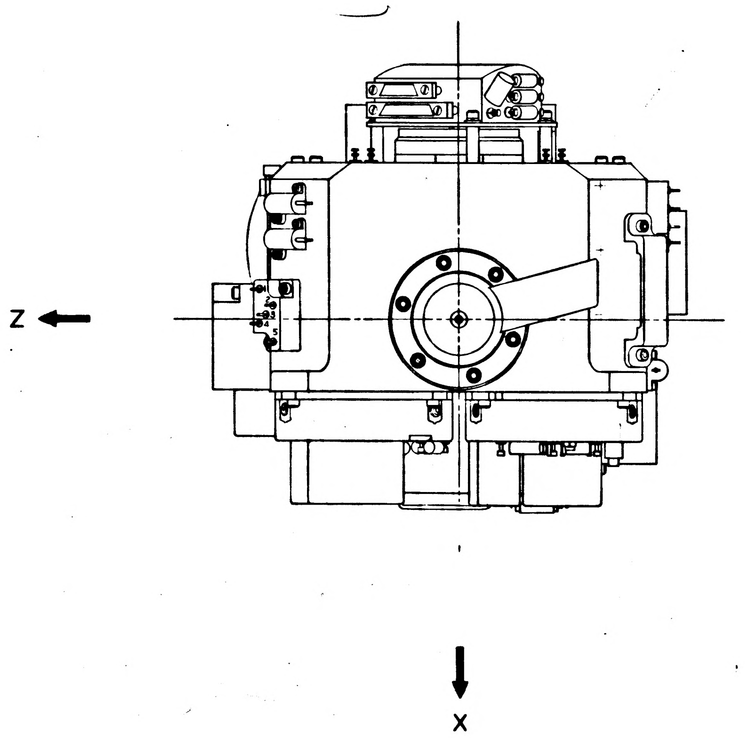
RESISTOR R3

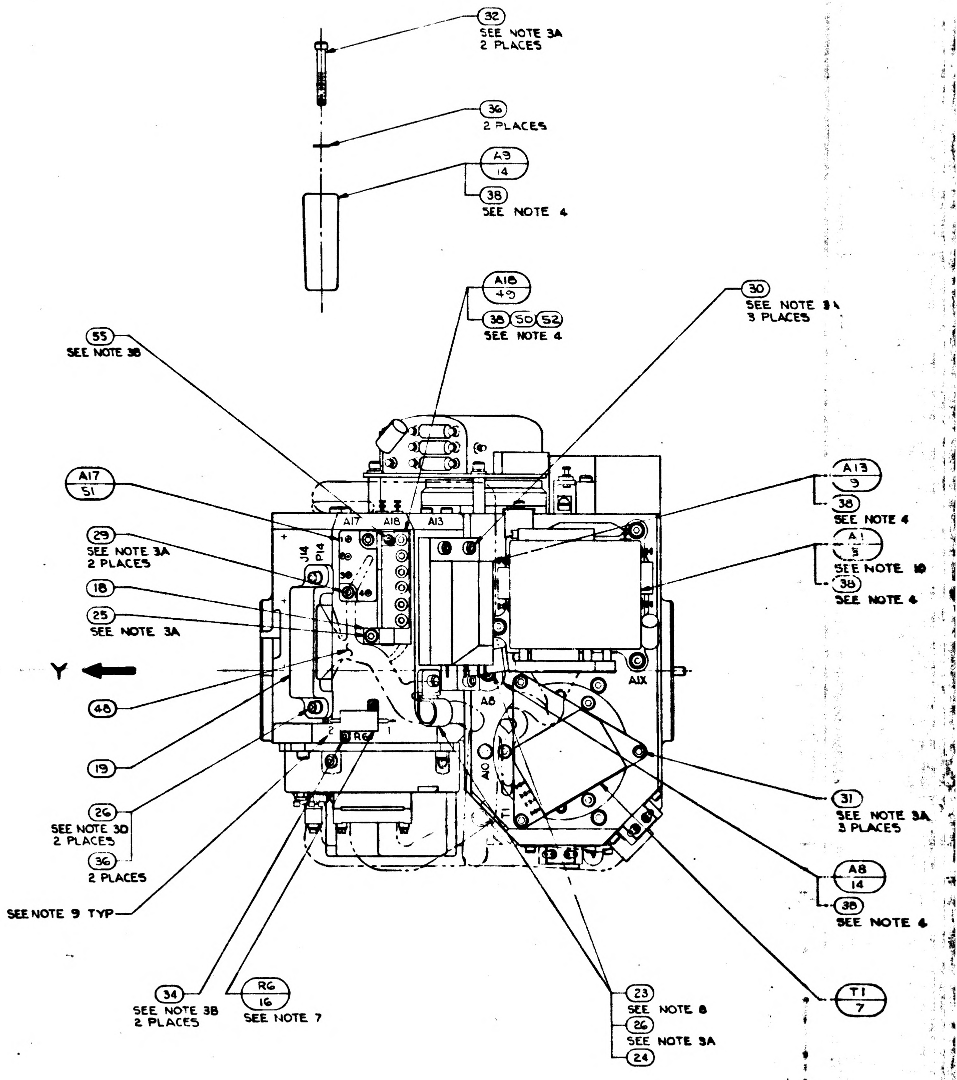
PART NO.	VALUE Ω
1010928-400	1430
-349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
-153	3.83
1010928-121	1.78

TABLE IV

RESISTORS R4, R5, R6, R9 & R10

PART NO.	VALUE Ω
1010928-386	1020
-369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
-215	16.9
-194	10.2
1010928-164	4.99

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A9
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SEE NOTE 4
A18
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38 50 52
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3 PLACES
55
SEE NOTE 3B
A17
51
A17
A18
A13
J14
P14
A13
9
38
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A1
3
SEE NOTE 10
38
SEE NOTE 4
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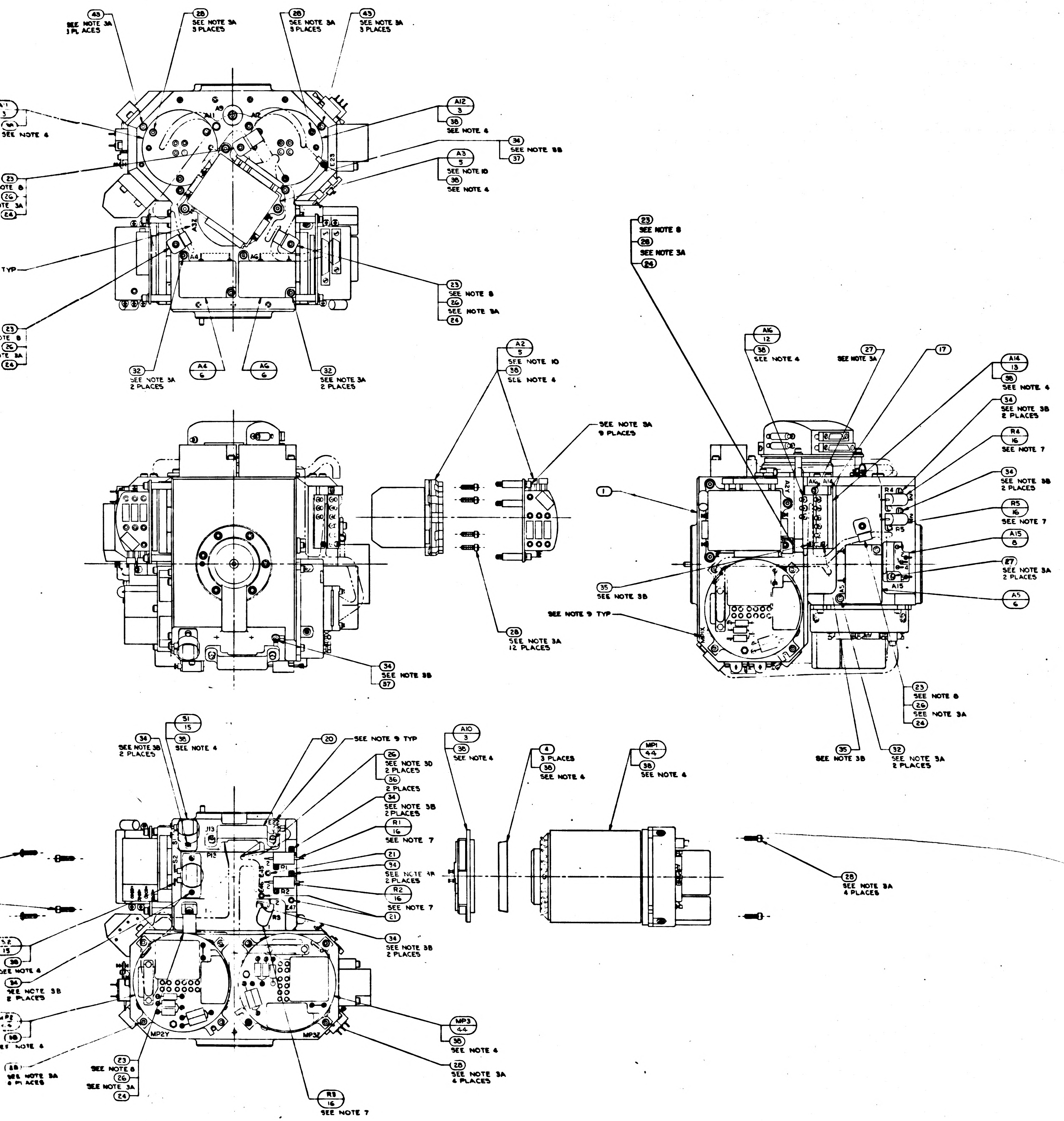
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
48
A1X
A8
A10
R6
T1
19
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
31
SEE NOTE 3A
3 PLACES
A8
14
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3A
24
T1
7

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 5.0 IN-LB
   B. 3.5 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14) & (15), BETWEEN ITEM (2) AND ITEM (3) AND BETWEEN ITEM (3) AND ITEM (4)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $^{.10}_{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF AMP NASA DWG. NO. 2007101-011, AC DIFF AMP DWG NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 PER PS 2010603 OR 6007105-011 PER PS 2010607 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSE TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY
12. R6 SHALL BE ITEM (54) FOR -011 CONFIGURATION OF THIS ASSY.

2018605	REV AD	SHEET 1

SYM	DESCRIPTION	DATE	APPROVAL	
REVISIONS				
Z	THIS SHEET ADDED PER TDRR 23699	19Oct65		WK
AA	REVISED PER TDRR 23862	19Nov65		WK
AB	REVISED PER TDRR 24508	14Dec65		WK
AC	REVISED PER TDRR	Nov 65		WK
AD	REVISED PER TDRR	Nov 65		WK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3 PLACES
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SEE NOTE 3A
3 PLACES
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38
SEE NOTE 4
34
SEE NOTE 3B
37
A3
5
SEE NOTE 10
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SEE NOTE 4
A11
A12
A4
A6
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SEE NOTE 8
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SEE NOTE 3A
24
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SEE NOTE 3A
2 PLACES
A4
6
A6
6
32
SEE NOTE 3A
2 PLACES
TYP
A2
5
SEE NOTE 10
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
28
SEE NOTE 3A
12 PLACES
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SEE NOTE 3B
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SEE NOTE 8
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SEE NOTE 3A
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A16
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SEE NOTE 4
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A14
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SEE NOTE 7
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SEE NOTE 3B
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R5
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A5
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SEE NOTE 8
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SEE NOTE 3A
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35
SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
31
15
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
20
SEE NOTE 9 TYP
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SEE NOTE 3D
2 PLACES
36
2 PLACES
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SEE NOTE 3B
2 PLACES
R1
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SEE NOTE 7
21
34
SEE NOTE 4A
2 PLACES
R2
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SEE NOTE 7
21
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2 PLACES
A10
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38
SEE NOTE 4
4
3 PLACES
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SEE NOTE 4
MP1
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38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
MP3
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38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
16
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3A
24
MP2Y
MP3Z
J13
P13
R1
R2
R3
A15
A5
R4
R5
A2Y
A14

-011 CONFIGURATION

31+

MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
		DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	DL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN L.G.B. DATE
CHECKED
APPROVAL 19Oct65
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL W Kupfer 24Nov65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

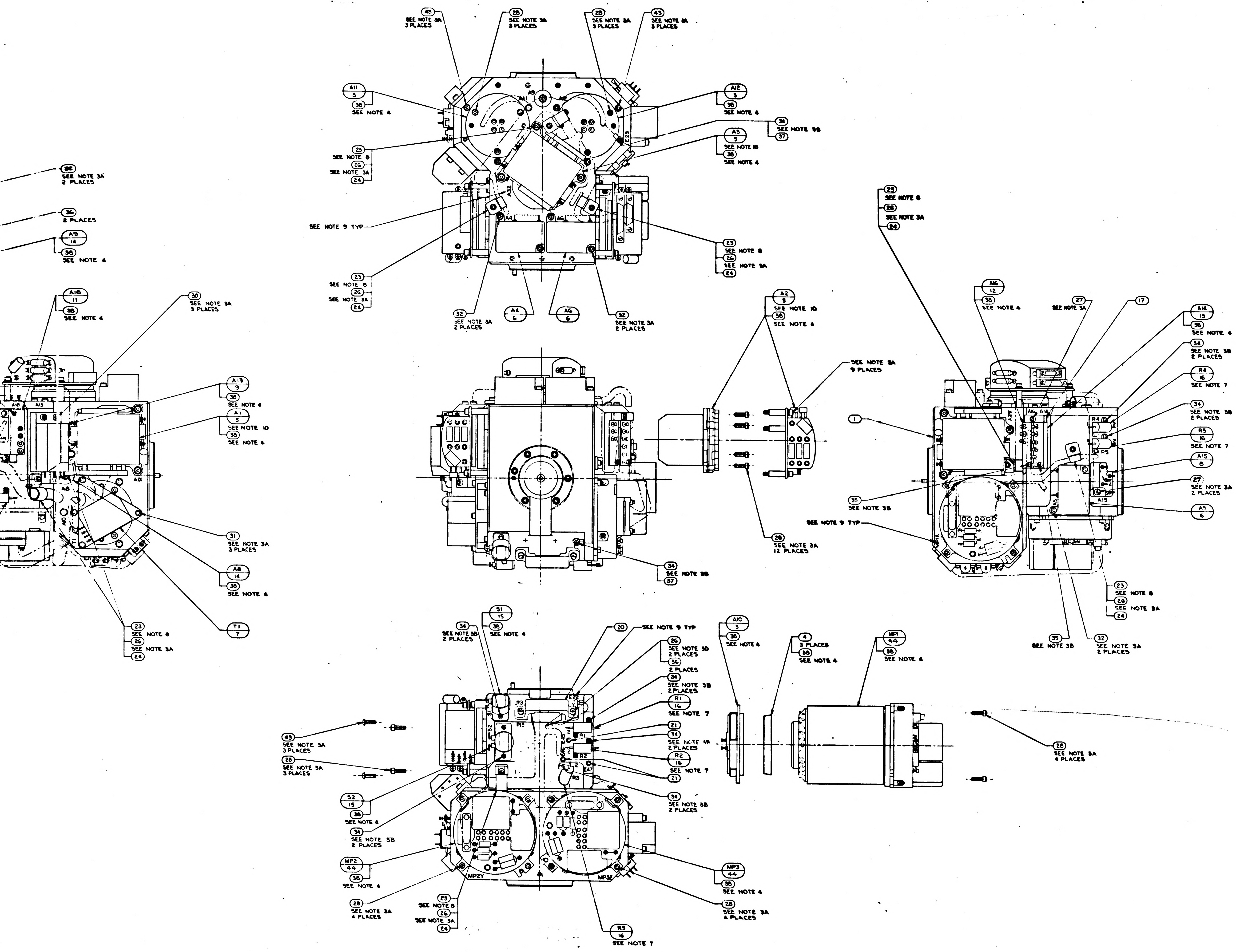
STABLE MEMBER ASSEMBLY

CODE IDENT NO	SIZE	NASA DRAWING NO
80230	J	2018605
SCALE 1/1	WT	SHEET 2 OF 2

2018605 AD

2018605

2018605 REV AD SHEET 2



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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
45 SEE NOTE 3A 3 PLACES
A11 3 38 SEE NOTE 4
A12 3 38 SEE NOTE 4
34 SEE NOTE 3B 37
A3 5 SEE NOTE 10 38 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3A 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
23 SEE NOTE 8 26 SEE NOTE 3A 24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A9
A4
A6
E29
32 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14 38 SEE NOTE 4
A18 11 38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9 38 SEE NOTE 4
A1 5 SEE NOTE 10 38 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14 38 SEE NOTE 4
T1 7
23 SEE NOTE 8 26 SEE NOTE 3A 24
A13
A1X
A8
A2 5 SEE NOTE 10 38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3A 24
A16 12 38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
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35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
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A15
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34 SEE NOTE 3B 2 PLACES
S1 15 38 SEE NOTE 4
20 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
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34 SEE NOTE 4A 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3 38 SEE NOTE 4
4 3 PLACES 38 SEE NOTE 4
MP1 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
45 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
R3 16 SEE NOTE 7
MP3 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
S2
R1
R2
R3
E47
MP2Y
MP3Z

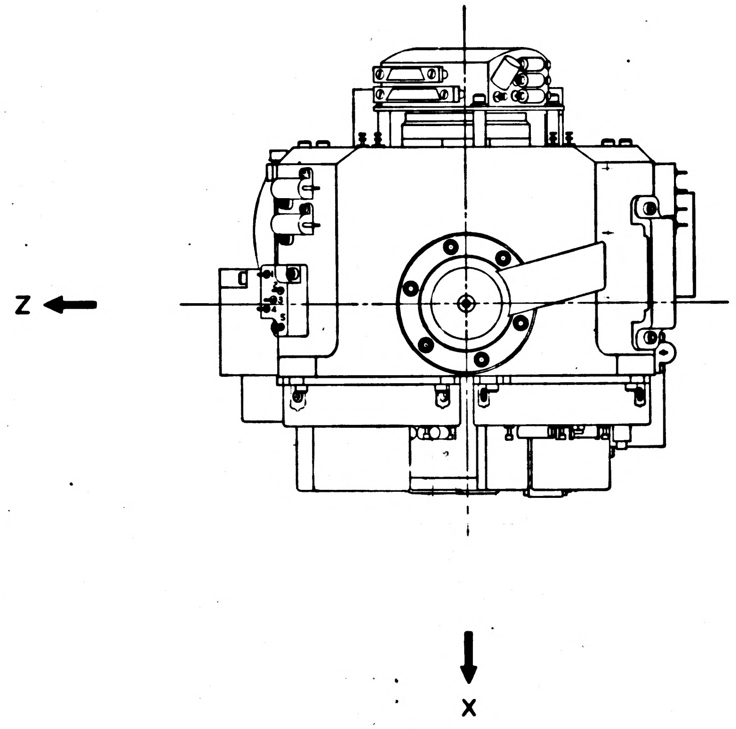
-C11 CONFIGU

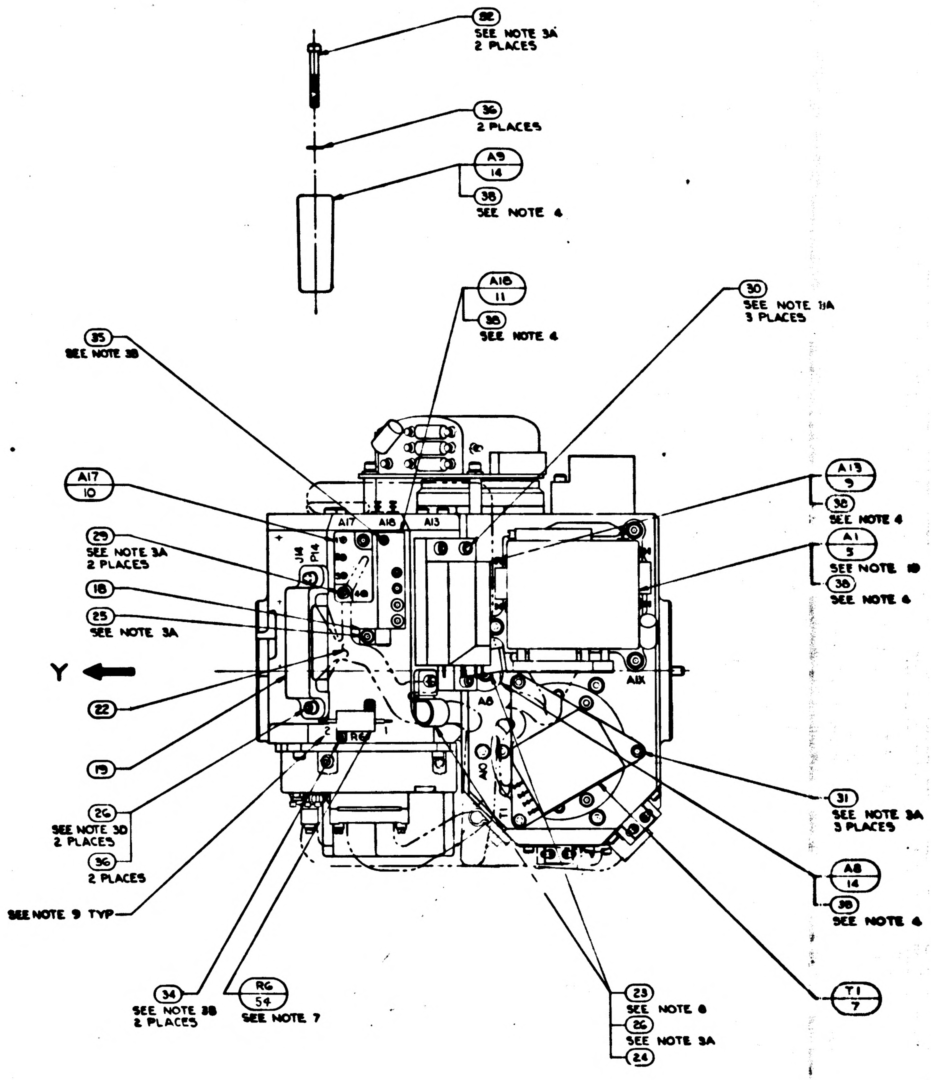
MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± DO NOT SCALE THIS DRAWING	INSTRUMENT
		MATERIAL	DRAWN CHECKED APPROVAL APPROVAL
2018604	DL2018601	HEAT TREATMENT	NASA APPROVAL
NEXT ASSY	USED ON	FINAL FINISH	
APPLICATION			

2018605 REV AD SHEET 2

F-2

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3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
19
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
RG
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SEE NOTE 7
A13
9
38
SEE NOTE 4
A1
5
SEE NOTE 10
38
SEE NOTE 6
31
SEE NOTE 3A
3 PLACES
A8
14
38
SEE NOTE 4
T1
7
23
SEE NOTE 8
26
SEE NOTE 3A
24
A17
A18
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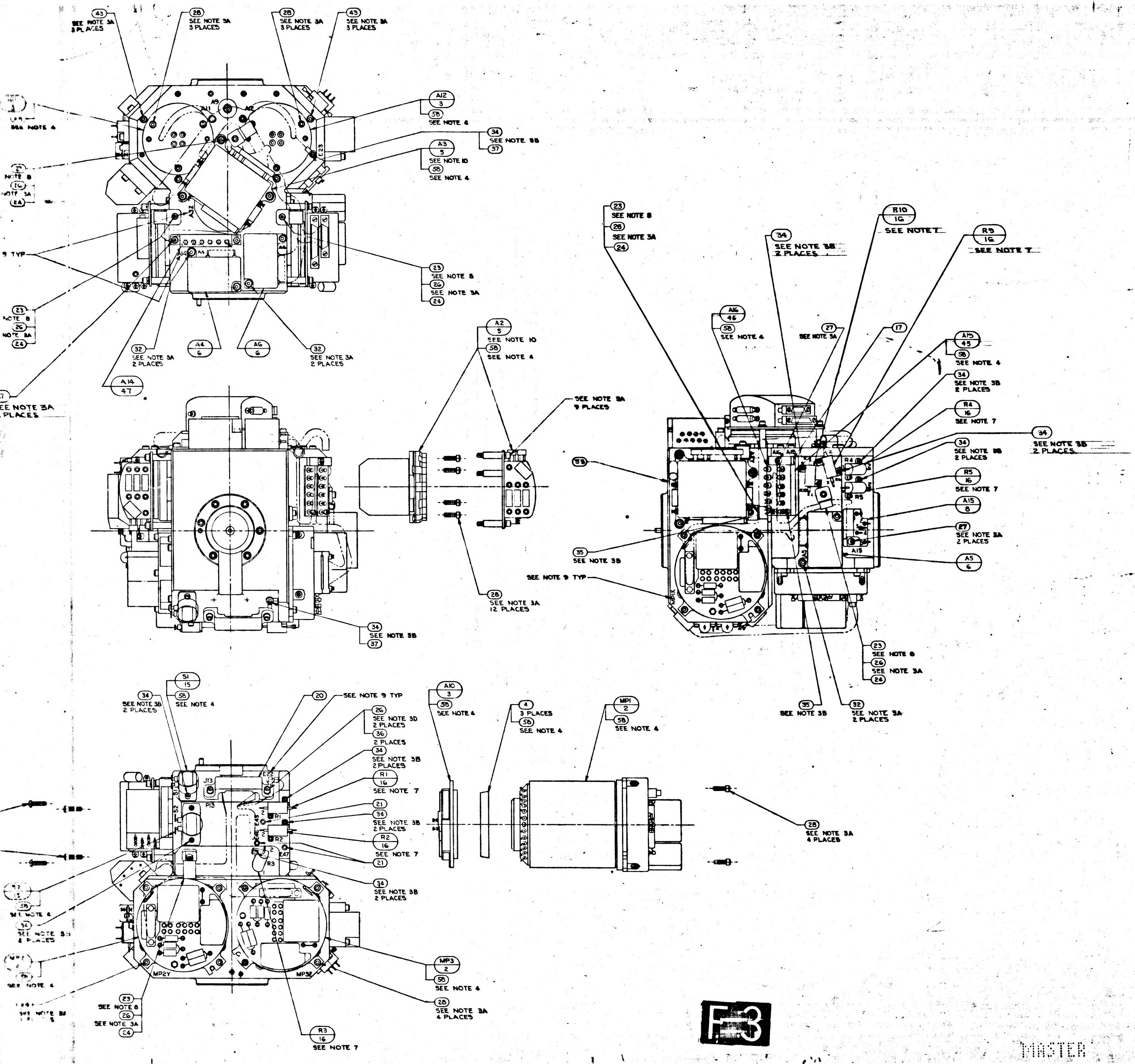
RG
1
2

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL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12 PLACES
R10
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R4
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R5
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36
2 PLACES
R1
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SEE NOTE 7
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R2
16
A10
3
MP1
2
4
3 PLACES
56
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
MP3
2
R3
16
SEE NOTE 7
MP2Y
MP3Z
J13
P13

F-3

MASTER

	REVISIONS TDRR 17755		
SYM	DESCRIPTION	DATE	APPROVAL
M	REPLACES REV L WITH CHANGES TDRR 17755	23 Mar 65	
N	REVISED PER TDRR 18608	20 APR 65	
P	REVISED PER TDRR 19266	25 May 65	
R	REVISED PER TDRR 19267	25 May 65	
S	REVISED PER TDRR 20088	7/21/65	
T	REVISED PER TDRR 21190	7/23/65	
U	REVISED PER TDRR 21671	8-31-65	
V	REVISED PER TDRR 21606	8-31-65	
W	REVISED PER TDRR 22791	28 Sep 65	
Y	REVISED PER TDRR 23046	19 Oct 65	
Z	SHEET TWO ADDED REVISED PER TDRR 23699	18 Oct 65	
AA	REVISED PER TDRR 23862	19 Nov 65	
AB	REVISED PER TDRR 24308	14 Dec 65	
AC	REVISED PER TDRR 24898	12 NOV 65	
AD	REVISED PER TDRR 24899	12 NOV 65	
AE	REVISED PER TDRR 25005	16 Feb 66	
AF	REVISED PER TDRR 25089	16 Feb 66	
AG	REVISED PER TDRR 26244	16 Feb 66	

021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	2018837	BRACKET, CONN. 44 PIN	56
1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	1	1010928-25	RESISTOR FIXED	54
1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
—	3	2021500 SEE NOTE 11	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S/M~~	~~42~~
~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M~~	~~41~~
~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-12~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
8	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
~~2~~	~~2~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
~~1~~	~~1~~	~~2018779~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-031 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
—	1	2018750	HOUSING STABLE MEMBER	1

LIST OF MATERIALS

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

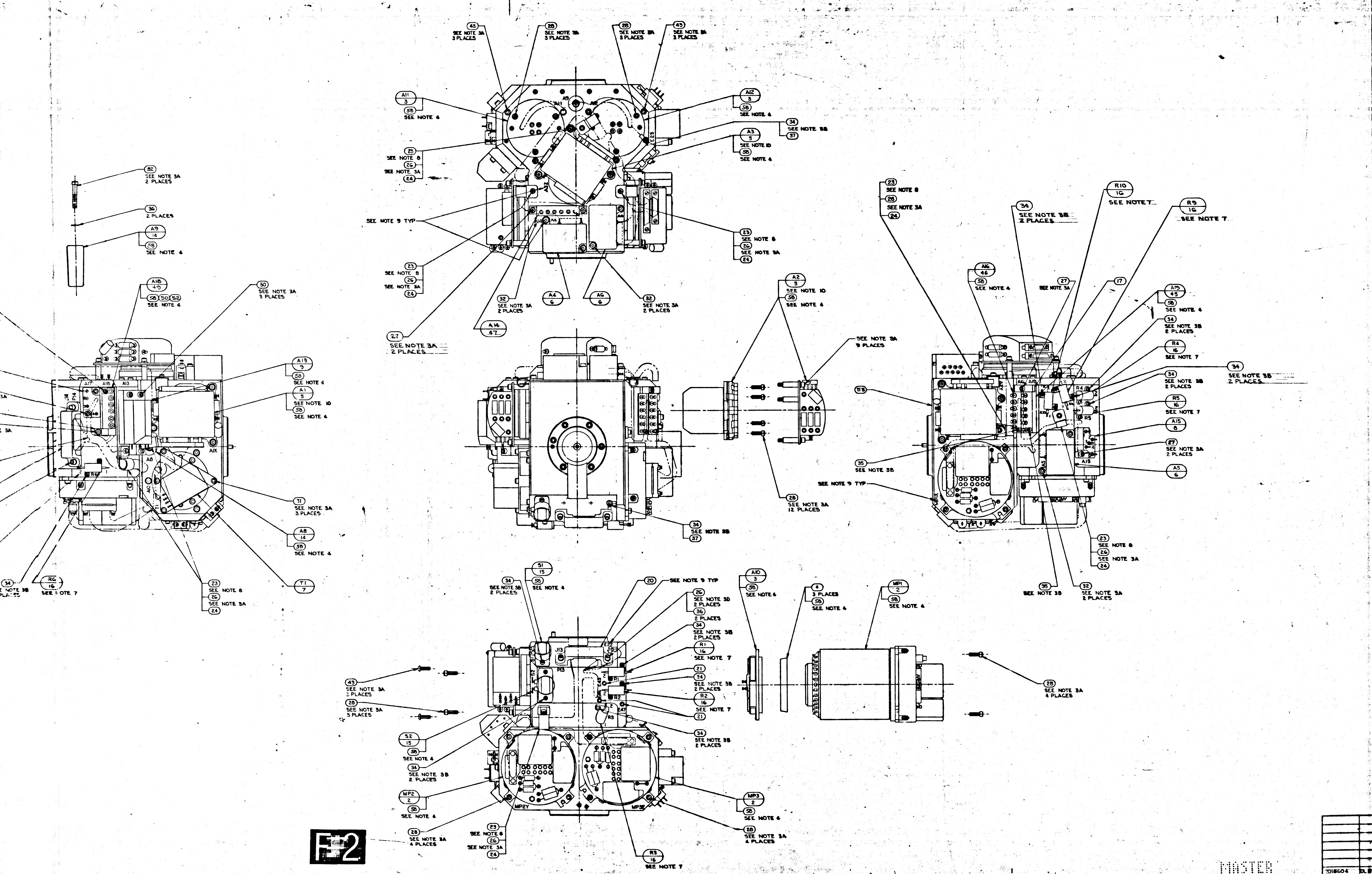
STABLE MEMBER
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 AG

3H

2018605 REV AG SHEET J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F-2

MASTER

2018604	DL	25601
NEXT ASSY		
APPLICATION		

UNLESS OTHERWISE
DIMENSIONS ARE IN
TOLERANCES ON
FRACTIONS
DO NOT SCALE THIS
MATERIAL

	REV	SHEET
2018605	A6	1

WIRING LEGEND				
COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

CABLE CLAMP ㉓	
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

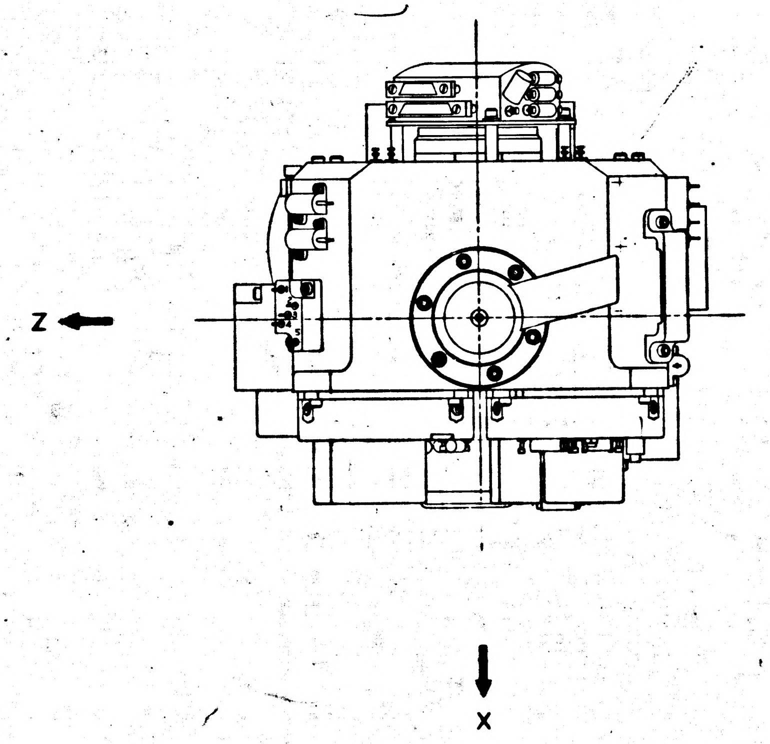
RESISTORS R1 & R2	
PART NO.	VALUE Ω
1010928-289	100
-287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-215	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
-126	2.0
1010928-097	1.0

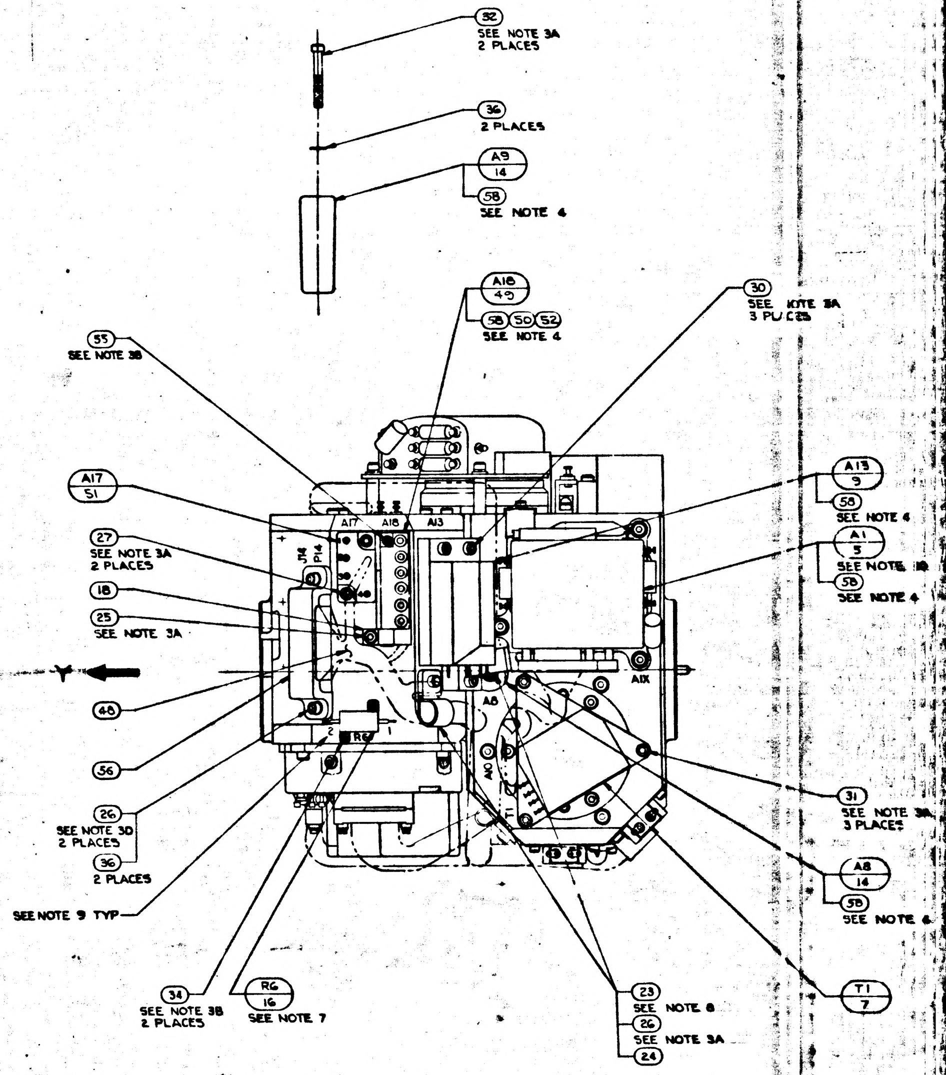
TABLE III

RESISTOR R3	
PART NO.	VALUE Ω
1010928-400	1430
-349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
-153	3.83
1010928-121	1.78

TABLE IV

RESISTORS R4, R5, R6, R9 & R10	
PART NO.	VALUE Ω
1010928-386	1020
-369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
-215	16.9
-194	10.2
1010928-164	4.99

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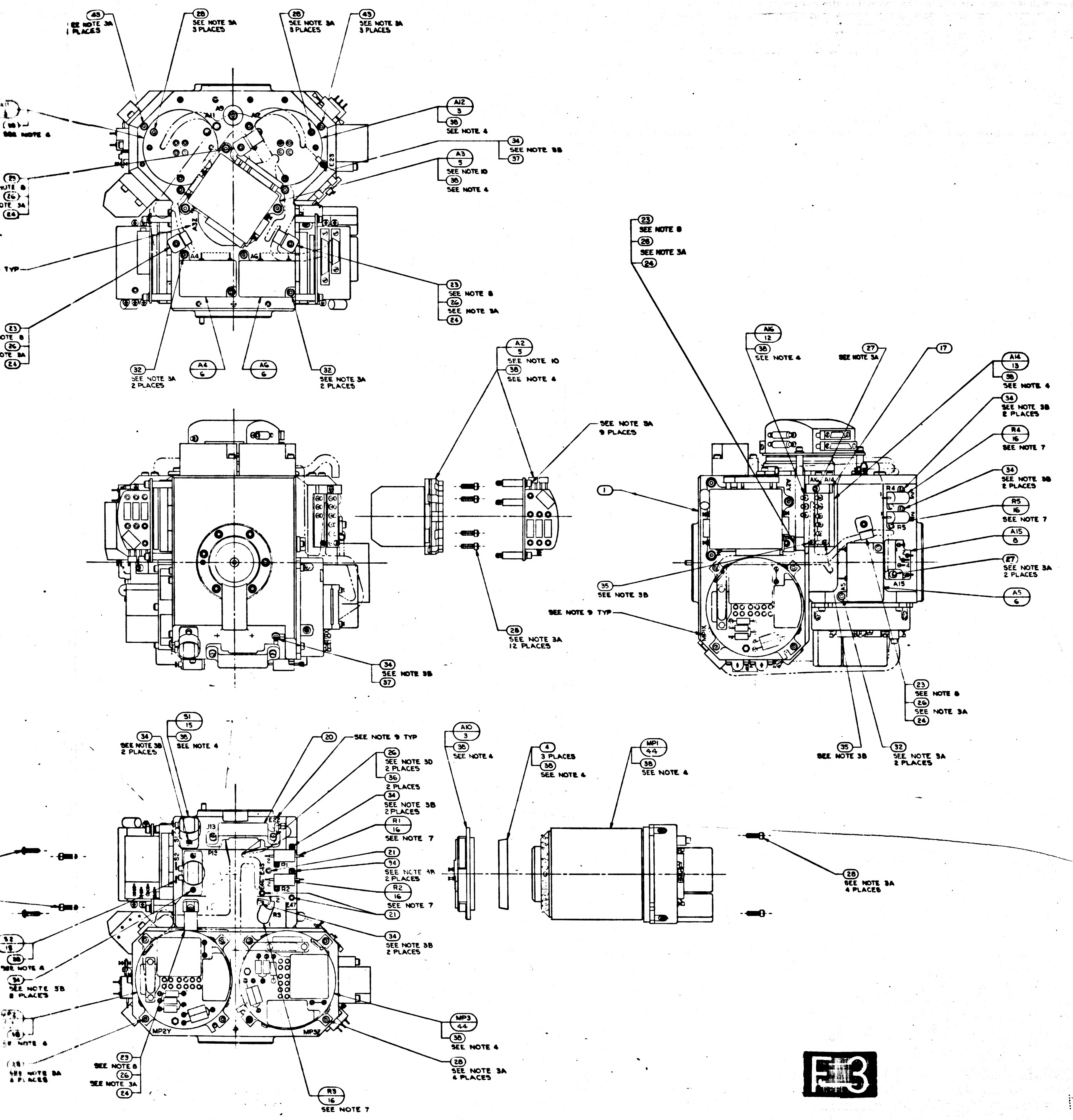
NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM ㊳ OR (58) TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ②, ③, ⑤, ⑨, ⑪, ⑫, ⑬, ⑭ & ⑮, BETWEEN ITEM ② AND ITEM ③ AND BETWEEN ITEM ③ AND ITEM ④
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF. AMP. NASA DWG. NO. 2007101-011, AC DIFF AMP DWG NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 PER PS 2010608 OR 6007105-011 PER PS 2010607 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSE TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY
12. R6 SHALL BE ITEM (54) FOR -011 CONFIGURATION OF THIS ASSY.

F-1

2018605	REV AG	SHEET 1

SYM	DESCRIPTION	DATE	APPROVAL	
Z	THIS SHEET ADDED PER TDRR 23699	[illegible]	[illegible]	WK
AA	REVISED PER TDRR 23862	[illegible]	[illegible]	WK
AB	REVISED PER TDRR 24308	[illegible]	[illegible]	WK
AC	REVISED PER TDRR	[illegible]	[illegible]	WK
AD	REVISED PER TDRR	20NOV65	[illegible]	WK
AE	REVISED PER TDRR 25005	15Feb66	[illegible]	WK
AF	REVISED PER TDRR 25089	15Feb66	[illegible]	WK
AG	REVISED PER TDRR 26244	15Feb66	[illegible]	WK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-011 CONFIGURATION

F3

MASTER

3

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN L.S.S. DATE
CHECKED
APPROVAL 17Dec65
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL 24Nov65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 2 OF 2

2018605 AG

2018605

2018605 REV AG SHEET 2

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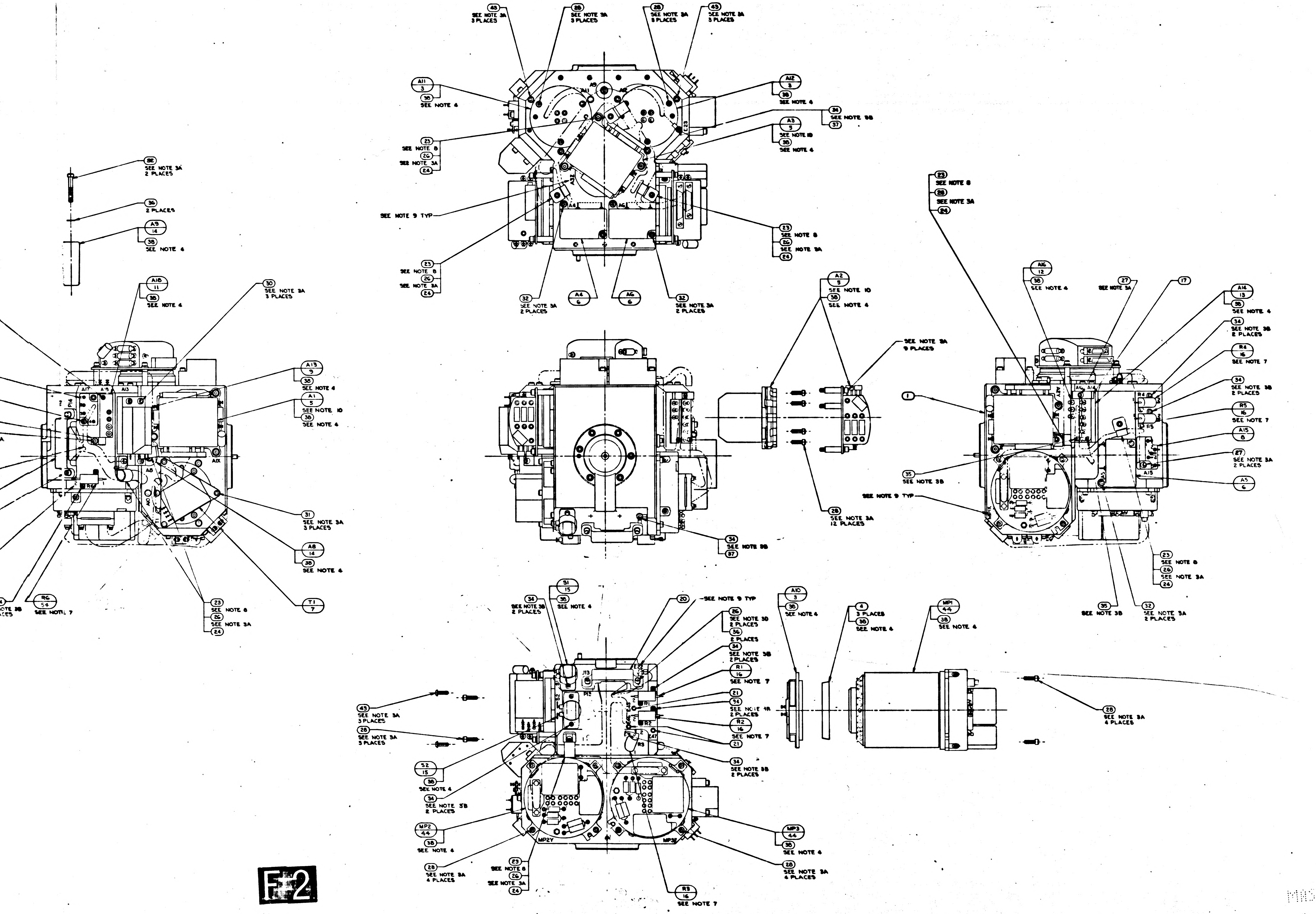
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F2

MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ± ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	DL 2018605 01	NEXT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

2018605 REV AG SHEET 2

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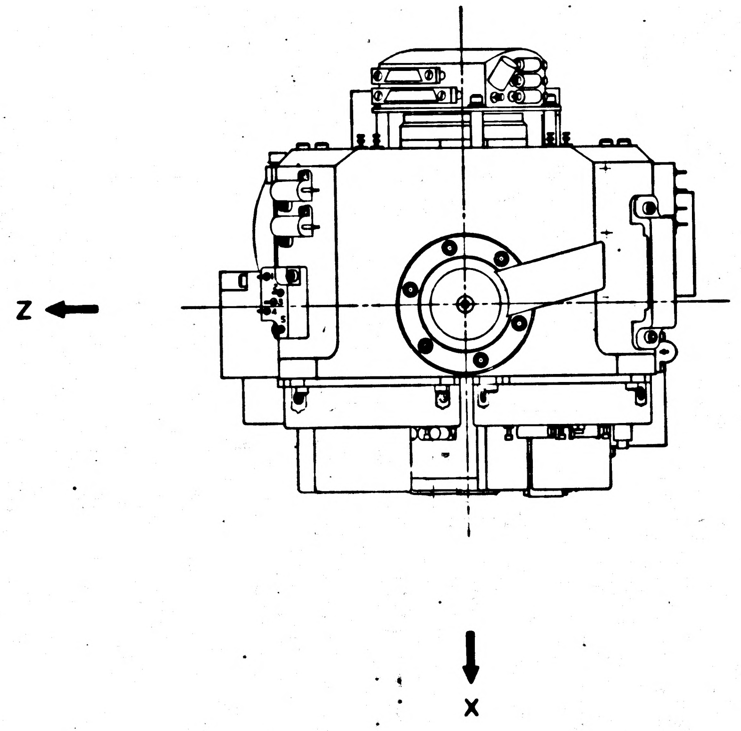
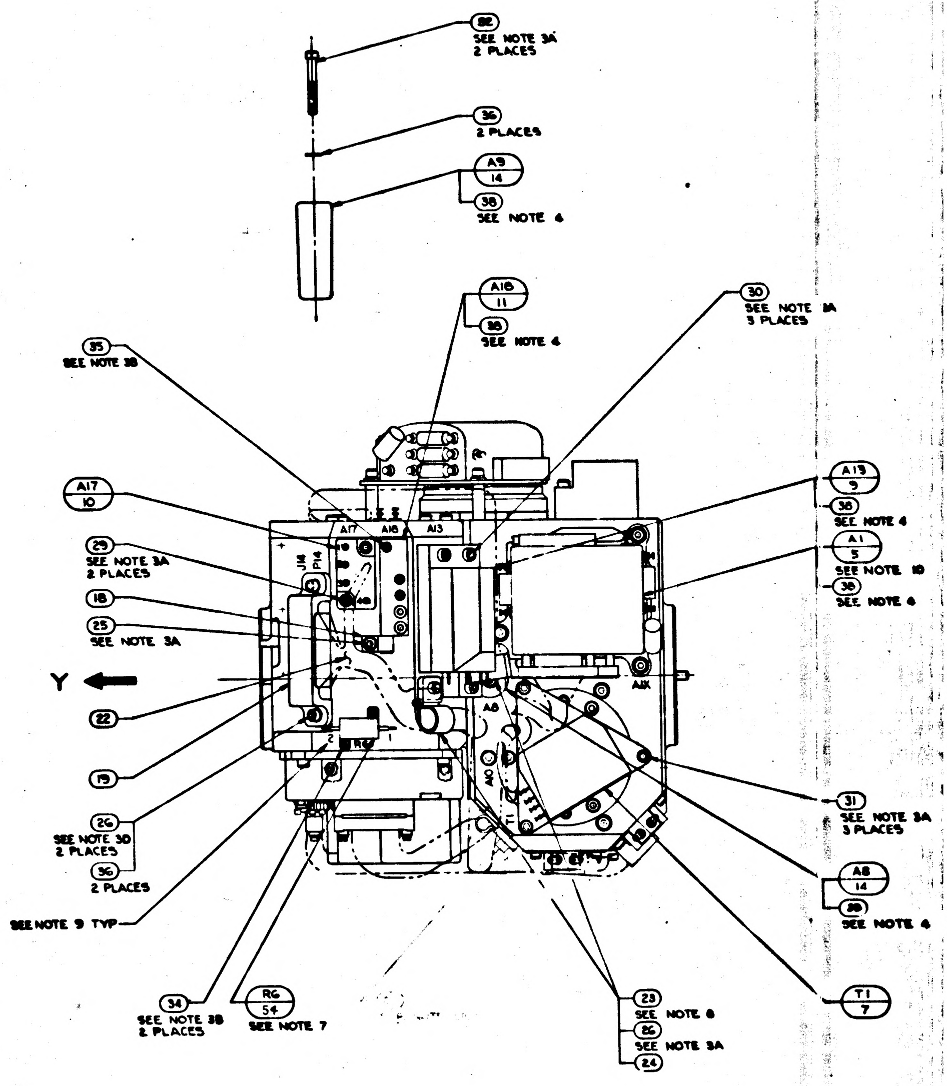
2018605

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SEE NOTE 3A
3 PLACES
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SEE NOTE 4
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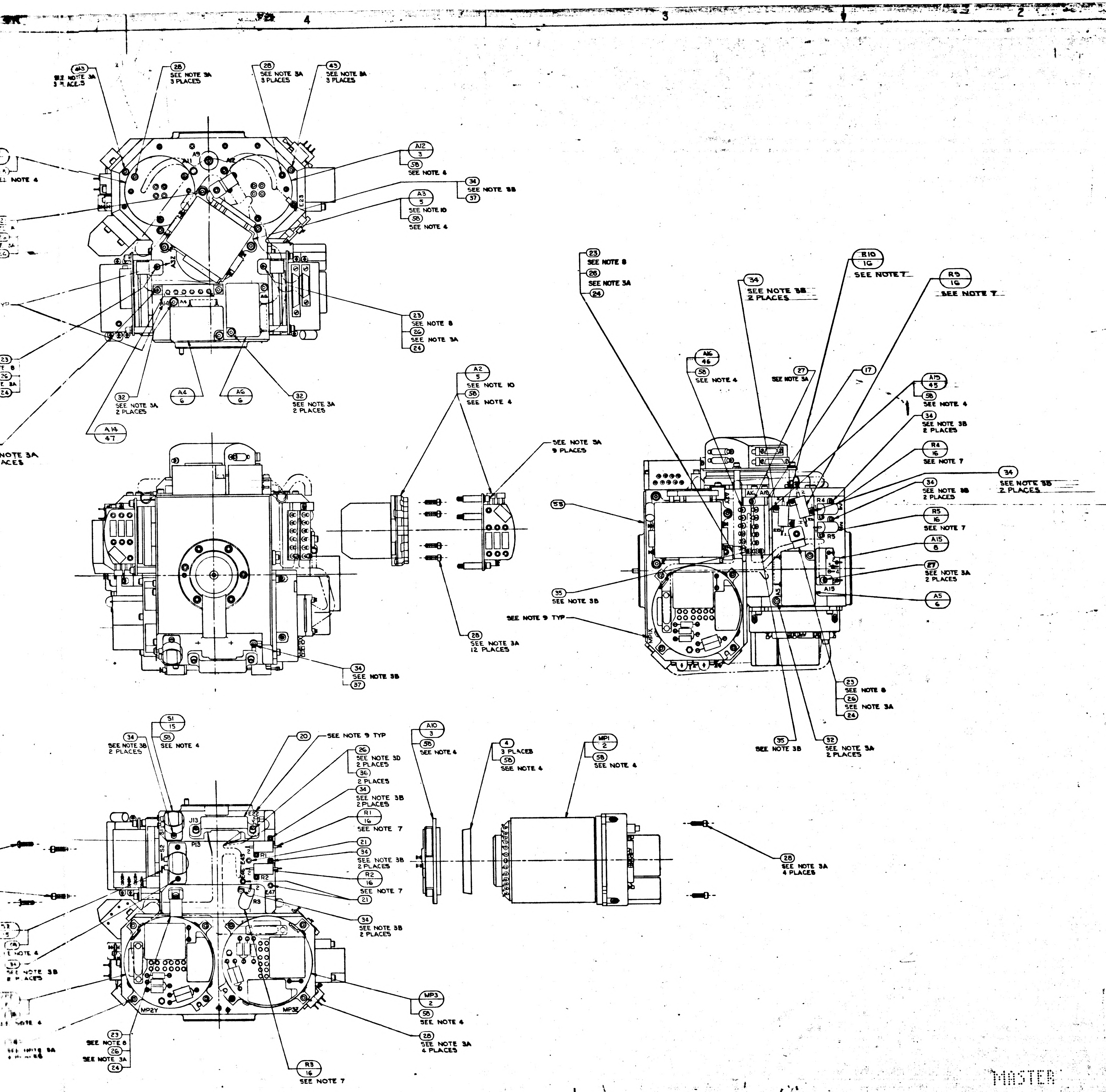
NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

F-1

2018605	REV AG	SHEET 2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SEE NOTE 4
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SEE NOTE 3A
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MP2Y
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REVISIONS TDRR 17755			
SYM	DESCRIPTION	DATE	APPROVAL
M	REPLACES REV L WITH CHANGES TDRR 17755	23 Mar 65	WK
N	REVISED PER TDRR 18608	20 APR 65	WK
P	REVISED PER TDRR 19266	25 May 65	WK
R	REVISED PER TDRR 19267	28 May 65	WK
S	REVISED PER TDRR 20088	7/21/65	WK
T	REVISED PER TDRR 21190	7/23/65	WK
U	REVISED PER TDRR 21671	8-31-65	WK
V	REVISED PER TDRR 21686	8-31-65	WK
W	REVISED PER TDRR 22791	28 Sep 65	WK
Y	REVISED PER TDRR 23046	1 Oct 65	WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	1 Oct 65	WK
AA	REVISED PER TDRR 23862		WK
AB	REVISED PER TDRR 24308	14 Dec 65	WK
AC	REVISED PER TDRR 24898	12 NOV 65	WK
AD	REVISED PER TDRR 24899	12 NOV 65	WK
AE	REVISED PER TDRR 25005	4 Feb 66	WK
AF	REVISED PER TDRR 25089	4 Feb 66	WK
AG	REVISED PER TDRR 26244	16 Feb 66	WK
AH	REVISED PER TDRR 26602	24 Feb 66	WK

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	2018837	BRACKET, CONN. 44 PIN	56
1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	1	1010928-295	RESISTOR FIXED	54
1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
—	3	2021500 SEE NOTE 11	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT HD., SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~[illegible]~~	~~WEIGHT, BALANCE, S/M.~~	~~42~~
~~1~~	~~1~~	~~[illegible]~~	~~WEIGHT, BALANCE, S/M.~~	~~41~~
~~1~~	~~1~~	~~[illegible]~~	~~WEIGHT, BALANCE, S/M.~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
8	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
~~2~~	~~2~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
~~1~~	~~1~~	~~2018779~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL.	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-031 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
—	1	2018750	HOUSING STABLE MEMBER	1
021	011	LIST OF MATERIALS		

2018605 AH

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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY	USED ON
2018604	DL 2018601
APPLICATION	

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

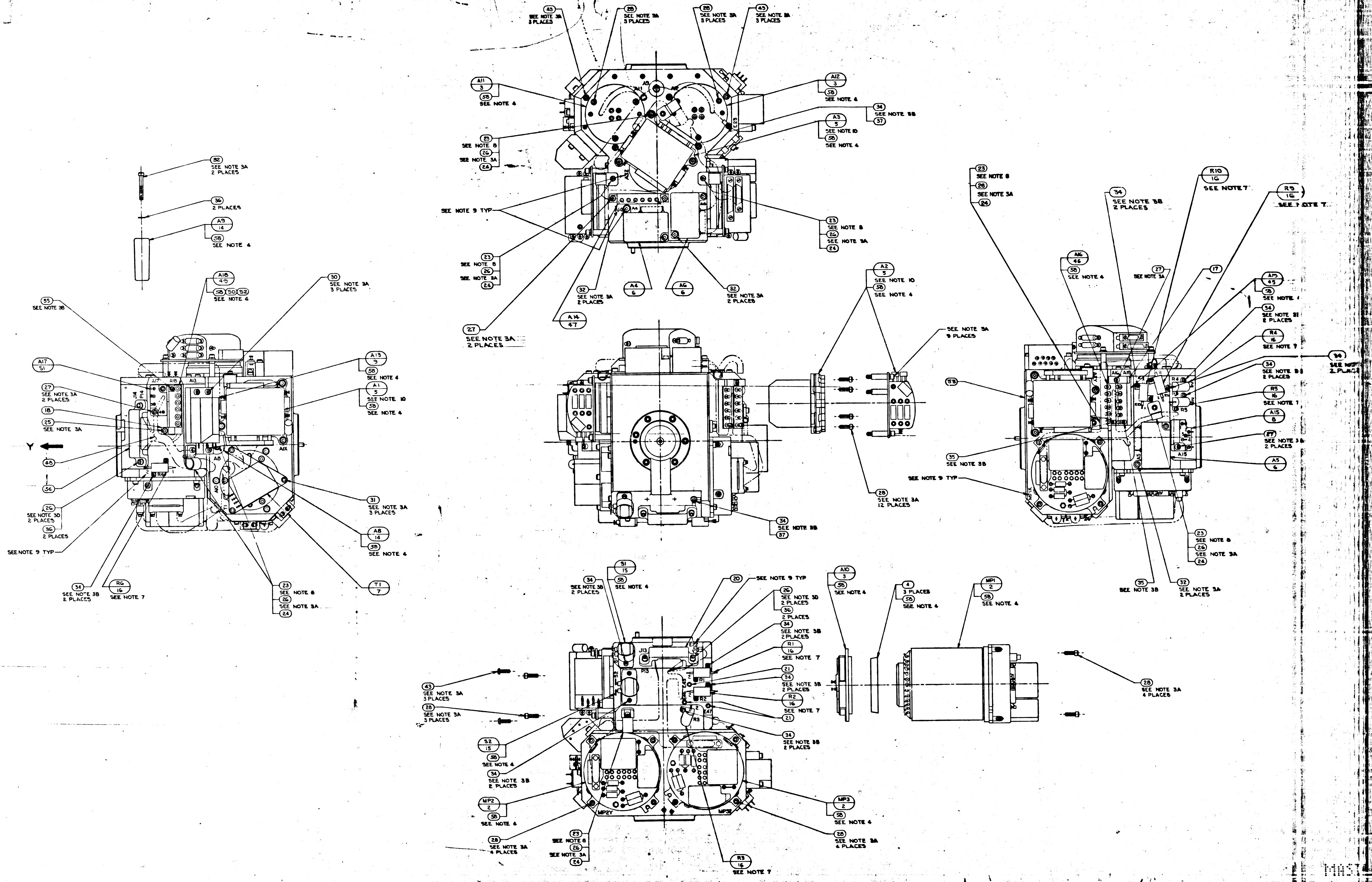
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

MASTER

2018605 A-D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2018605 AH 1

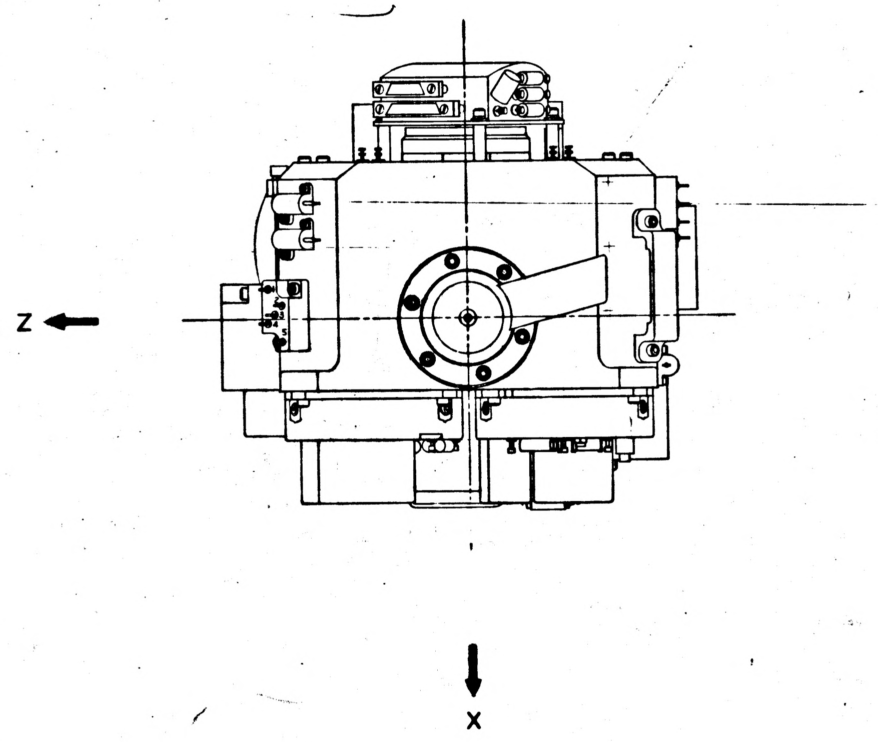
WIRING LEGEND				
COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A1C-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

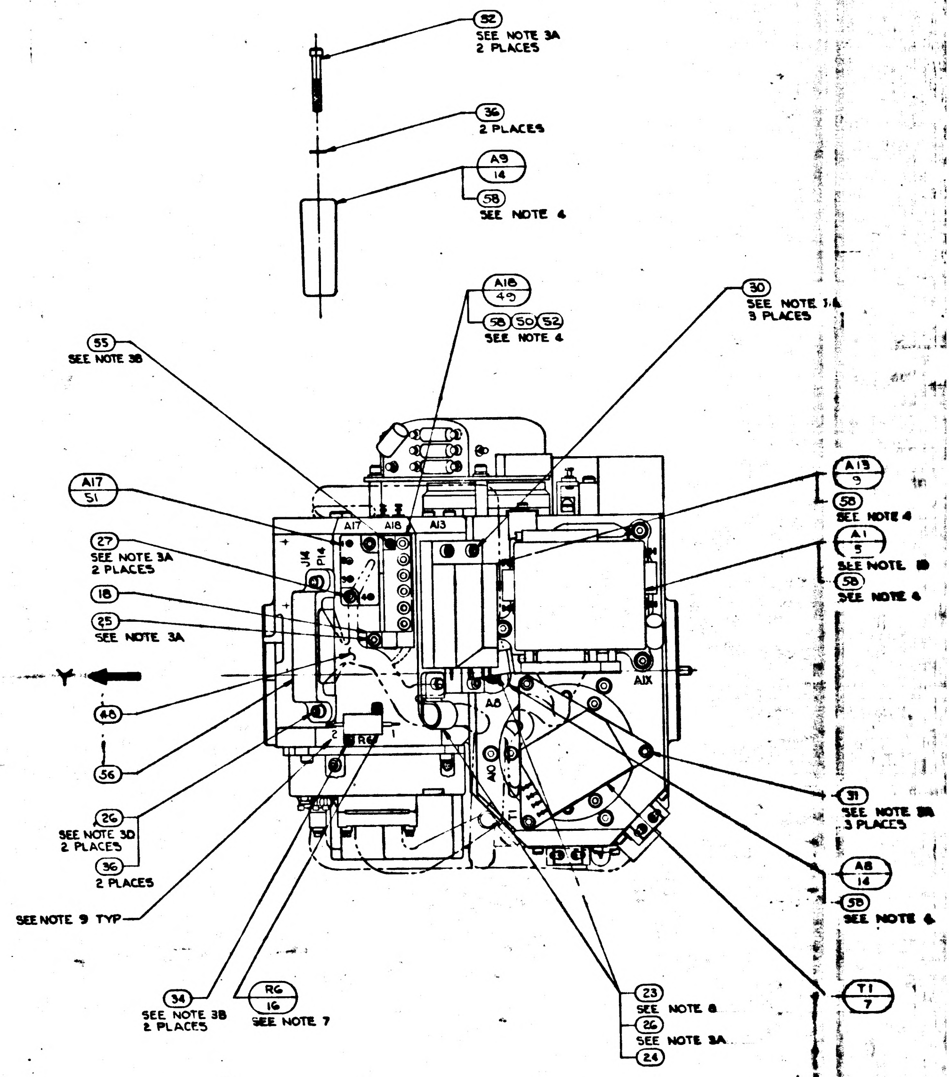
TABLE I	
CABLE CLAMP (23)	
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II	
RESISTORS R1 & R2	
PART NO.	VALUE Ω
1010928-289	100
-287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-275	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
-126	2.0
1010928-097	1.0

TABLE III	
RESISTOR R3	
PART NO.	VALUE Ω
1010928-400	1430
-349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
-153	3.83
1010928-121	1.78

TABLE IV	
RESISTORS R4, R5, R6, R9 & R10	
PART NO.	VALUE Ω
1010928-386	1020
-369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
-215	16.9
-194	10.2
1010928-164	4.99

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(36) 2 PLACES
A9 14
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A18 49
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(55) SEE NOTE 3B
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(27) SEE NOTE 3A 2 PLACES
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(26) SEE NOTE 3D 2 PLACES
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(34) SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
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A8 14
(58) SEE NOTE 4
T1 7
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NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2), (3), (5), (9), (11), (12), (13), (14) & (15), BETWEEN ITEM (2) AND ITEM (3) AND BETWEEN ITEM (3) AND ITEM (4)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF AMP NASA DWG. NO. 2007101-011, AC DIFF AMP DWG NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 PER PS 2010608 OR 6007105-011 PER PS 2010607 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSE TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY
12. R6 SHALL BE ITEM (54) FOR -011 CONFIGURATION OF THIS ASSY.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
Z	THIS SHEET ADDED PER TDRR 23699		WK
AA	REVISED PER TDRR 23862		WK
AB	REVISED PER TDRR 24308		WK
AC	REVISED PER TDRR		WK
AD	REVISED PER TDRR		WK
AE	REVISED PER TDRR 25005		WK
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AG	REVISED PER TDRR 26244		WK
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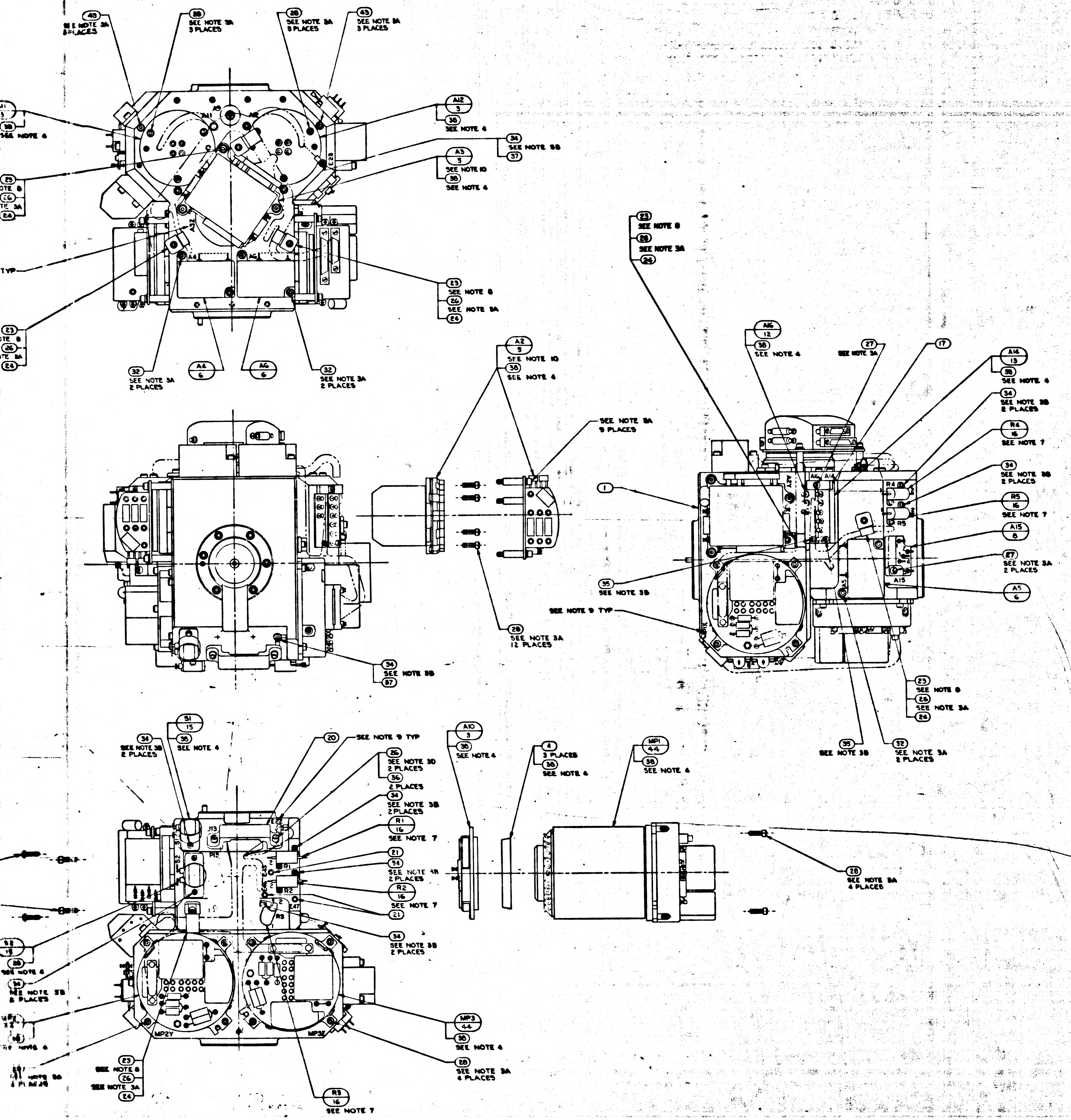
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-011 CONFIGURATION

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN S.G.S. DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 2018605
SCALE 1/1
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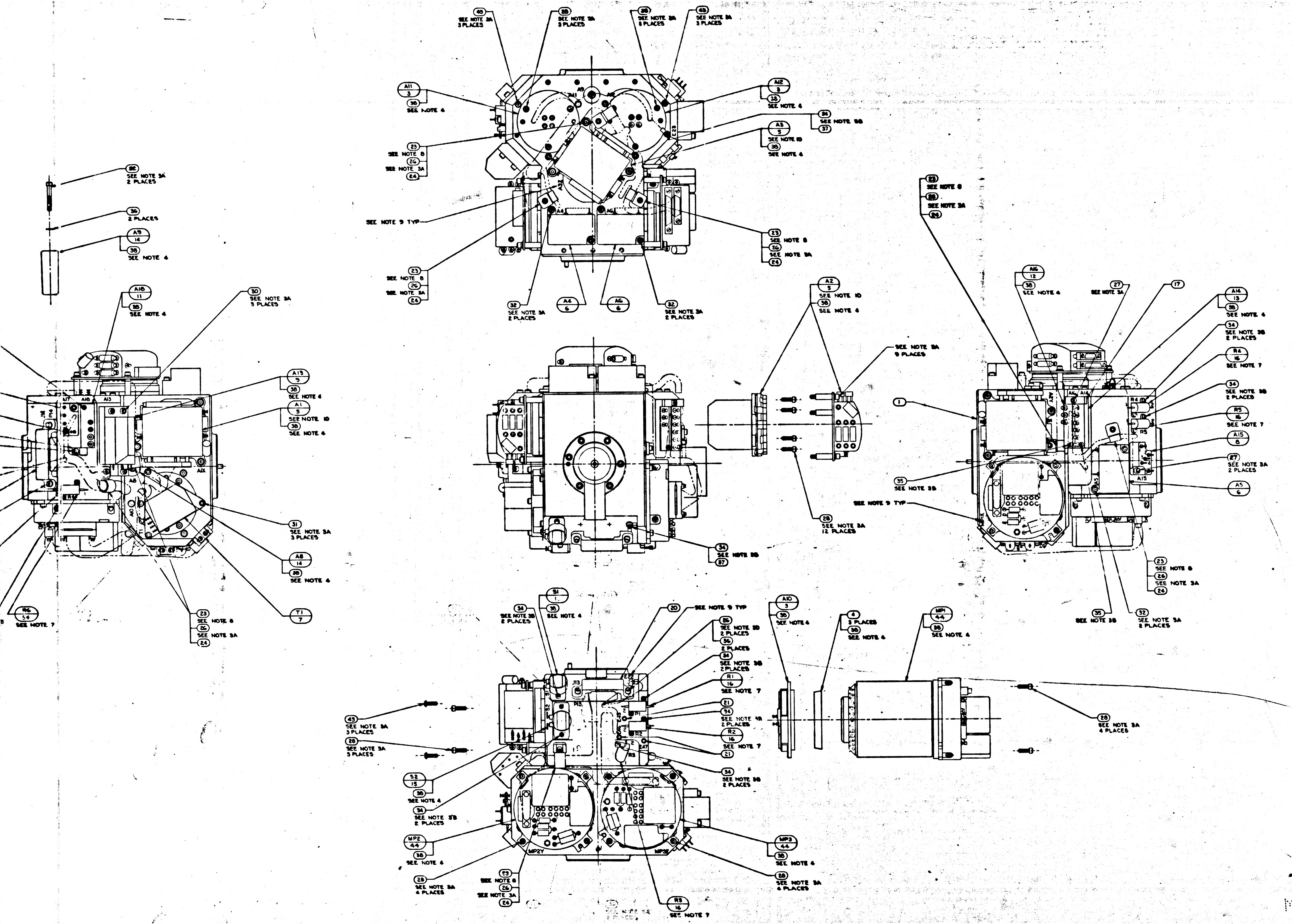
SHEET 2 OF 2

2018605 AH

MASTER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SEE NOTE 3A
3 PLACES
A8
14
38
SEE NOTE 4
T1
7
23
SEE NOTE 8
26
SEE NOTE 3A
24
R6
54
SEE NOTE 7
A2
5
SEE NOTE 10
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
23
SEE NOTE 8
26
SEE NOTE 3A
24
A16
12
38
SEE NOTE 4
27
SEE NOTE 3A
17
A14
13
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
1
A15
6
27
SEE NOTE 3A
2 PLACES
A5
6
35
SEE NOTE 3B
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3A
24
35
SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
S1
1
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
20
SEE NOTE 9 TYP
35
SEE NOTE 3B
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
44
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
S2
15
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
MP2
44
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3A
24
R3
16
SEE NOTE 7
MP3
44
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
A9
A11
A12
E28
A7
A4
A6
A17
A18
A13
A1X
A8
J13
P13
MP1
R2
R5
E47
MP2Y
MP3Z
R4
R5
A14
A15

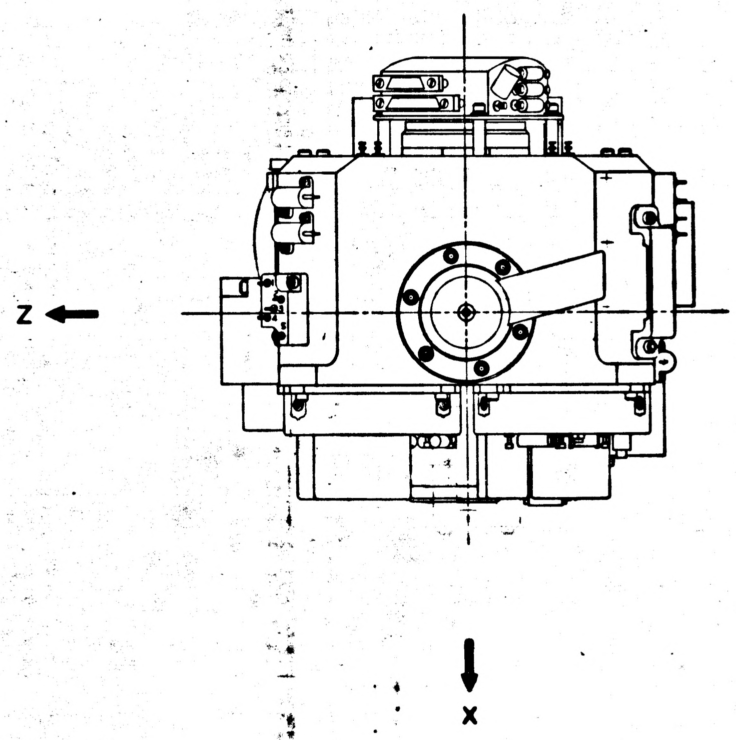
MASTER

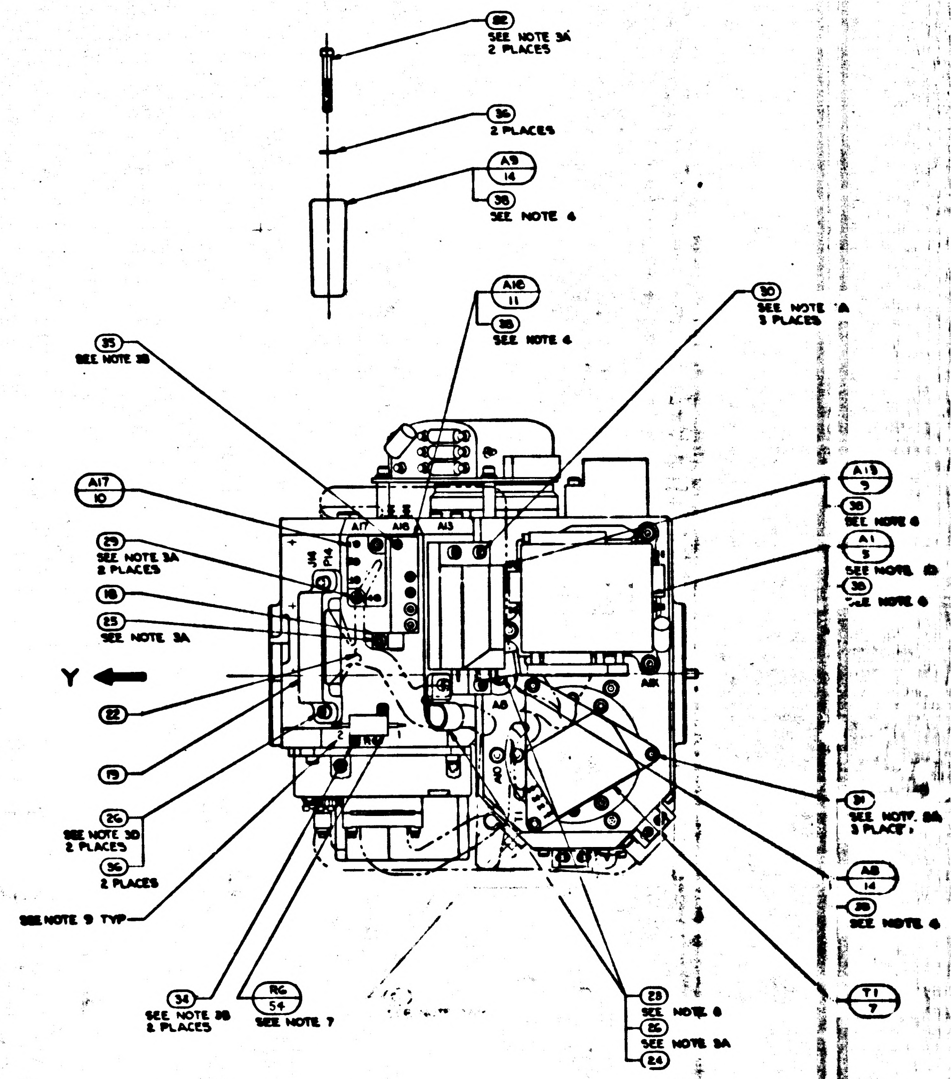
2018604	DL 2018604
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS
± ±
DO NOT SCALE THIS DRAWING
MATERIAL

HEAT TREATMENT

FINAL FINISH

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36 2 PLACES
A9 14
38 SEE NOTE 4
A16 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
35 SEE NOTE 3B
A17 10
29 SEE NOTE 3A 2 PLACES
18
25 SEE NOTE 3A
Y
22
19
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
SEE NOTE 9 TYP
34 SEE NOTE 3B 2 PLACES
RG 54 SEE NOTE 7
28 SEE NOTE 8
26 SEE NOTE 3A
24
A13 9
38 SEE NOTE 6
A1 5
SEE NOTE 3D
38 SEE NOTE 6
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
A17
A16
A13
J16
P14
A1K
A8

NOTES:

1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17755			
M	REPLACES REV L WITH CHANGES TDRR 17755	23Mar65		WK
N	REVISED PER TDRR 18608	20APR65		WK
P	REVISED PER TDRR 19266	25May65		WK
R	REVISED PER TDRR 19267	25May65		WK
S	REVISED PER TDRR 20088	7/21/65		WK
T	REVISED PER TDRR 21190	7/23/65		WK
U	REVISED PER TDRR 21671	8-31-65		WK
V	REVISED PER TDRR 21686	8-31-65		WK
W	REVISED PER TDRR 22791	28Sep65		WK
Y	REVISED PER TDRR 23046	19Oct65		WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	19Oct65		WK
AA	REVISED PER TDRR 23862	19Nov65		WK
AB	REVISED PER TDRR 24308	14Dec65		WK
AC	REVISED PER TDRR 24898	12 NOV 65		WK
AD	REVISED PER TDRR 24899	12 NOV 65		WK
AE	REVISED PER TDRR 25005	16Feb66		WK
AF	REVISED PER TDRR 25089	16Feb66		WK
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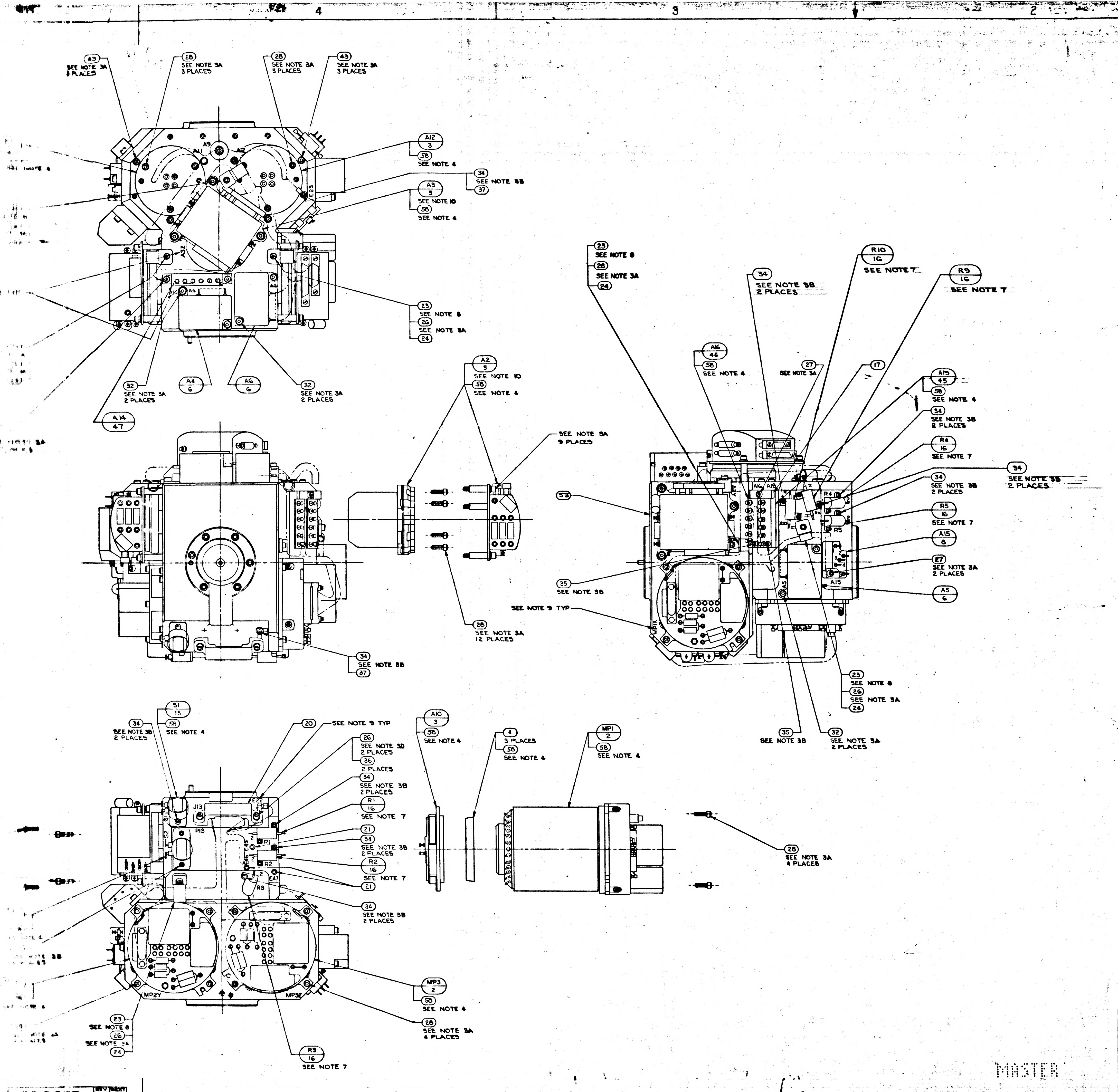
AH	REVISED PER TDRR 26602	24Feb66		WK
AJ	REVISED TDRR 26877	19Mar66		WK



4
3
2
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43 SEE NOTE 3A 8 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
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A12 3 58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 5 SEE NOTE 10 58 SEE NOTE 4
A9
A11
A13
E23
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A4
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23 SEE NOTE 8 26 SEE NOTE 3A 24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A14 47
A2 5 SEE NOTE 10 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
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SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
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A15 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
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27 SEE NOTE 3A 2 PLACES
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34 SEE NOTE 3B 2 PLACES
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26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
E22
E47
R1
R2
R3
MP2Y
MP3Z
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 2 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 2 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
R3 16 SEE NOTE 7

021	011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	2018837	BRACKET, CONN. 44 PIN	56
1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	1	1010928-295	RESISTOR FIXED	54
1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
—	3	2021500 SEE NOTE 11	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S./M.~~	~~42~~
~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M.~~	~~41~~
~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M.~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-12~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
8	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
~~2~~	~~2~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
~~1~~	~~1~~	~~2018779~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-031 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
—	1	2018750	HOUSING STABLE MEMBER	1

LIST OF MATERIALS

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.G.S. DATE
CHECKED
APPROVAL 23Mar65
APPROVAL
NASA APPROVAL W. J. Rhine 3-23-65
MIT APPROVAL 23Mar65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

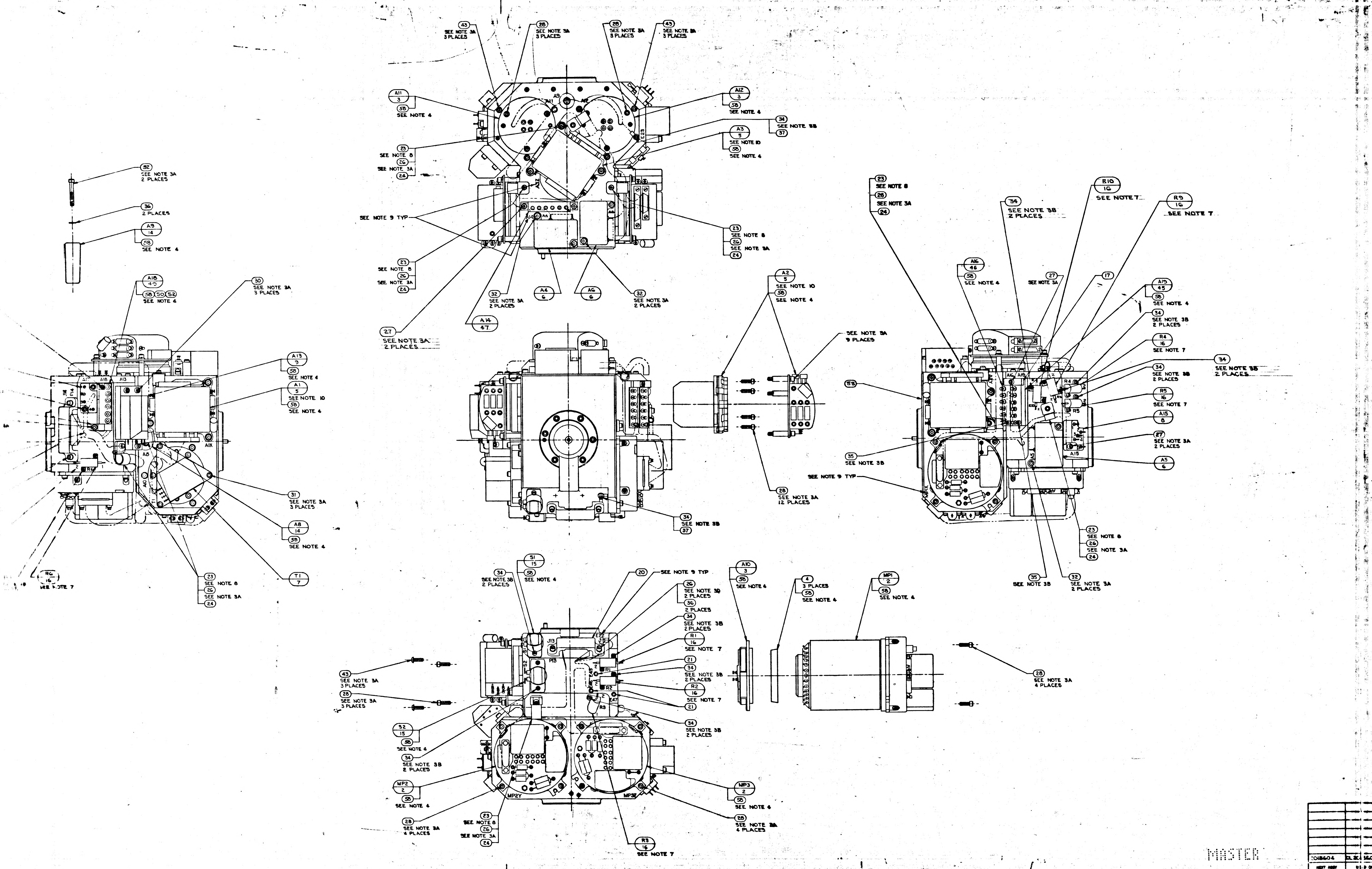
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 AJ

3H

MASTER

2018605 A 1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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3 58 SEE NOTE 4
A12 3 58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 5 SEE NOTE 10 58 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3A 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
32 SEE NOTE 3A 2 PLACES
A14 47
27 SEE NOTE 3A 2 PLACES
52 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14 58 SEE NOTE 4
A18 45 58 50 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9 58 SEE NOTE 4
A1 5 SEE NOTE 10 58 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14 58 SEE NOTE 4
T1 7
23 SEE NOTE 8 26 SEE NOTE 3A 24
R6 16 SEE NOTE 7
A2 5 SEE NOTE 10 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3A 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
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A15 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
58
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
S1 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
20 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 2 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 2 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
R3 16 SEE NOTE 7
MP3 2 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A1 A2 A9 A4 A16 A18 A13 A5 A15 R4 R5 J13 P13 J14 P14 S1 S2 R1 R2 R3 E47 MP2Y MP3Z A1X A2Z

MASTER

2018604

2018605	REV AJ	SHEET 1

E2

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

CABLE CLAMP (23)

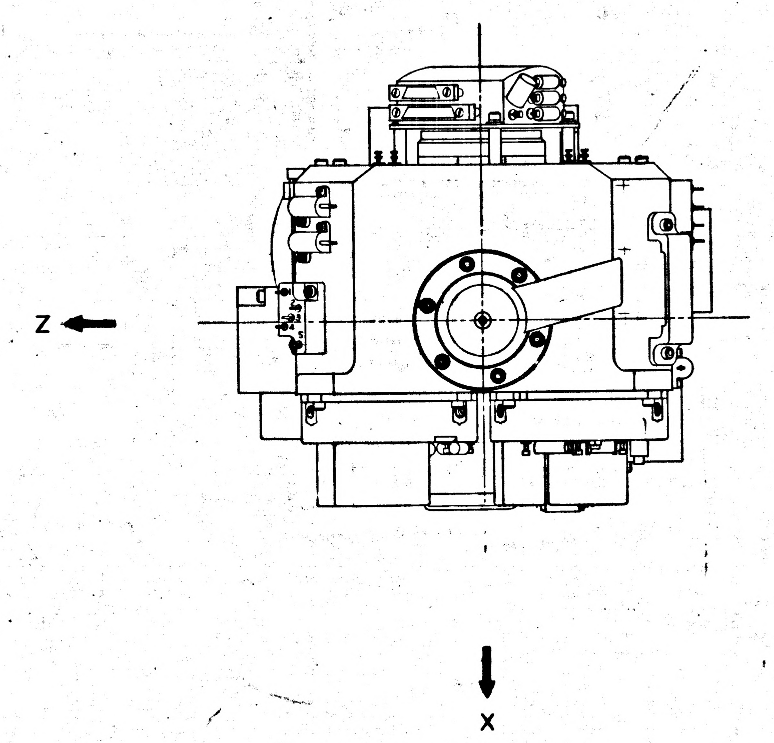
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

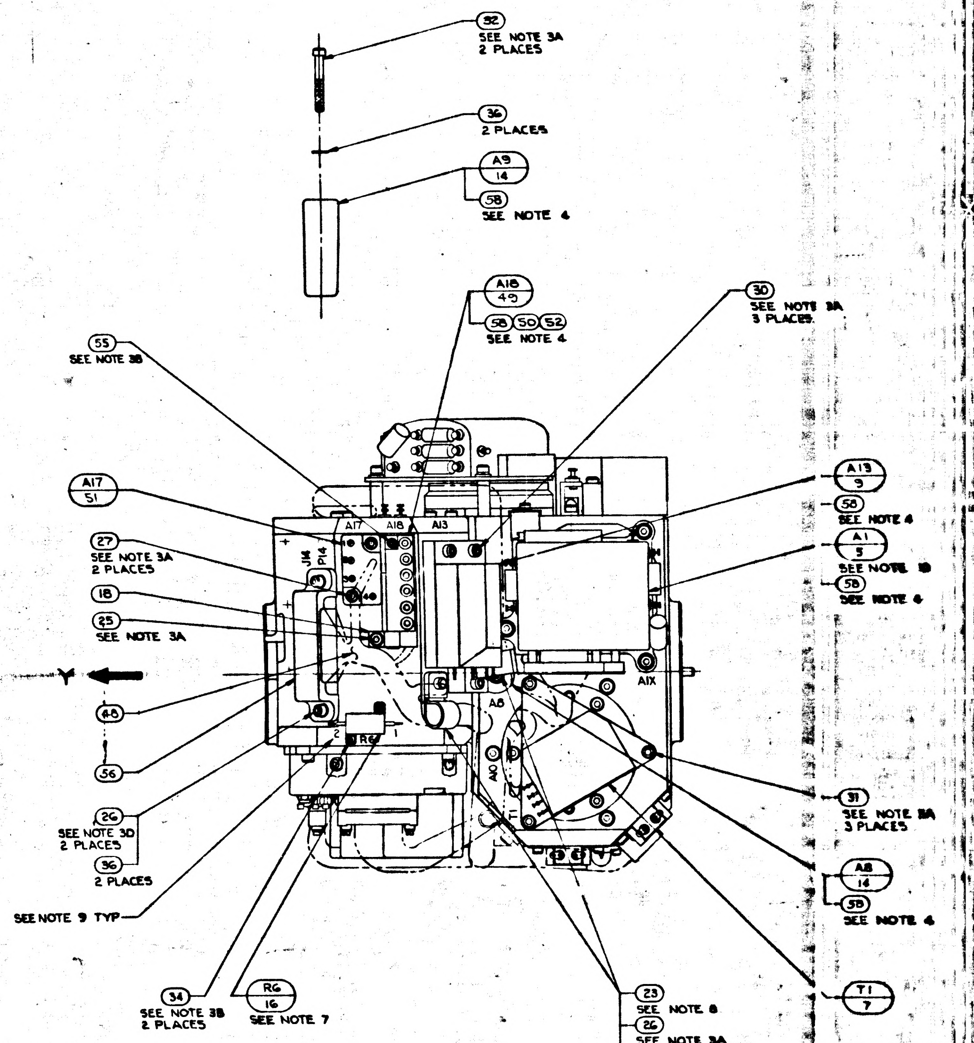
TABLE II

RESISTORS R1, R2, R3, R4, R5, R6, R9, & R10.

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-389	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		

ASSEMBLY NO	PROCUREMENT SPEC
2018605-011	2018601
2018605-021	2016152

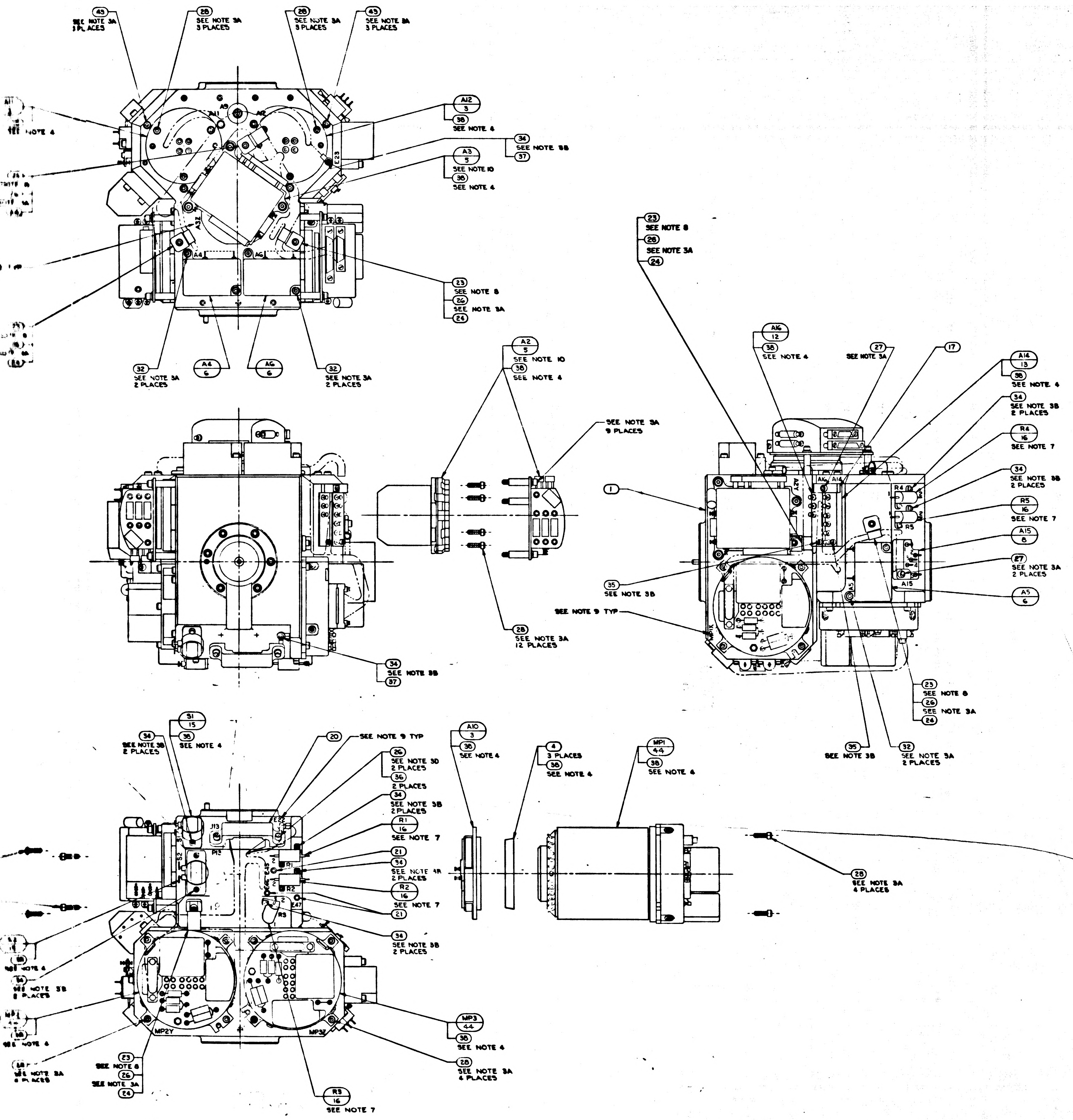



(32) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9 / 14
(58) SEE NOTE 4
A18 / 49
(58) (50) (52) SEE NOTE 4
(30) SEE NOTE 3A 3 PLACES
(55) SEE NOTE 3B
A17 / 51
(27) SEE NOTE 3A 2 PLACES
(18)
(25) SEE NOTE 3A
Y
(48)
(56)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
(34) SEE NOTE 3B 2 PLACES
R6 / 16 SEE NOTE 7
(23) SEE NOTE 8
(26) SEE NOTE 3A
(24)
A13 / 9
(58) SEE NOTE 4
A1 / 5 SEE NOTE 10
(58) SEE NOTE 4
(31) SEE NOTE 3A 3 PLACES
A8 / 14
(58) SEE NOTE 4
T1 / 7
A17
A18
A13
J14
P14
R6
A8
A10
AIX
T1

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2), (3), (5), (9), (11), (12), (13), (14) & (15), BETWEEN ITEM (2) AND ITEM (3) AND BETWEEN ITEM (3) AND ITEM (4)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II PER APPLICABLE SPECIFICATION (SEE CHART) EXCEPT R6 (SEE NOTE 6)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF. AMP. NASA DWG. NO. 2007101-011, AC DIFF AMP DWG NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 PER PS 2010603 OR 6007105-011 PER PS 2010607 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSE TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY
12. R6 SHALL BE ITEM (54) FOR -011 CONFIGURATION OF THIS ASSY.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
Z	THIS SHEET ADDED PER TDRR 23699		WK
AA	REVISED PER TDRR 23862		WK
AB	REVISED PER TDRR 24308		WK
AC	REVISED PER TDRR		WK
AD	REVISED PER TDRR		WK
AE	REVISED PER TDRR 25008	15 Feb 66	WK
AF	REVISED PER TDRR 25089	15 Feb 66	WK
AG	REVISED PER TDRR 26244	15 Feb 66	WK
AH	REVISED PER TDRR 26602	1 Mar 66	WK
AJ	REVISED TDRR 26877		WK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3 PLACES
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SEE NOTE 3A
3 PLACES
A12
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SEE NOTE 4
34
SEE NOTE 3B
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A3
5
SEE NOTE 10
38
SEE NOTE 4
23
SEE NOTE 8
26
SEE NOTE 3A
24
32
SEE NOTE 3A
2 PLACES
A4
6
A6
6
A2
5
SEE NOTE 10
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
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SEE NOTE 3A
12 PLACES
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35
SEE NOTE 3B
SEE NOTE 9 TYP
A16
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SEE NOTE 4
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SEE NOTE 3A
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SEE NOTE 3B
2 PLACES
R4
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SEE NOTE 7
R5
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SEE NOTE 7
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SEE NOTE 3A
2 PLACES
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SEE NOTE 4
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SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
R1
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SEE NOTE 7
21
R2
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SEE NOTE 7
A10
3
36
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
44
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
MP3
44
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
16
SEE NOTE 7
MP2Y
MP3Z
J13
P12

-011 CONFIGURATION

3/4

MASTER

2018604	DL 2018601	
NEXT ASSY	USED ON	
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN L.S.B. DATE
CHECKED
APPROVAL 170765
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL W Kupfer 24Nov65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

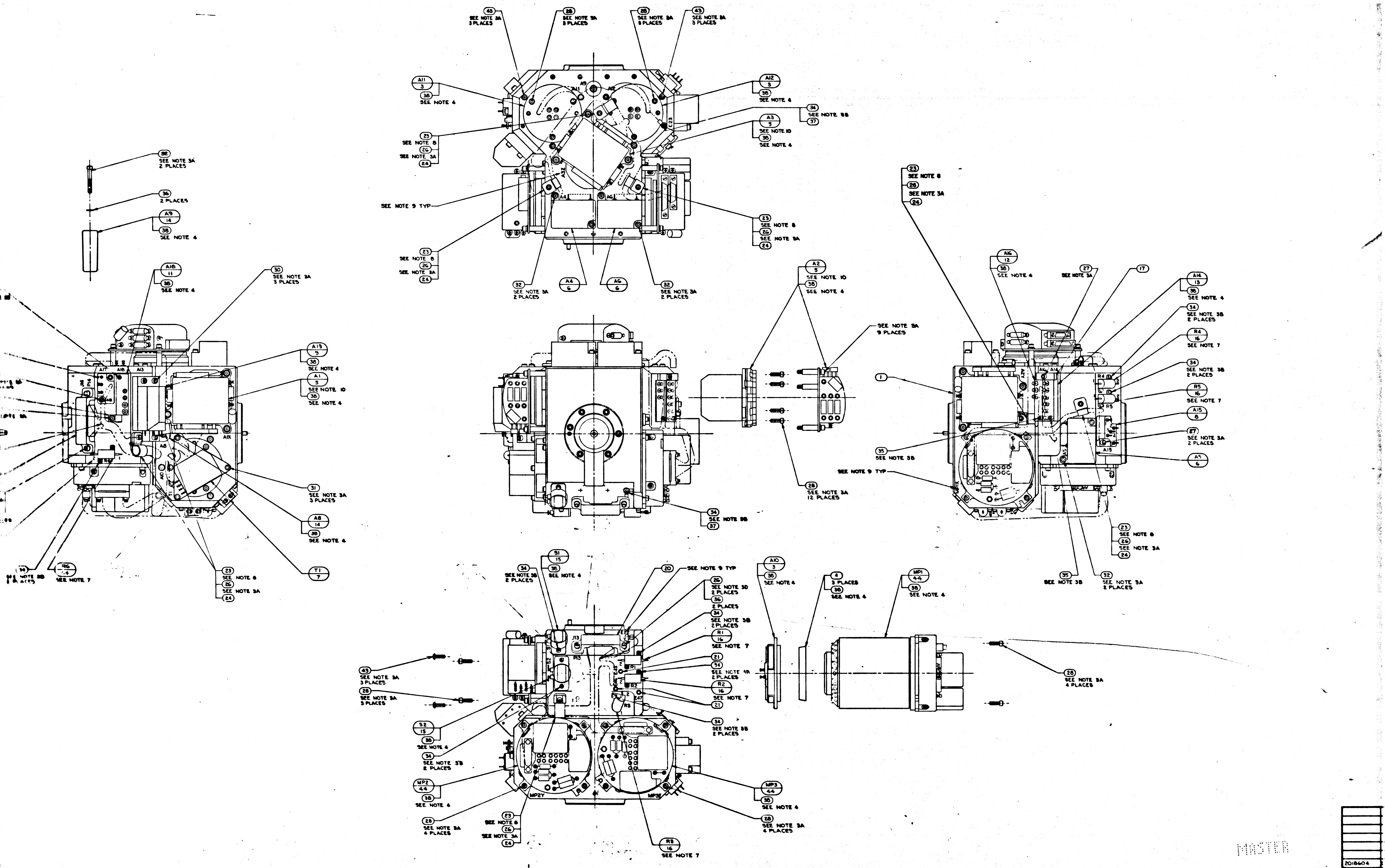
STABLE MEMBER
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 2 OF 2

2018605 AJ

2018605 REV AJ SHEET 2

E-3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26 SEE NOTE 3A 3 PLACES
26 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
36 SEE NOTE 3B
37
A3 5
SEE NOTE 10
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3A
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3A
24
23 SEE NOTE 8
26 SEE NOTE 3A
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
32 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
38 SEE NOTE 4
A18 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 5
SEE NOTE 10
38 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
23 SEE NOTE 8
26 SEE NOTE 3A
24
14 SEE NOTE 3B 2 PLACES
R6 16
SEE NOTE 7
A2 5
SEE NOTE 10
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3A
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16
SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16
SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3A
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
38 SEE NOTE 4
20 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16
SEE NOTE 7
21
34 SEE NOTE 4B 2 PLACES
R2 16
SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3A
24
R3 16
SEE NOTE 7
MP3 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A17
A18
A13
A1X
A8
J13
P13
E23
MP2Y
MP3Z

MASTER

2018604	2018601
NEXT ASSY	USED ON
APPLICATION	

2018605 REV AJ SHEET 2

E-2

2018602

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C

B

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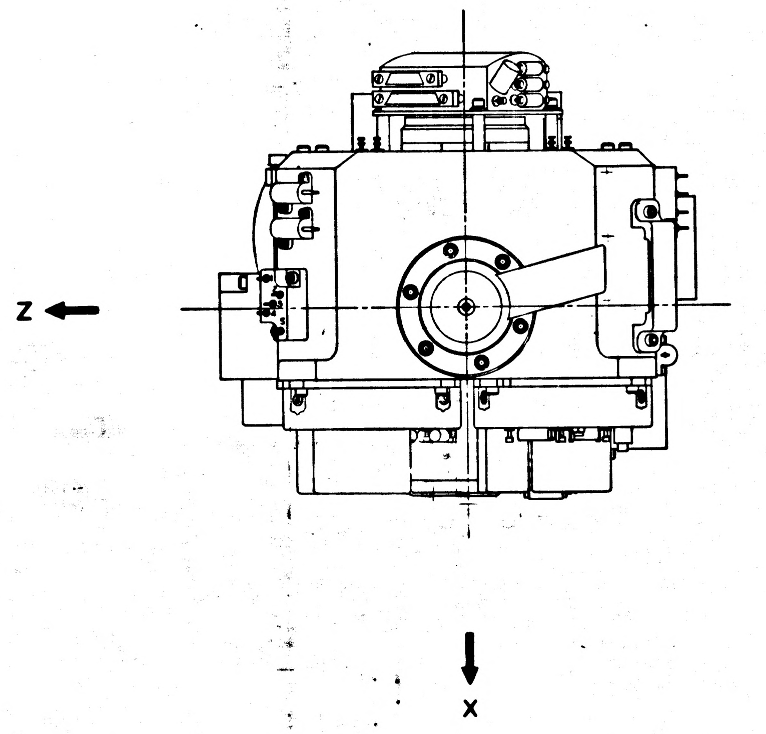

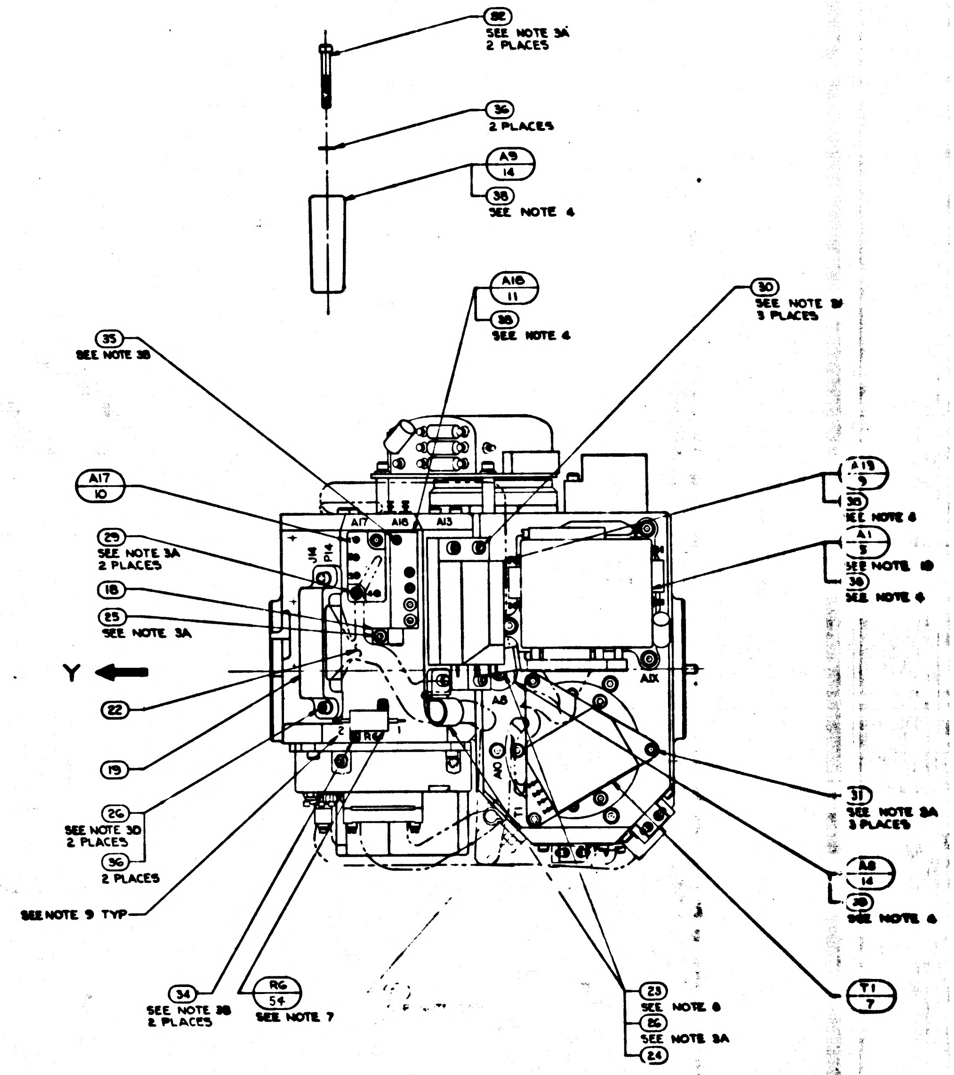
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3 PLACES
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SEE NOTE 9 TYP
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J14
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SEE NOTE 4
A1
3
SEE NOTE 10
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SEE NOTE 4
31
SEE NOTE 3A
3 PLACES
A8
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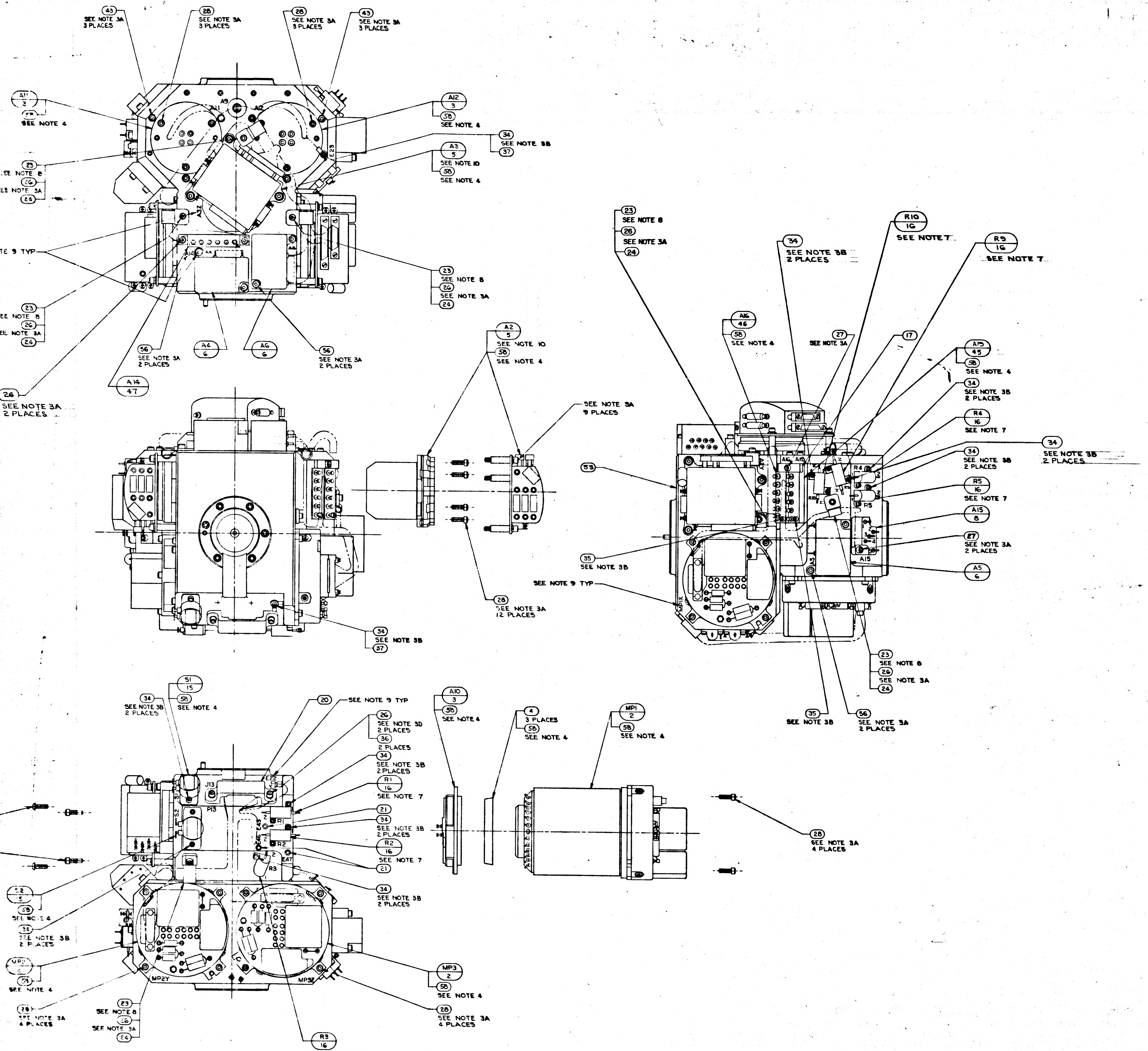
38
SEE NOTE 4
T1
7
23
SEE NOTE 8
25
SEE NOTE 3A
24

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

	REV	SHEET
.2018605	AJ	2



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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
58 SEE NOTE 4
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A11
A12
E23
A3Z
A14
A4
A6
A12 3
58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 5
SEE NOTE 10
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3A
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3A
24
23 SEE NOTE 8
26 SEE NOTE 3A
24
56 SEE NOTE 3A 2 PLACES
A4 6
A6 6
56 SEE NOTE 3A 2 PLACES
A14 47
26 SEE NOTE 3A 2 PLACES
A2 5
SEE NOTE 10
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8
26 SEE NOTE 3A
24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A19 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
53
35 SEE NOTE 3B
SEE NOTE 9 TYP
MP1X
A1Y
A16
A19
R4
R5
A15
A5
23 SEE NOTE 8
26 SEE NOTE 3A
24
35 SEE NOTE 3B
56 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
58 SEE NOTE 4
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SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
J13
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E47
R1
R2
R3
MP2Y
MP3Z
S2 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 4
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3A
24
R3 16 SEE NOTE 7
MP3 2
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 2
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

REVISIONS TDRR 17755

SYM	DESCRIPTION	DATE	APPROVAL	
M	REPLACES REV L WITH CHANGES TDRR 17755	23Mar65		WK
N	REVISED PER TDRR 18608	20APR65		WK
P	REVISED PER TDRR 19266	25May65		WK
R	REVISED PER TDRR 19267	25May65		WK
S	REVISED PER TDRR 2008	7/21/65	ajB	WK
T	REVISED PER TDRR 2119C	7/23/65	ajB	WK
U	REVISED PER TDRR 216	8-31-65		WK
V	REVISED PER TDRR 216	8-31-65		WK
W	REVISED PER TDRR 22791	28Sep65		WK
Y	REVISED PER TDRR 2304C	19Oct65		WK
Z	SHEET TWO ADDED REVISED PER TDRR 23	19Oct65		WK
AA	REVISED PER TDRR 23	19Nov65		WK
AB	REVISED PER TDRR 24	14Dec65		WK
AC	REVISED PER TDRR 24	NOV65		WK
AD	REVISED PER TDRR 24	NOV65		WK
AE	REVISED PER TDRR 2	4Feb66		WK
AF	REVISED PER TDRR 2	4Feb66		WK
AG	REVISED PER TDRR 26	6Feb66		WK
AH	REVISED PER TDRR	Feb66		WK
AJ	REVISED TDRR 2687	Mar66		WK
AK	REVISED PER TDRR 2	3Mar66		WK
AL	REVISED PER TDRR 2	3Mar66		WK

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
6	–	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	2018837	BRACKET, CONN. 44 PIN	56
1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
–	1	1010928-295	RESISTOR FIXED	54
1	–	2018750-011	HOUSING STABLE MEMBER	53
1	–	2018830	SHIELD THERMOSTAT	52
1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
1	–	2018829-2	SHIM BLOWER CONT THERMO	50
1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	–	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
–	3	2021500 SEE NOTE 11	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S/M.~~	~~42~~
~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M.~~	~~41~~
~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M.~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
3	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-12~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
~~2~~	~~2~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
13	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
~~1~~	~~1~~	~~2018779~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-031 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
—	1	2018750	HOUSING STABLE MEMBER	1
021	011	LIST OF MATERIALS		

2018604	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DRAWN R.G.S. DATE CHECKED APPROVAL 23Mar65 APPROVAL NASA APPROVAL 3-23-65 MIT APPROVAL 23Mar65
NEXT ASSY	USED ON		
APPLICATION			

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018605
SCALE 1/1 WT SHEET 1 OF 2

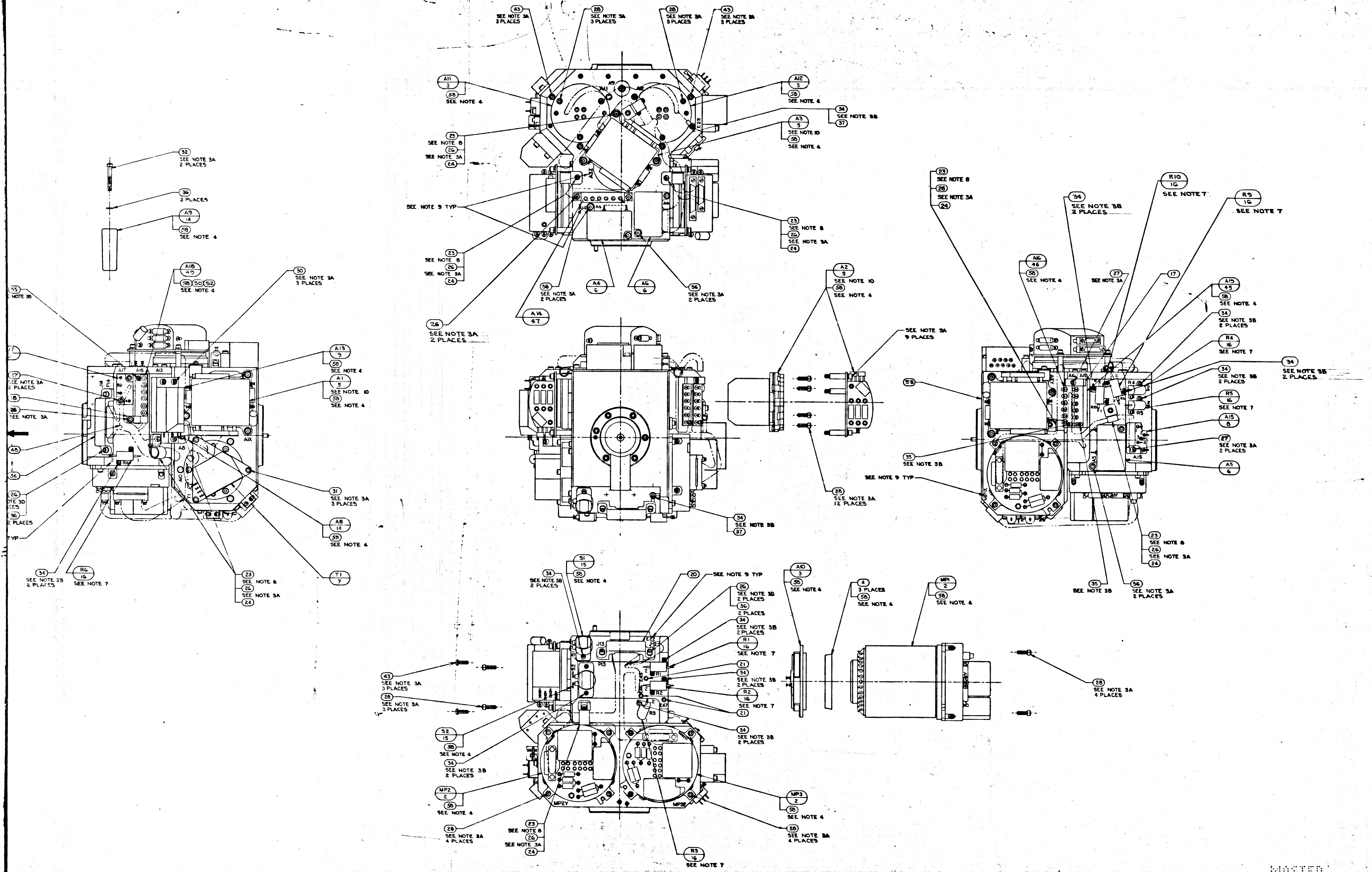
2018605 AL

3H

MASTER

2018605 REV A_ SHEET 1

E3



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SEE NOTE 3A
3 PLACES
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SEE NOTE 7

MASTER

2018605	REV AL	SHEET 1

'018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

F-2

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A1C-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

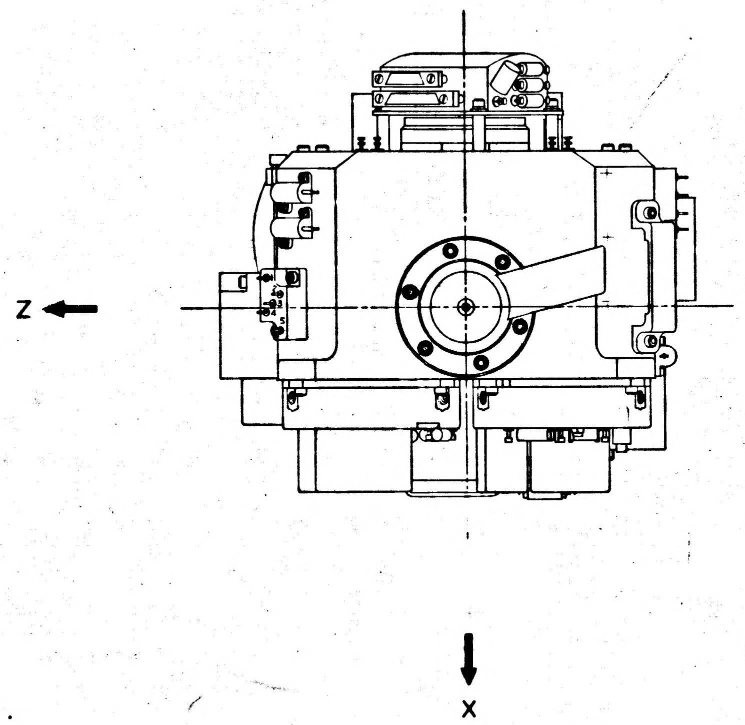
CABLE CLAMP ㉓

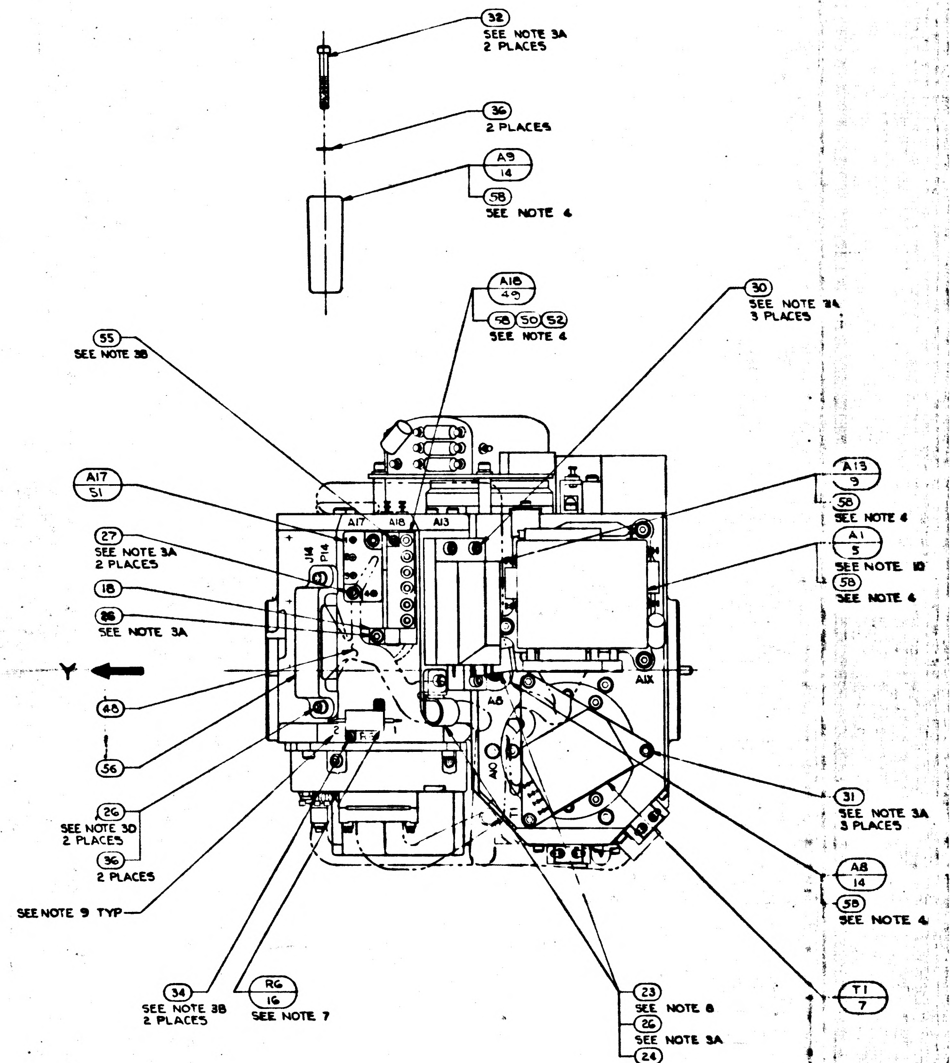
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10.

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-389	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		

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A13
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2 PLACES
R6
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SEE NOTE 7
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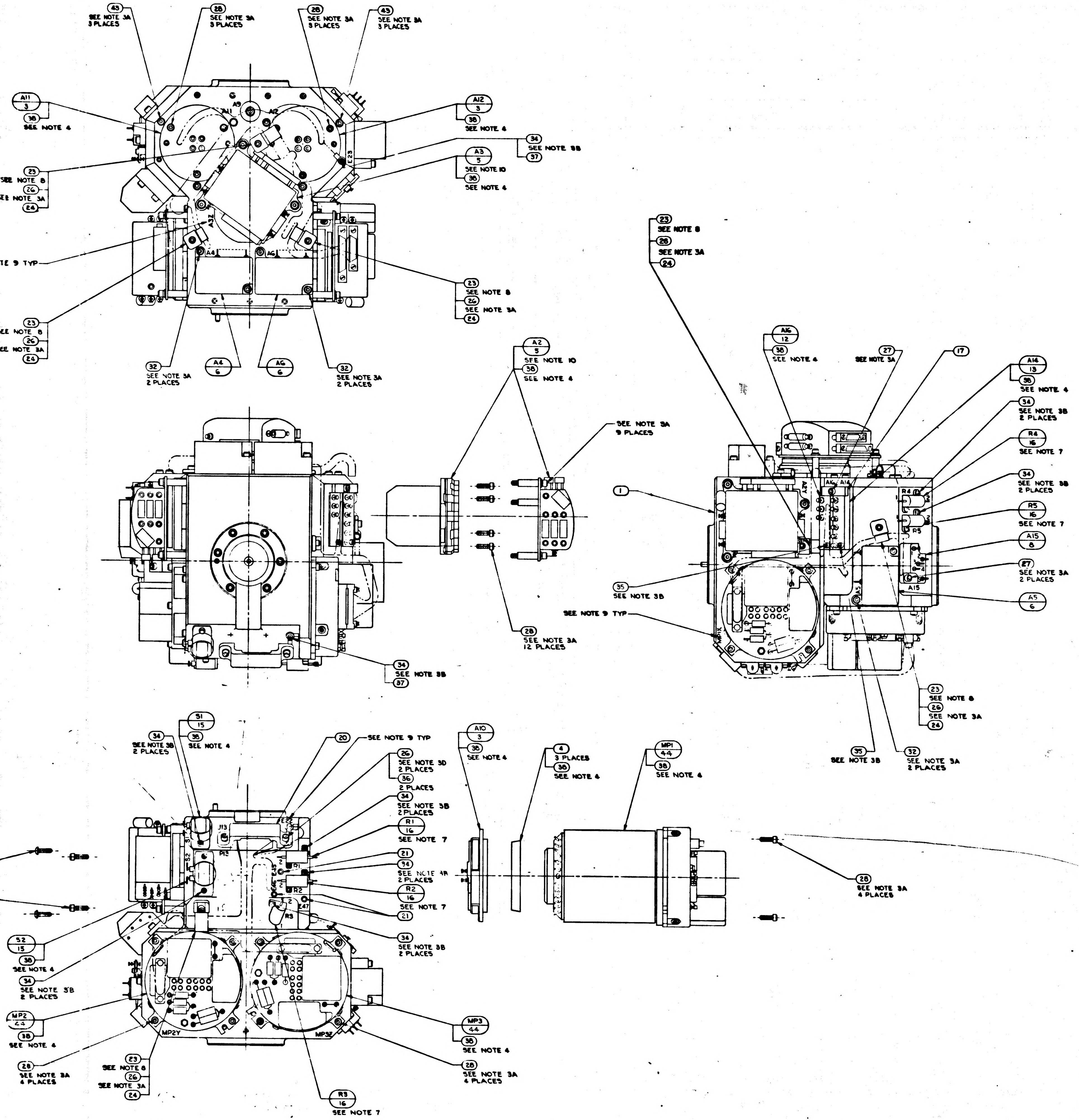
SEE NOTE 8
26
SEE NOTE 3A
24
T1
7

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ± 7%
   A. 5.0 IN-LB
   B. 3.5 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM ㊳ OR (58) TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ②, ③, ⑤, ⑨, ⑪, ⑫, ⑬, ⑭ & ⑮, BETWEEN ITEM ② AND ITEM ③ AND BETWEEN ITEM ③ AND ITEM ④
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II PER APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF AMP NASA DWG. NO. 2007101-011, AC DIFF AMP DWG NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 PER PS 2010603 OR 6007105-011 PER PS 2010607 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSE TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY
12. R6 SHALL BE ITEM (54) FOR -011 CONFIGURATION OF THIS ASSY.

SYM	DESCRIPTION	DATE	APPROVAL	
Z	THIS SHEET ADDED PER TDRR 23699	[illegible]	[illegible]	WK
AA	REVISED PER TDRR 23862	[illegible]	[illegible]	WK
AB	REVISED PER TDRR 24308	[illegible]	[illegible]	WK
AC	REVISED PER TDRR	[illegible]	[illegible]	WK
AD	REVISED PER TDRR	[illegible]	[illegible]	WK
AE	REVISED PER TDRR 25005	15Feb66	[illegible]	WK
AF	REVISED PER TDRR 25089	15Feb66	[illegible]	WK
AG	REVISED PER TDRR 26244	15Feb66	[illegible]	WK
AH	REVISED PER TDRR 26602	1Mar66	[illegible]	WK
AJ	REVISED TDRR 26877	[illegible]	[illegible]	WK
AK	REVISED PER TDRR 27508	[illegible]	[illegible]	WK
AL	REVISED PER TDRR 27508	[illegible]	[illegible]	WK



43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
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A11 3 38 SEE NOTE 4
A12 3 38 SEE NOTE 4
34 SEE NOTE 3B 37
A3 5 SEE NOTE 10 38 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3A 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 5 SEE NOTE 10 38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3A 24
A16 12 38 SEE NOTE 4
27 SEE NOTE 3A
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A14 13 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
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32 SEE NOTE 3A 2 PLACES
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34 SEE NOTE 3B 2 PLACES
20 SEE NOTE 9 TYP
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R2 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
A10 3 38 SEE NOTE 4
4 3 PLACES 38 SEE NOTE 4
MP1 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
S2 15 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
R3 16 SEE NOTE 7
MP3 44 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A11 A12 A9 A10 A12 A4 A6 E23
A7 A16 A14 R4 R5 A15 A5
J13 P13 S1 S2 R1 R2 R3 E47 MP2Y MP3Z

-011 CONFIGURATION

31

MASTER

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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MIT
INSTRUMENTATION LAB
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CHECKED
APPROVAL 170365
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL W Kupfer 24Nov65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

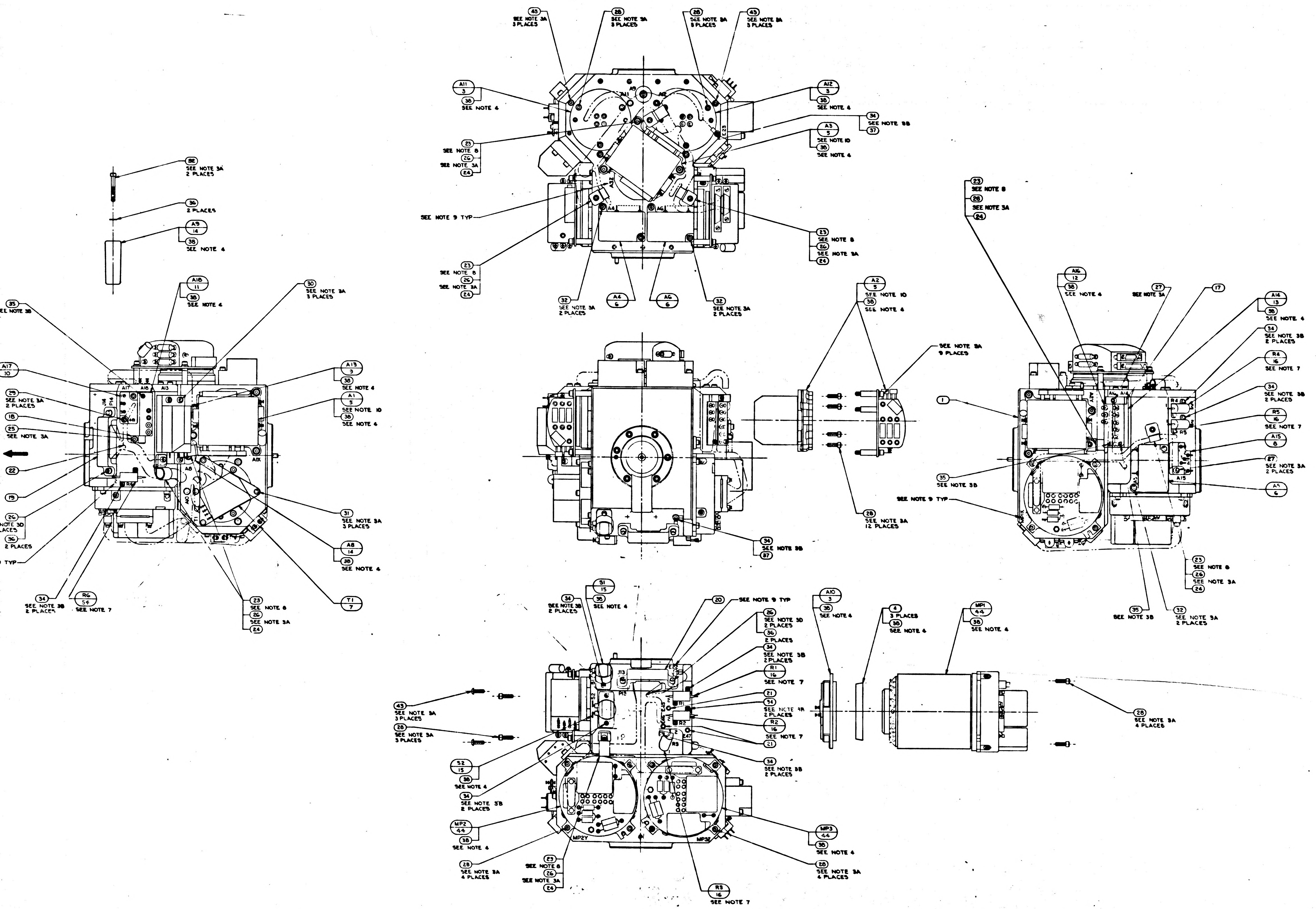
STABLE MEMBER
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 2018605
SCALE 1/1
WT
SHEET 2 OF 2

2018605 AL

2018605 REV AL SHEET 2

E3



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A12 3
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SEE NOTE 9 TYP
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32 SEE NOTE 3A 2 PLACES
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A18 11
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A17 10
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25 SEE NOTE 3A
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26 SEE NOTE 3D 2 PLACES
36 2 PLACES
SEE NOTE 9 TYP
34 SEE NOTE 3B 2 PLACES
R6 54 SEE NOTE 7
A13 3
38 SEE NOTE 4
A1 5
SEE NOTE 10
38 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
23 SEE NOTE 8
26 SEE NOTE 3A
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A17 A18 A13 J14 P14 A1X A8 A10 R6
A2 5
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SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
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A16 12
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27 SEE NOTE 3A
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A14 13
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34 SEE NOTE 3B 2 PLACES
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R3 16 SEE NOTE 7
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28 SEE NOTE 3A 4 PLACES
A10 3
36 SEE NOTE 4
4 3 PLACES
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MP1 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13 P13 S2 R1 R2 R3 E47 MP2Y MP3Y

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

MASTER

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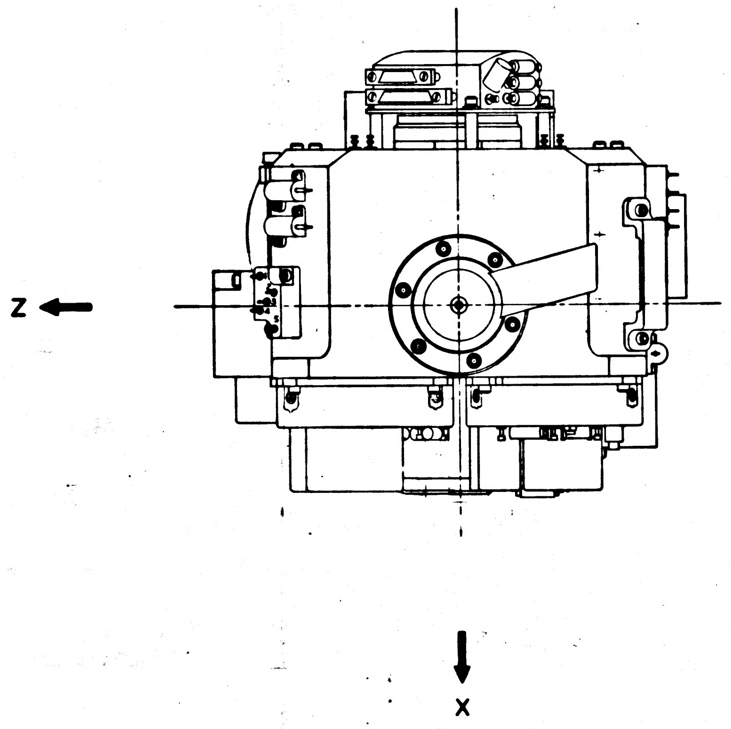

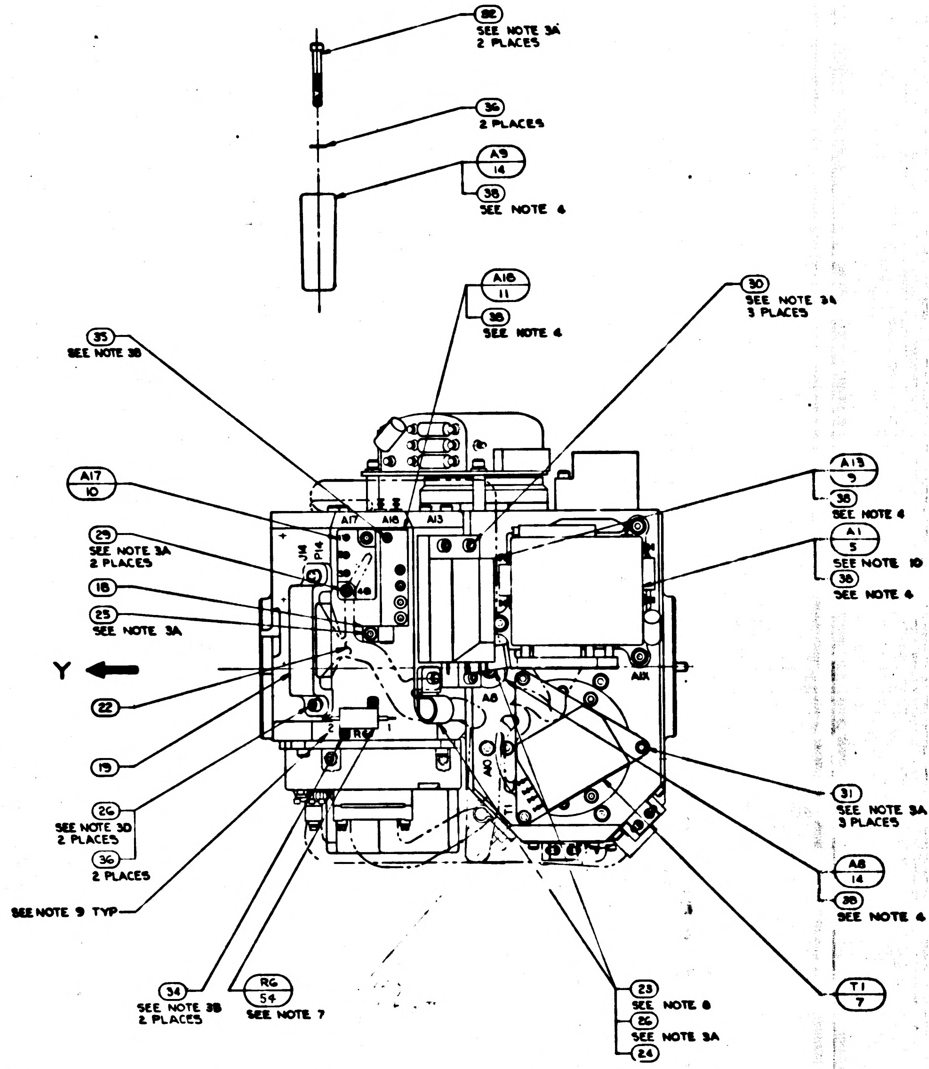
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A1 5 SEE NOTE 10
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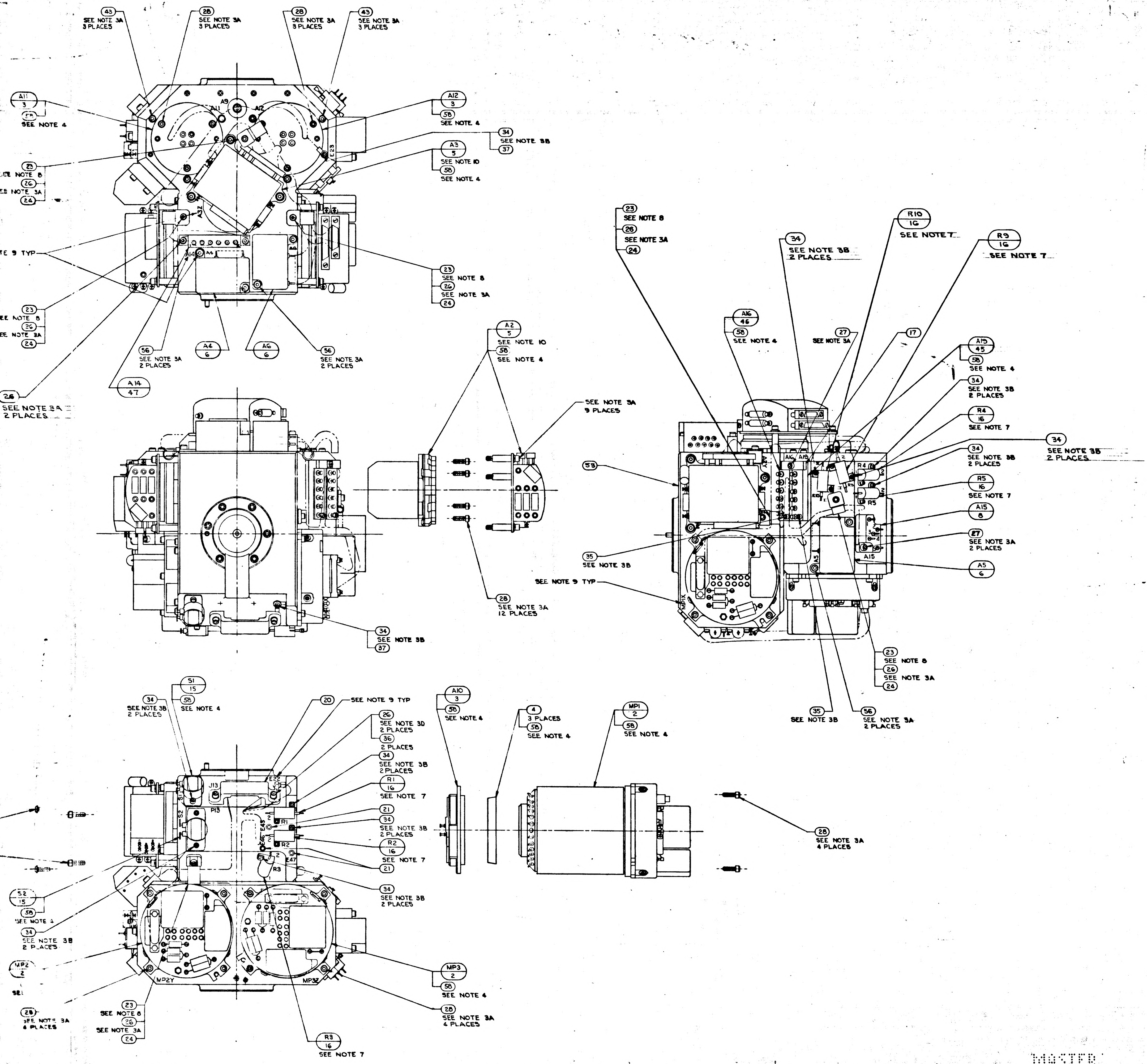
NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

2018605 REV AL SHEET 2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A10
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES

REVISIONS TDRR 17755			
SYM	DESCRIPTION	DATE	APPROVAL
M	REPLACES REV L WITH CHANGES TDRR 17755	23Mar65	WK
N	REVISED PER TDRR 18608	20APR65	WK
P	REVISED PER TDRR 19266	25May65	WK
R	REVISED PER TDRR 19267	25May65	WK
S	REVISED PER TDRR 20088	7/21/65	AJB WK
T	REVISED PER TDRR 21190	7/23/65	AJB WK
U	REVISED PER TDRR 21671	8-31-65	WK
V	REVISED PER TDRR 21686	8-31-65	WK
W	REVISED PER TDRR 22791	28Sep65	WK
Y	REVISED PER TDRR 23046	19Oct65	WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	19Oct65	WK
AA	REVISED PER TDRR 23862	19Nov65	WK
AB	REVISED PER TDRR 24308	14Dec65	WK
AC	REVISED PER TDRR 24898	12 NOV 65	WK
AD	REVISED PER TDRR 24899	12 NOV65	WK
AE	REVISED PER TDRR 25005	16Feb66	WK
AF	REVISED PER TDRR 25089	16Feb66	WK
AG	REVISED PER TDRR 26244	16Feb66	WK
AH	REVISED PER TDRR 26602	24Feb66	WK
AJ	REVISED TDRR 26877	14Mar66	WK
AK	REVISED PER TDRR 27508	31Mar66	WK
AL	REVISED PER TDRR 27508	31Mar66	WK
AM	REVISED PER TDRR 277 5	12Apr66	WK

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
6	—	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	2018837	BRACKET, CONN. 44 PIN	56
1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	1	1010928-295	RESISTOR FIXED	54
1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
—	3	2021500 SEE NOTE 11	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S/M.~~	~~42~~
~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M.~~	~~41~~
~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M.~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	[illegible]	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
~~2~~	~~2~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
13	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
~~1~~	~~1~~	~~2018779~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-031 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
—	1	2018750	HOUSING STABLE MEMBER	1
021	011	LIST OF MATERIALS		

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23Mar65
APPROVAL
NASA APPROVAL W. J. 3-23-65
MIT APPROVAL 23Mar65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 AM

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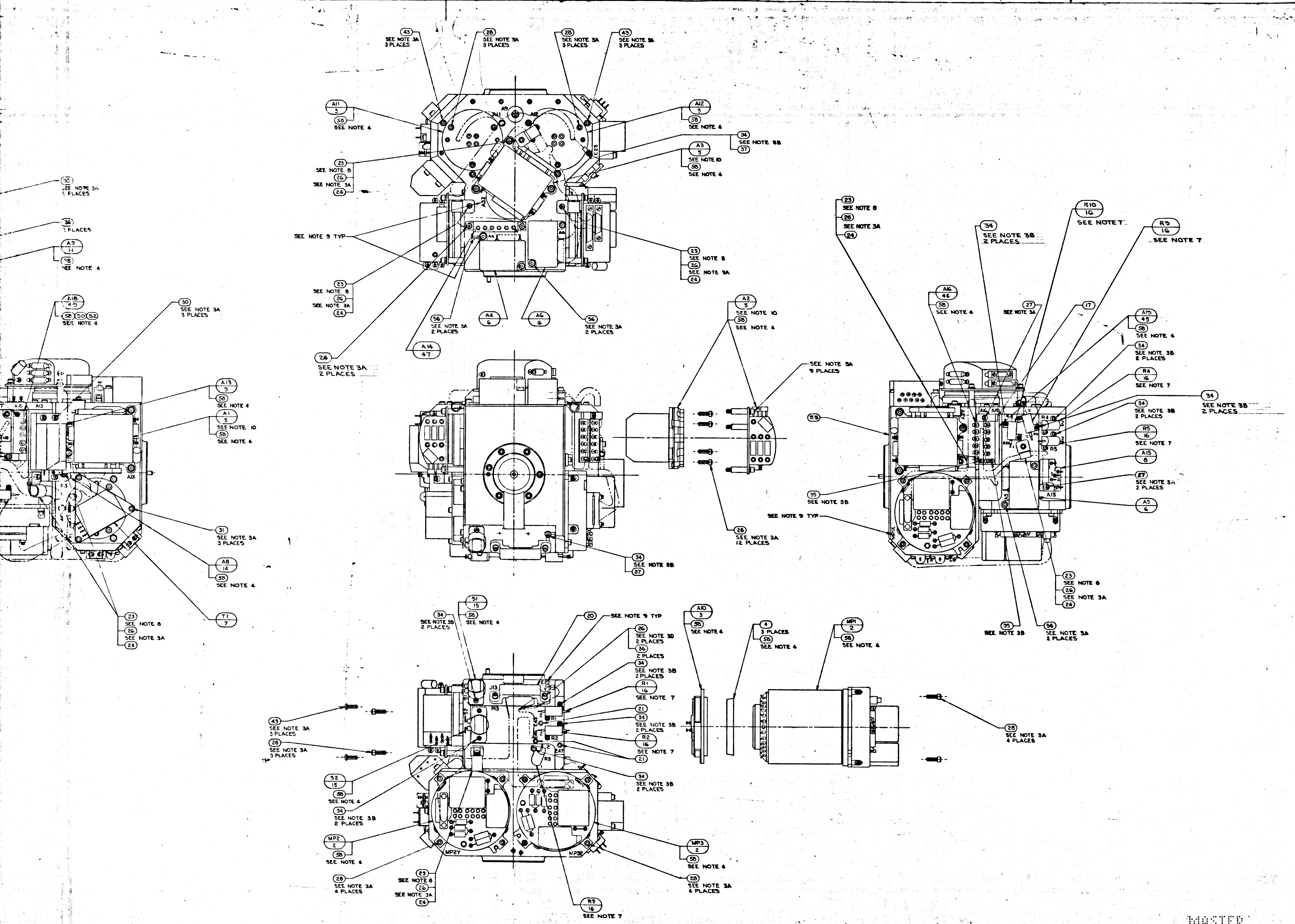
MASTER

2018605 REV AM SHEET 1

F-3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SEE NOTE 3A
4 PLACES

MASTER

6		1001488-9
A/R		MIL-I-8660 SEE N
1		2018838
1		2018837
1		1011625-15
—		1010928-295
1		2018750-011
1		2018830
1		2007172-011
1		2018825-2
1		2018825-011
1		2018828
1		2018826-011
1		2018824-011
1		2018823-011
—	1	2021500 SEE NOT
9		1010891-15
~~1~~		~~2018811~~
~~1~~		~~2018809~~
~~1~~		~~2018808~~
A/R	A	MIL-T-713, TYPE P,
—	R	1006879 SEE N
2		MS15795-802
6		MS15795-703
2		1011625-11
22		1011625-9
~~8~~		~~1001488-13~~
2		1001488-10
3		1001488-7
3		1001488-6
~~2~~		~~1001488-5~~
33		1001488-4
5		1001488-3
13		1001488-2
-		1001488-1
8		1000223
8		1000220-SEE N
—		2018796
3		1001600-1
~~1~~		~~2018780~~
~~1~~		~~2018779~~
1		2018778
1		2018776
8		1010928 - SEE N
2		1001485
2		2018641
—		2018637
—		2018636
—		2018635
—		2007171-011
1		2007064-011
1		2007170-011
1		2007019-011
3		2007060-011
3		2018639
3		2018820
3		2018741
3		2021500-031 SEE
—		2018750
	QTY REQD	PART OR IDENTIFYING N
021		

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.G.S. DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL

	REV	SHEET
2018605	AM	1

E-2

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2	↑	↑
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A1C-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3	↓	↓
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

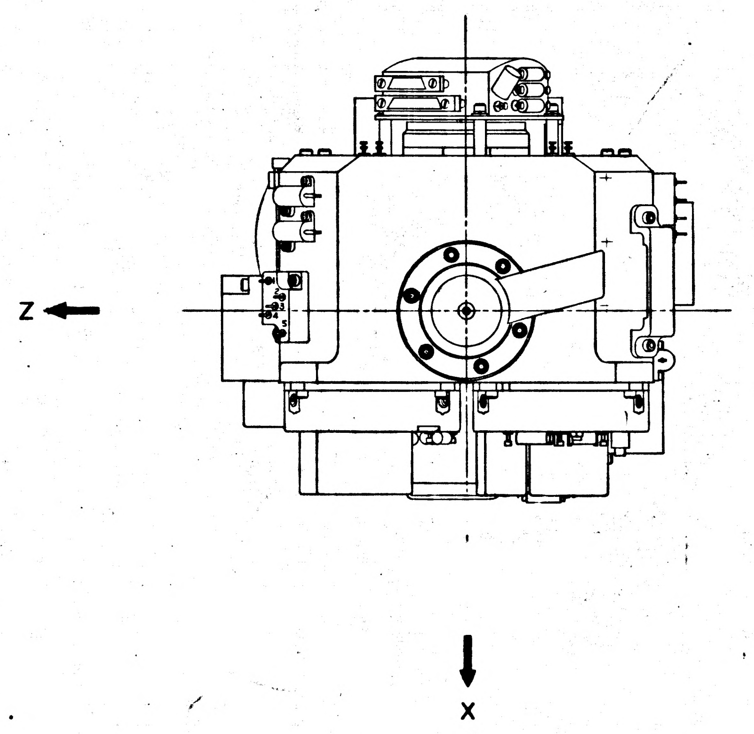
CABLE CLAMP (23)

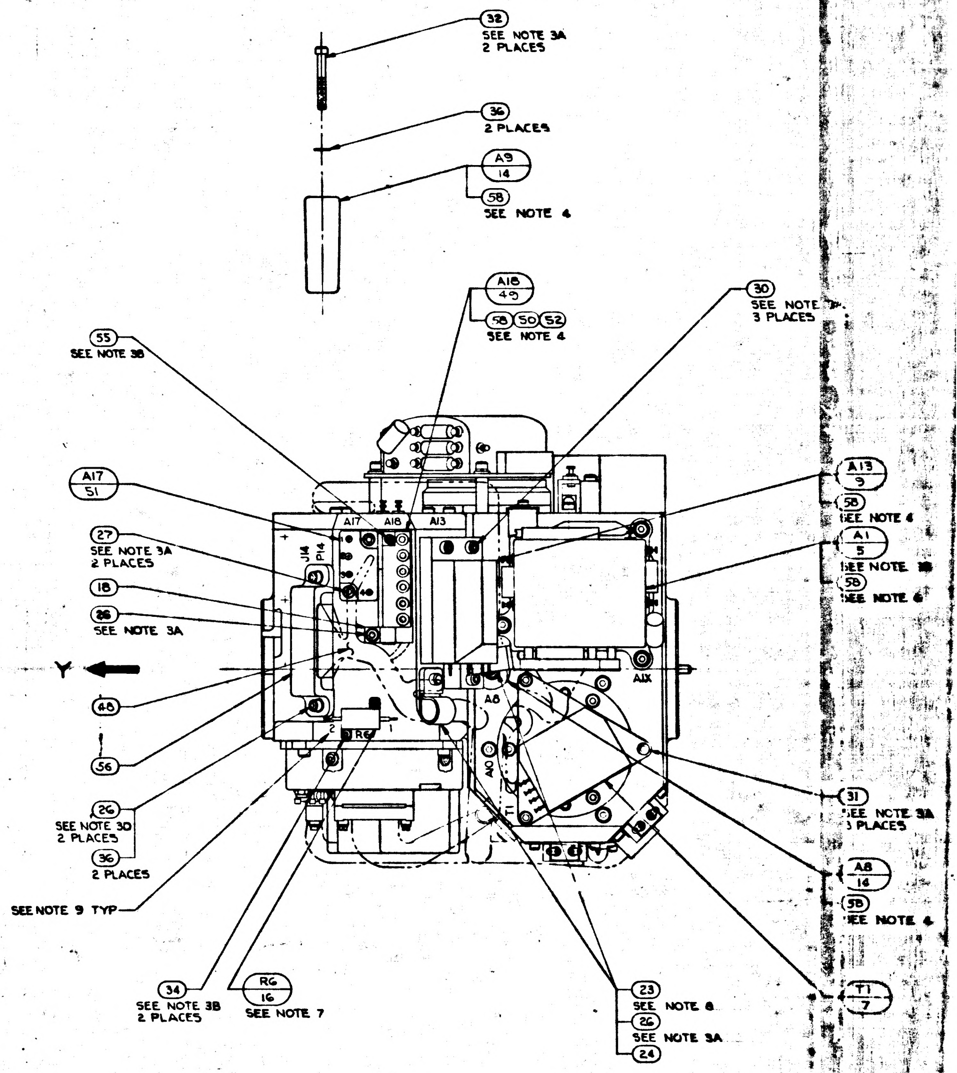
PART NO.	DIA REF
1000220-13	5/32
↑ -4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
↓ -11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10.

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
↑ -114	1.5	↑ -256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	↓ -389	1020
↓ -248	37.4	1010928-400	1430
1010928-251	40.2		



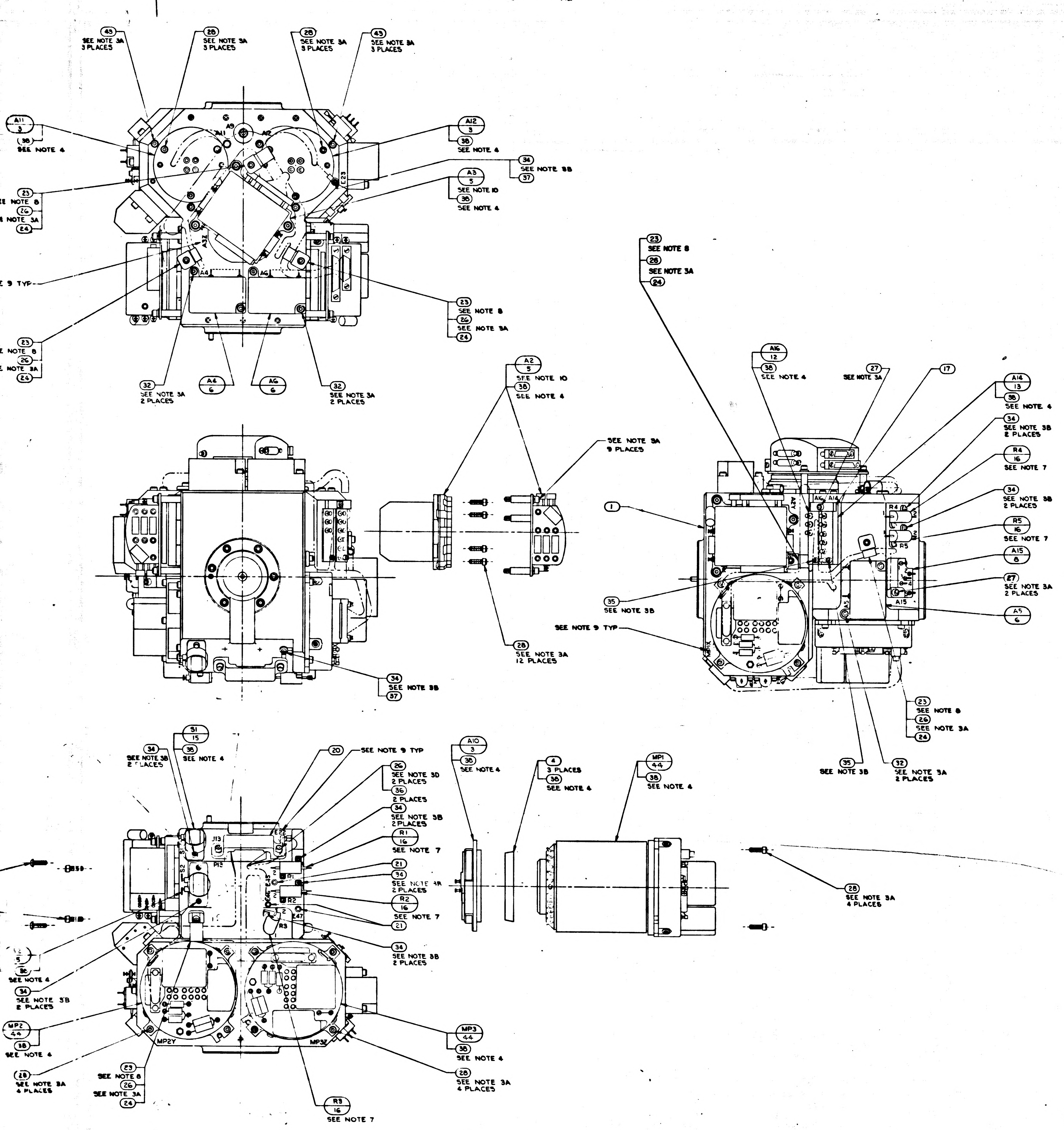

(32) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9 / 14
(58) SEE NOTE 4
A18 / 49
(58)(50)(52) SEE NOTE 4
(30) SEE NOTE 3A 3 PLACES
(55) SEE NOTE 3B
A17 / 51
(27) SEE NOTE 3A 2 PLACES
(18)
(26) SEE NOTE 3A
Y
(48)
(56)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
(34) SEE NOTE 3B 2 PLACES
R6 / 16 SEE NOTE 7
(23) SEE NOTE 8
(26) SEE NOTE 3A
(24)
A13 / 9
(58) SEE NOTE 4
A1 / 5
SEE NOTE 3B
(58) SEE NOTE 6
(31) SEE NOTE 3A 3 PLACES
A8 / 14
(58) SEE NOTE 4
T1 / 7
A17
A18
A13
J14
P14
R6
A8
A10
A1X
T1

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14),(15),(45),(46),(47) AND (50), BETWEEN ITEM (2) AND ITEM (3), BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (49) AND ITEM (50)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II PER APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF. AMP. NASA DWG. NO. 2007101 -011, AC DIFF AMP DWG NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 PER PS 2010603 OR 6007105-011 PER PS 2010607 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSF TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY
12. R6 SHALL BE ITEM (54) FOR -011 CONFIGURATION OF THIS ASSY.

2018605	REV AM	SHEET 1

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
Z	THIS SHEET ADDED PER TDRR 23699	17 Oct 65		WK
AA	REVISED PER TDRR 23862	19 Nov 65		WK
AB	REVISED PER TDRR 24308	14 Dec 65		WK
AC	REVISED PER TDRR	Nov 65		WK
AD	REVISED PER TDRR	30 Nov 65		WK
AE	REVISED PER TDRR 25005	15 Feb 66		WK
AF	REVISED PER TDRR 25089	15 Feb 66		WK
AG	REVISED PER TDRR 26244	15 Feb 66		WK
AH	REVISED PER TDRR 26602	1 Mar 66		WK
AJ	REVISED TDRR 26877	4 Mar 66		WK
AK	REVISED PER TDRR 27505	3 Mar 66		WK
AL	REVISED PER TDRR 27508	3 Mar 66		WK
AM	REVISED TDRR 27775	12 Apr 66		WK



43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B 37
A3 5 SEE NOTE 10
36 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3A
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3A
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A9
A11
A12
A4
A6
E23
A2 5 SEE NOTE 10
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
1
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8
26 SEE NOTE 3A
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3A
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
A16
A14
R4
R5
A15
A5
51 15
34 SEE NOTE 3B 2 PLACES
35 SEE NOTE 4
20 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 4A 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3A
24
R3 16 SEE NOTE 7
MP3 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
E22
E47
R1
R2
R3
MP2Y
MP3Z

-011 CONFIGURATION

MASTER

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN L.S.S. DATE
CHECKED
APPROVAL 19 Oct 65
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL W Kupfer 24 Nov 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

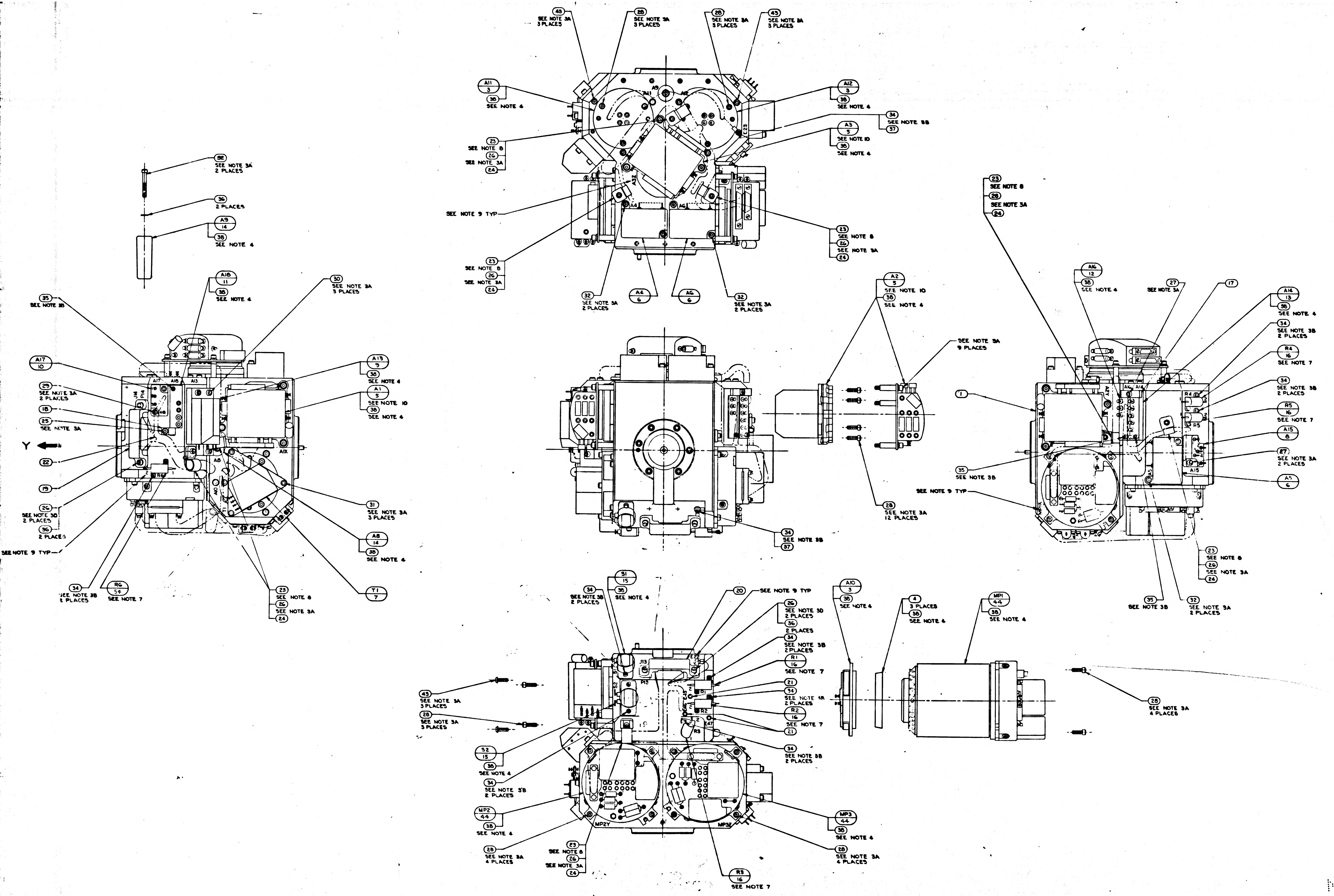
CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 2 OF 2

2018605 AM

201860 REV AM SHEET 2

314

6 5 4 3 2



43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A9
A11
A12
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 5 SEE NOTE 10
38 SEE NOTE 4
E23
23 SEE NOTE 8
26 SEE NOTE 3A
24
A32
SEE NOTE 9 TYP
A4
A6
23 SEE NOTE 8
26 SEE NOTE 3A
24
23 SEE NOTE 8
26 SEE NOTE 3A
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
52 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
38 SEE NOTE 4
A18 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
35 SEE NOTE 3B
A17 10
29 SEE NOTE 3A 2 PLACES
18
25 SEE NOTE 3A
Y
22
19
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
SEE NOTE 9 TYP
A17
A18
A13
J14
P14
A8
A10
T1
RG
A1X
A13 9
38 SEE NOTE 4
A1 5 SEE NOTE 10
38 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
RG 54 SEE NOTE 7
23 SEE NOTE 8
26 SEE NOTE 3A
24
T1 7
34 SEE NOTE 3B
37
A2 5 SEE NOTE 10
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
23 SEE NOTE 8
26 SEE NOTE 3A
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
A16
A14
R4
R5
A15
A5
MP1X
23 SEE NOTE 8
26 SEE NOTE 3A
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
38 SEE NOTE 4
20
SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
E22
S1
S2
R1
R2
R3
E45
E46
E47
MP2Y
MP3Z
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3A
24
R3 16 SEE NOTE 7
MP3 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

MASTER

2018604 | NEXT ASSY | APPLICATION

2018605 REV AM SHEET 2

6 5 4 3 2

F-2

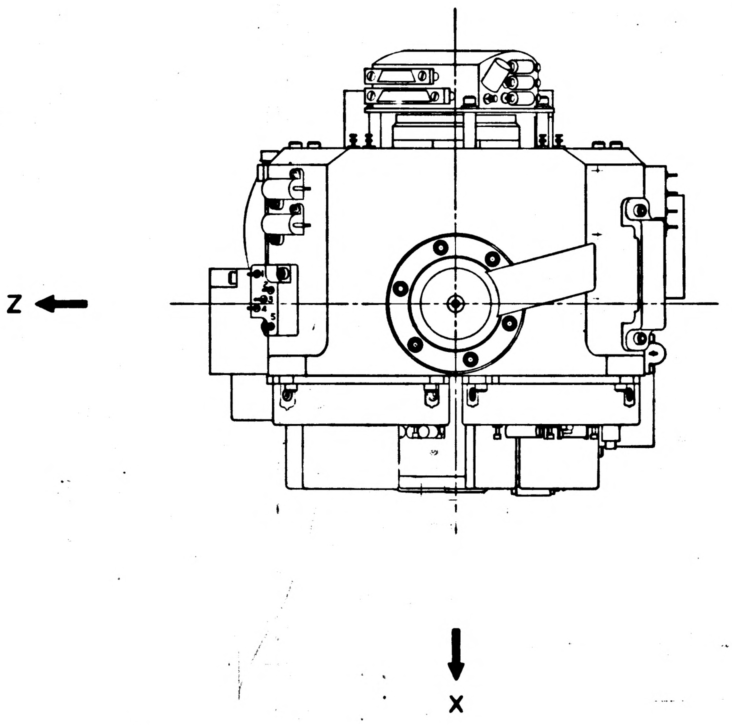
2018602

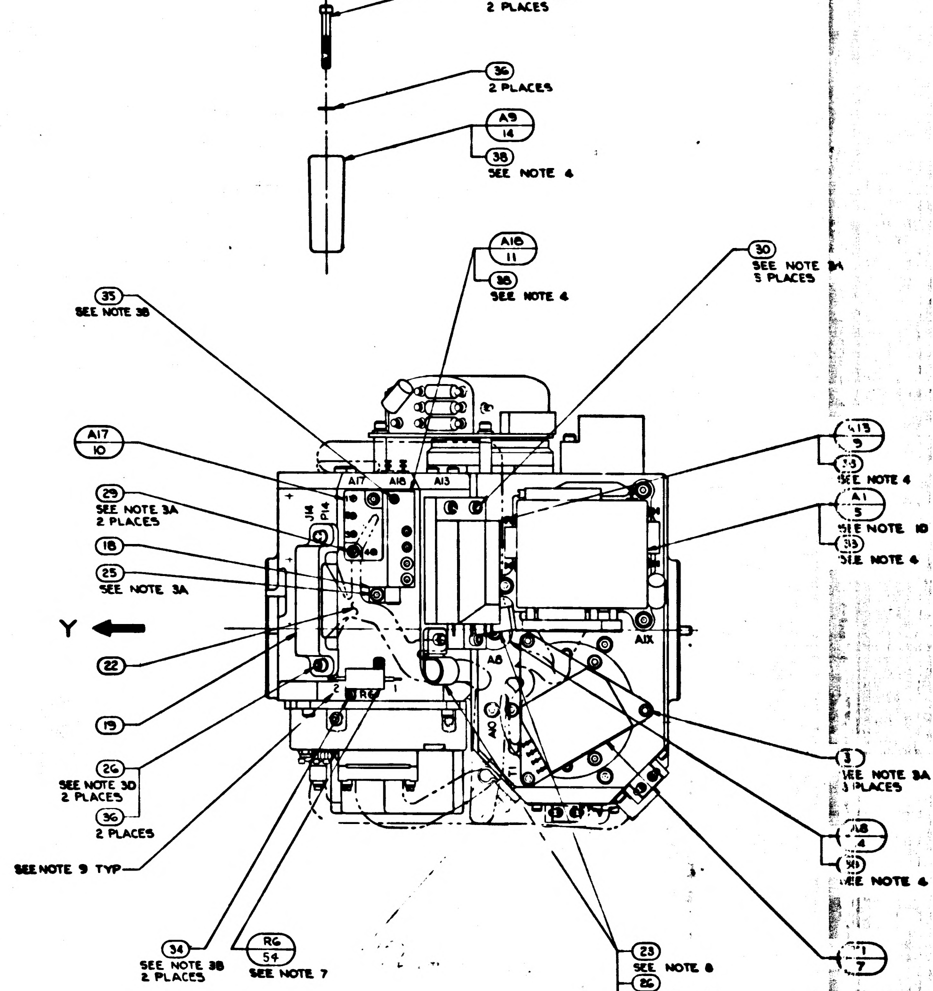
D

C

B

A



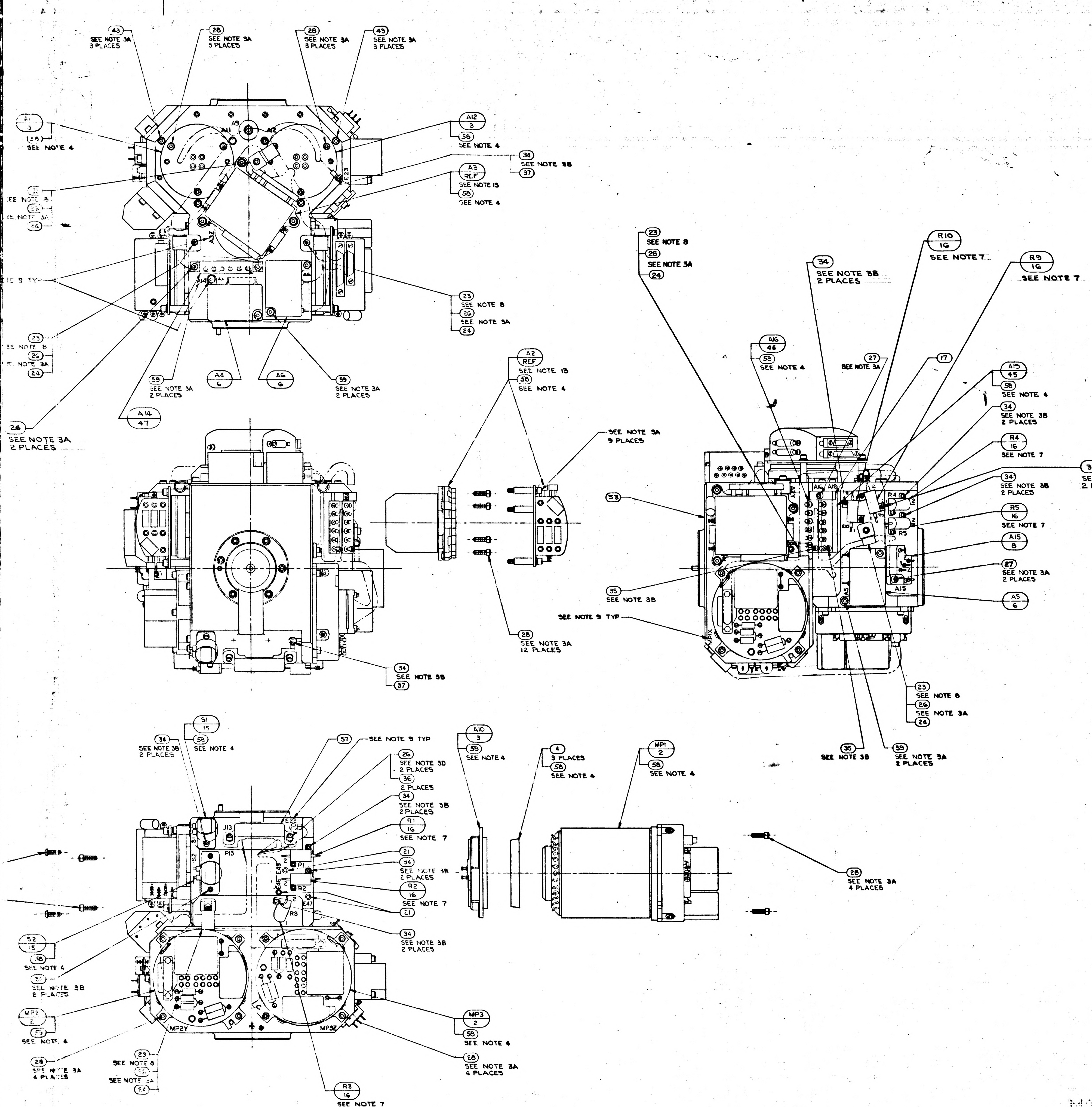

32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
38
SEE NOTE 4
A18
11
38
SEE NOTE 4
30
SEE NOTE 3A
5 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
19
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
54
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3A
24
A13
9
38
SEE NOTE 4
A1
5
SEE NOTE 10
38
SEE NOTE 4
3
SEE NOTE 3A
3 PLACES
A8
4
38
SEE NOTE 4
7
A17
A18
A13
J14
P14
A8
A10
A1X
R6

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

	REV	SHEET
2018605	AM	2

F-1



43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
A12
3
58
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
58
SEE NOTE 4
SEE NOTE 4
23
SEE NOTE 8
26
SEE NOTE 3A
24
59
SEE NOTE 3A
2 PLACES
A4
6
A6
6
59
SEE NOTE 3A
2 PLACES
A14
47
26
SEE NOTE 3A
2 PLACES
A2
REF
SEE NOTE 13
58
SEE NOTE 4
SEE NOTE 3A
9 PLACES
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
53
35
SEE NOTE 3B
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3A
24
34
SEE NOTE 3B
2 PLACES
R10
16
SEE NOTE 7
R9
16
SEE NOTE 7
A16
46
58
SEE NOTE 4
27
SEE NOTE 3A
17
A15
45
58
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A5
6
23
SEE NOTE 8
26
SEE NOTE 3A
24
35
SEE NOTE 3B
59
SEE NOTE 3A
2 PLACES
34
SEE NOTE 3B
2 PLACES
S1
15
58
SEE NOTE 4
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
A10
3
58
SEE NOTE 4
4
3 PLACES
58
SEE NOTE 4
MP1
2
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
MP3
2
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
16
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3A
24
28
SEE NOTE 3A
4 PLACES
MP2
2
58
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
52
3
38
SEE NOTE 4
J13
P13
MP2Y
MP3Z

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17755			
M	REPLACES REV L WITH CHANGES TDRR 17755	23 Mar 65		
N	REVISED PER TDRR 18608	20 APR 65		WK
P	REVISED PER TDRR 19266	25 May 65		WK
R	REVISED PER TDRR 19267	25 May 65		WK
S	REVISED PER TDRR 20088	7/21/65	AJB	WK
T	REVISED PER TDRR 21190	7/23/65	AJB	WK
U	REVISED PER TDRR 21671	8-31-65		WK
V	REVISED PER TDRR 21686	8-31-65		WK
W	REVISED PER TDRR 22791	28 Sep 65		WK
Y	REVISED PER TDRR 23046	19 Oct 65		WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	19 Oct 65		WK
AA	REVISED PER TDRR 23862	19 Nov 65		WK
AB	REVISED PER TDRR 24308	14 Dec 65		WK
AC	REVISED PER TDRR 24898	12 NOV 65		WK
AD	REVISED PER TDRR 24899	12 NOV 65		WK
AE	REVISED PER TDRR 25005	16 Feb 66		WK
AF	REVISED PER TDRR 25089	16 Feb 66		WK
AG	REVISED PER TDRR 26244	16 Feb 66		WK
AH	REVISED PER TDRR 26602	24 Feb 66		WK
AJ	REVISED TDRR 26877	19 Mar 66		WK
AK	REVISED PER TDRR 27505	31 Mar 66		WK
AL	REVISED PER TDRR 27508	31 Mar 66		WK
AM	REVISED PER TDRR 27775	12 Apr 66		WK
AN	REVISED PER TDRR 28127	22 Apr 66		WK
AP	REVISED PER TDRR 28285	26 Apr 66		WK

021	011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
6	—	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	2018837	BRACKET, CONN. 44 PIN	56
1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	1	1010928-295	RESISTOR FIXED	54
1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
—	31	2021500 SEE NOTE 11	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S/M.~~	~~42~~
~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M.~~	~~41~~
~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M.~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-[illegible]~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
~~2~~	~~2~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
-	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
~~1~~	~~1~~	~~2018779~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
~~3~~	~~3~~	~~2018639~~	~~PIP & SUSPENSION CAP. MODULE~~	~~5~~
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-031 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
—	1	2018750	HOUSING STABLE MEMBER	1

LIST OF MATERIALS

2018604	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	M I T INSTRUMENTATION LAB Cambridge, Mass	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL 23 Mar 65 APPROVAL	STABLE MEMBER ASSEMBLY
APPLICATION		HEAT TREATMENT FINAL FINISH	NASA APPROVAL W. J. 3-23-65 MIT APPROVAL 23 Mar 65	CODE IDENT NO. 80230 · SIZE J · NASA DRAWING NO. 2018605 SCALE 1/1 · WT · SHEET 1 OF 2

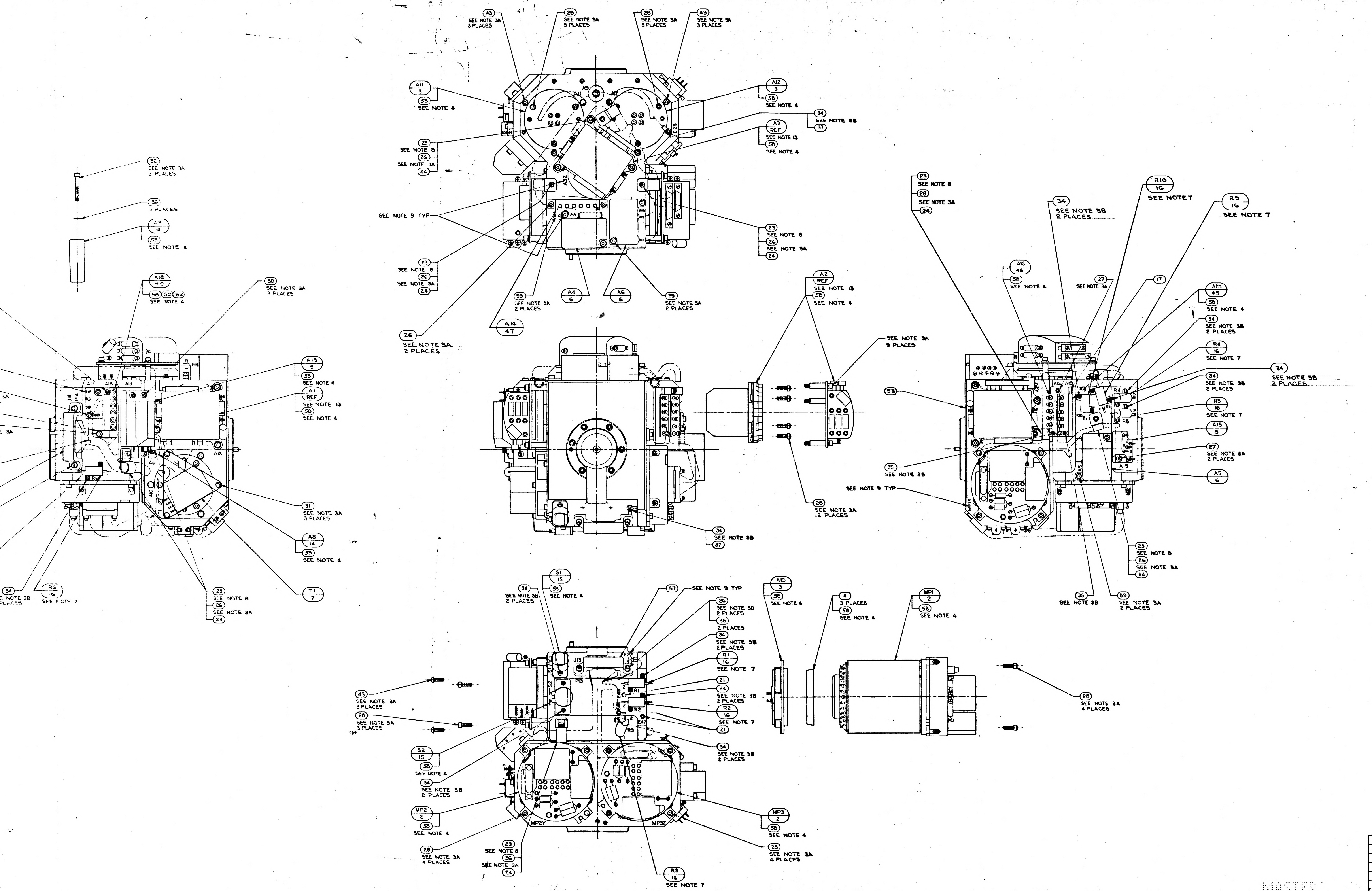
2018605 | REV AP | SHEET J

2018605 AP

3H

MASTER

E-3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28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3 58 SEE NOTE 4
A12 3 58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13 58 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3A 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
23 SEE NOTE 8 26 SEE NOTE 3A 24
59 SEE NOTE 3A 2 PLACES
A4 6
A6 6
59 SEE NOTE 3A 2 PLACES
A14 47
26 SEE NOTE 3A 2 PLACES
A9
A11
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E23
A12
32 SEE NOTE 3A 2 PLACES
36 2 PLACES
A3 14 58 SEE NOTE 4
A18 40 58 50 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 3 58 SEE NOTE 4
A1 REF SEE NOTE 13 58 SEE NOTE 4
A17 A18 A13
J14 P14
A6 A10 T1 A1X R6
31 SEE NOTE 3A 3 PLACES
A8 14 58 SEE NOTE 4
T1 7
34 SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
23 SEE NOTE 8 26 SEE NOTE 3A 24
34 SEE NOTE 3B 37
A2 REF SEE NOTE 13 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
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A15 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
59
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
35 SEE NOTE 3B
59 SEE NOTE 3A 2 PLACES
A16 A14 A15 A5 R4 R5 MP1X
S1 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 2 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
R3 16 SEE NOTE 7
MP3 2 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13 P13 S1 S2 R1 R2 R3 E23 MP2Y MP3Z
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 2 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

MASTER

2018604	DL 2018601	
NEXT ASSY	USED ON	
APPLICATION		

UNLESS OTHER
DIMENSIONS A
TOLERANCES O
FRACTIONS

DO NOT SCALE
MATERIAL

HEAT TREATM

FINAL FINISH

2018605 REV AP SHEET 1

F12

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10 2	↑	↑
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A1C-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3	↓	↓
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

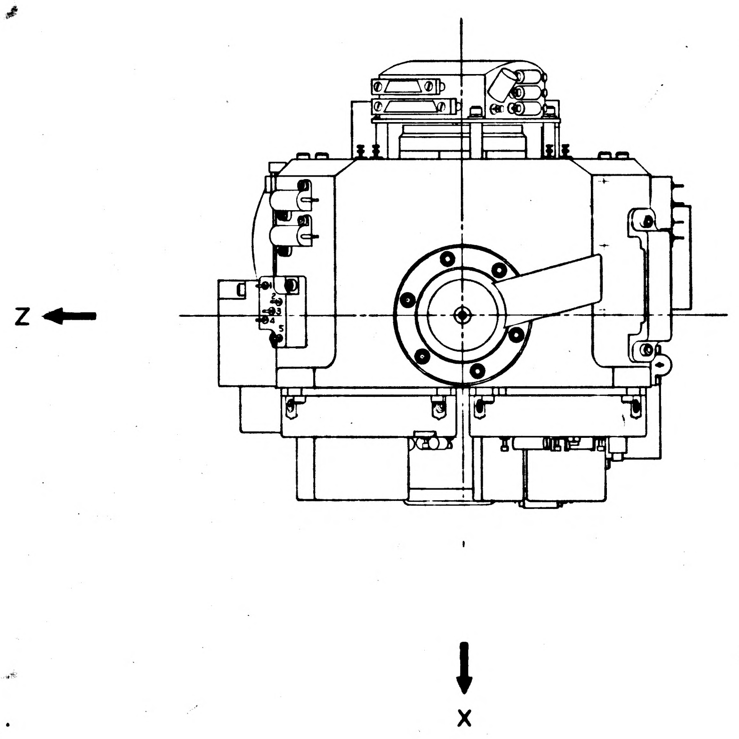
CABLE CLAMP ㉓

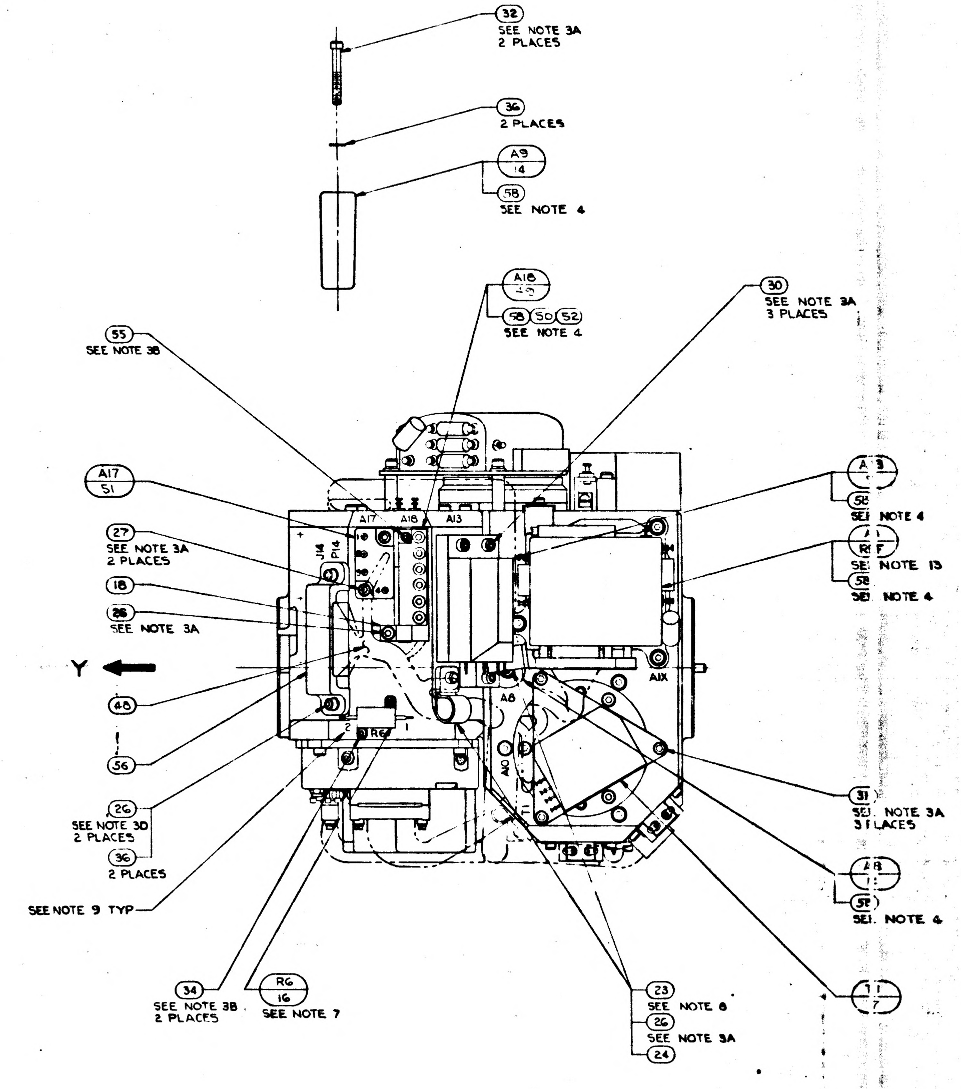
PART NO.	DIA REF
1000220-13	5/32
↑ -4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
↓ -11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
↑ -114	1.5	↑ -256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	↓ -389	1020
↓ -248	37.4	1010928 -400	1430
1010928 -251	40.2		

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SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
58
SEE NOTE 4
A18
58 50 52
SEE NOTE 4
30
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3 PLACES
55
SEE NOTE 3B
A17
51
27
SEE NOTE 3A
2 PLACES
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26
SEE NOTE 3A
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56
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SEE NOTE 3D
2 PLACES
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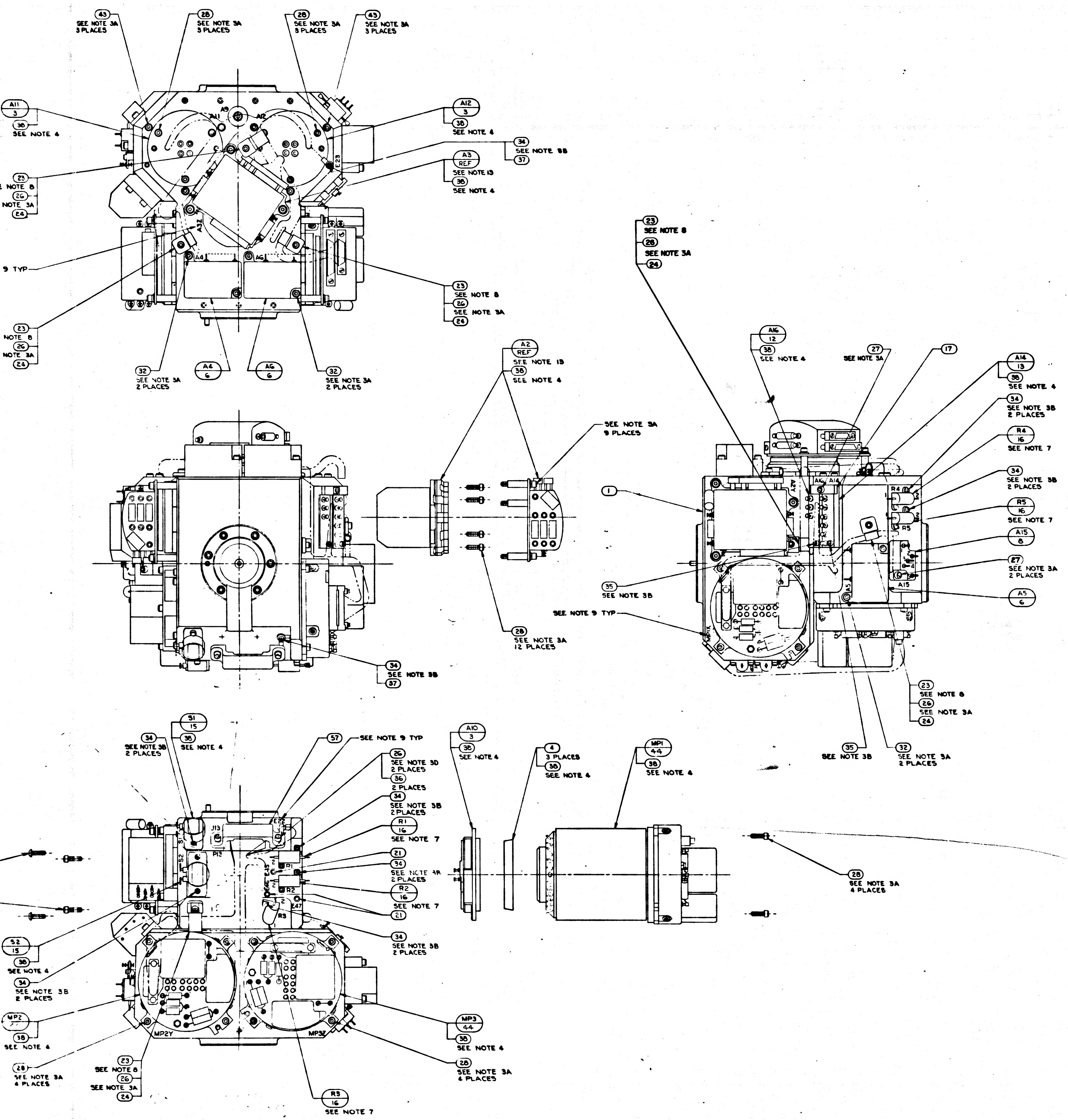
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3A
24
A17
A18
A13
J14
P14
R6
A8
A10
A1X
58
NOTE 4
REF
NOTE 13
58
NOTE 4
31
NOTE 3A
3 PLACES
58
NOTE 4
7

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 5.0 IN-LB
   B. 3.5 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM ㊳ OR (58) TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ②,③,⑤,⑨,⑪,⑫,⑬,⑭,⑮,㊺,㊻,㊼ AND ㊿, BETWEEN ITEM ② AND ITEM ③, BETWEEN ITEM ③ AND ITEM ④ AND BETWEEN ITEM ㊾ AND ITEM ㊿
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II PER APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $^{.10}_{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN-011 CONFIGURATION OF THIS ASSY
12. R6 SHALL BE ITEM (54) FOR-011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.

SYM	REVISIONS DESCRIPTION	DATE	APPROVAL	
Z	THIS SHEET ADDED PER TDRR 23699	19 Oct 65		WK
AA	REVISED PER TDRR 23862	19 Nov 65		WK
AB	REVISED PER TDRR 24308	19 Dec 65		WK
AC	REVISED PER TDRR	30 Nov 65		WK
AD	REVISED PER TDRR	30 Nov 65		WK
AE	REVISED PER TDRR 25005	15 Feb 66		WK
AF	REVISED PER TDRR 25089	15 Feb 66		WK
AG	REVISED PER TDRR 26244	15 Feb 66		WK
AH	REVISED PER TDRR 26602	1 Mar 66		WK
AJ	REVISED TDRR 26877	Mar 66		WK
AK	REVISED PER TDRR 27505	3 Mar 66		WK
AL	REVISED PER TDRR 27508	3 Mar 66		WK
AM	REVISED TDRR 27775	12 Apr 66		WK
AN	REVISED TDRR 28127	22 Apr 66		WK
AP	REVISED TDRR 28285	26 Apr 66		WK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A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 NOTE 8
26 NOTE 3A
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9 TYP
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E23
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A6
23 SEE NOTE 8
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23 NOTE 8
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32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
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23 SEE NOTE 8
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A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
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A14 13
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34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
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MP1X
23 SEE NOTE 8
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35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
S1 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
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E47
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R3
MP2Y
MP3Z
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34 SEE NOTE 3B 2 PLACES
MP2
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3A
24
MP3 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7

-011 CONFIGURATION

MASTER

3/4

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN L.S.S. DATE
CHECKED
APPROVAL 19 Oct 65
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL 24 Nov 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

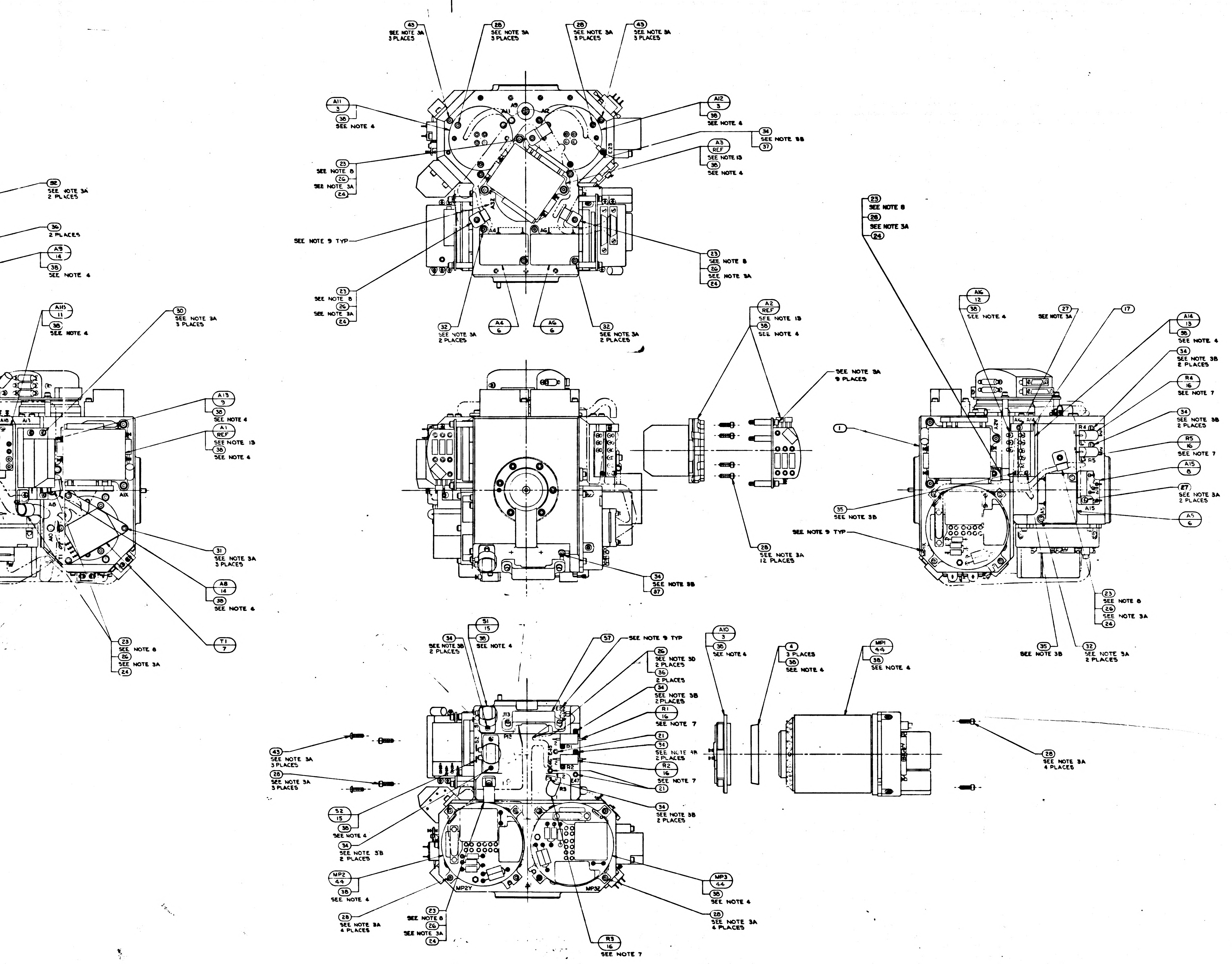
CODE IDENT NO 80230 SIZE J NASA DRAWING NO 2018605
SCALE 1/1 WT SHEET 2 OF 2

2018605 REV AP SHEET 2

2018605 AP

2018605

E3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SEE NOTE 3A
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SEE NOTE 3A
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SEE NOTE 3A
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A11
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SEE NOTE 8
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SEE NOTE 3B
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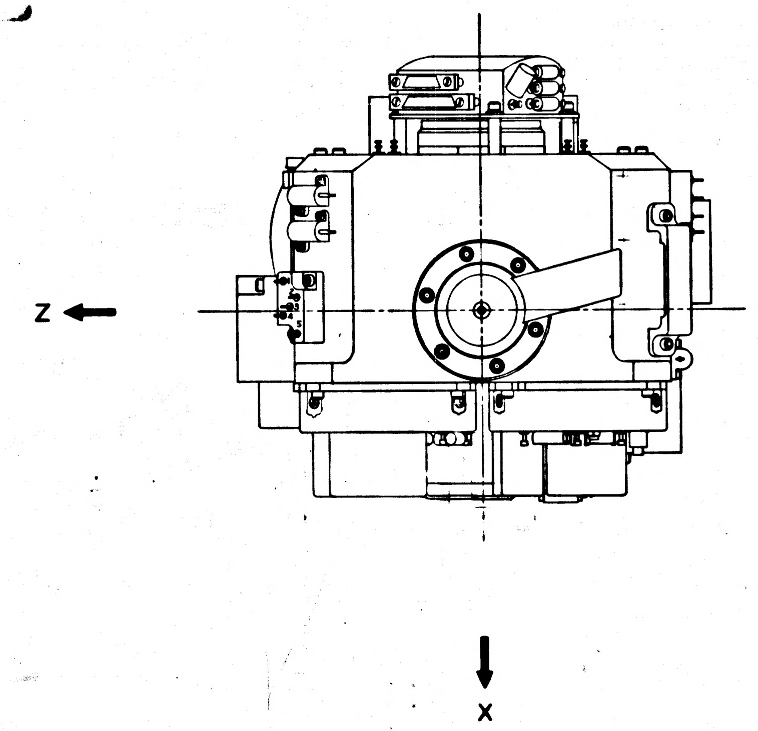
-011 CONFIGU

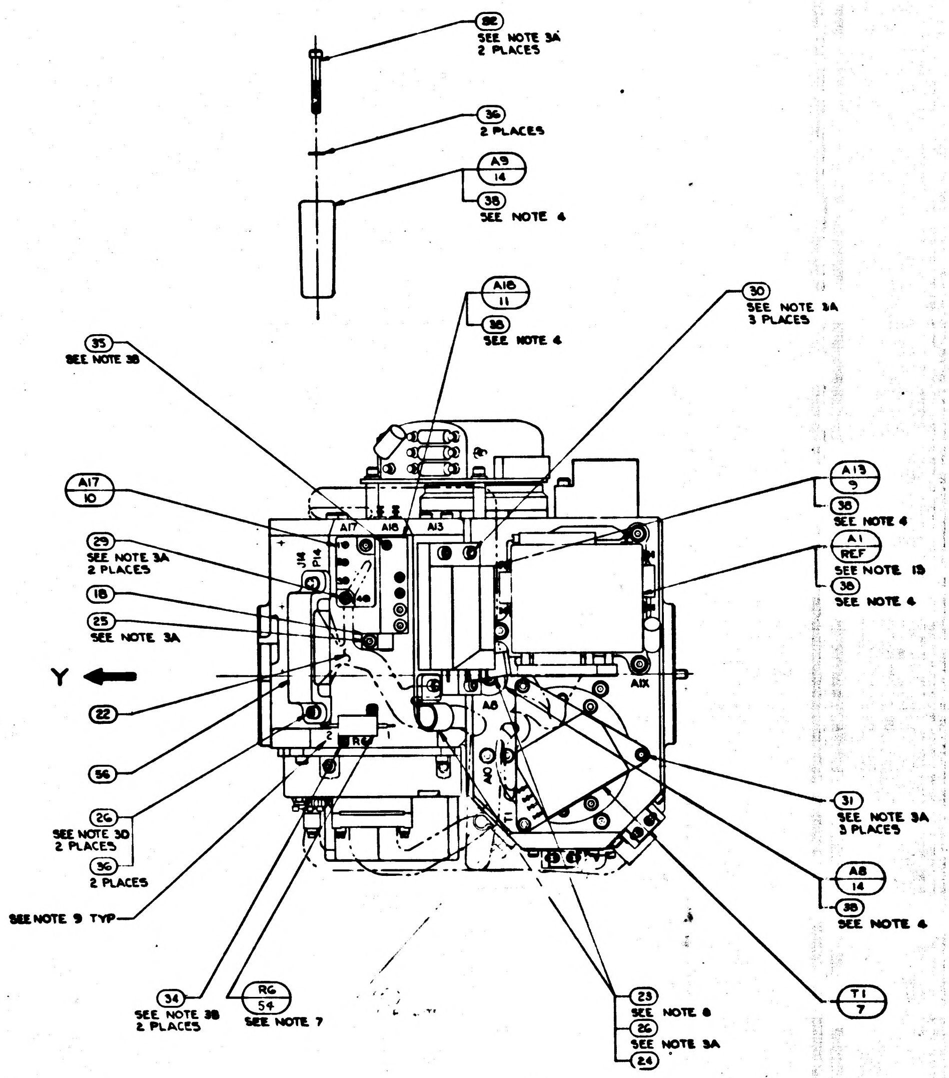
MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION CAMBRIDGE MASS
		MATERIAL	DRAWN CHECKED APPROVAL APPROVAL
2018604	DL2018601	HEAT TREATMENT	NASA APPROVAL
NEXT ASSY	USED ON	FINAL FINISH	
APPLICATION			

2018605	REV AP	SHEET 2

E-2

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3 PLACES
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A17
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SEE NOTE 3A
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SEE NOTE 3A
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SEE NOTE 3D
2 PLACES
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2 PLACES
SEE NOTE 9 TYP
A17
A18
A13
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P14
A1X
A8
A10
RG
A13
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A1
REF
SEE NOTE 13
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SEE NOTE 4
31
SEE NOTE 3A
3 PLACES
A8
14
38
SEE NOTE 4
T1
7
34
SEE NOTE 3B
2 PLACES
RG
54
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3A
24

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

	REV	SHEET
2018605	AP	2

9
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D
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B
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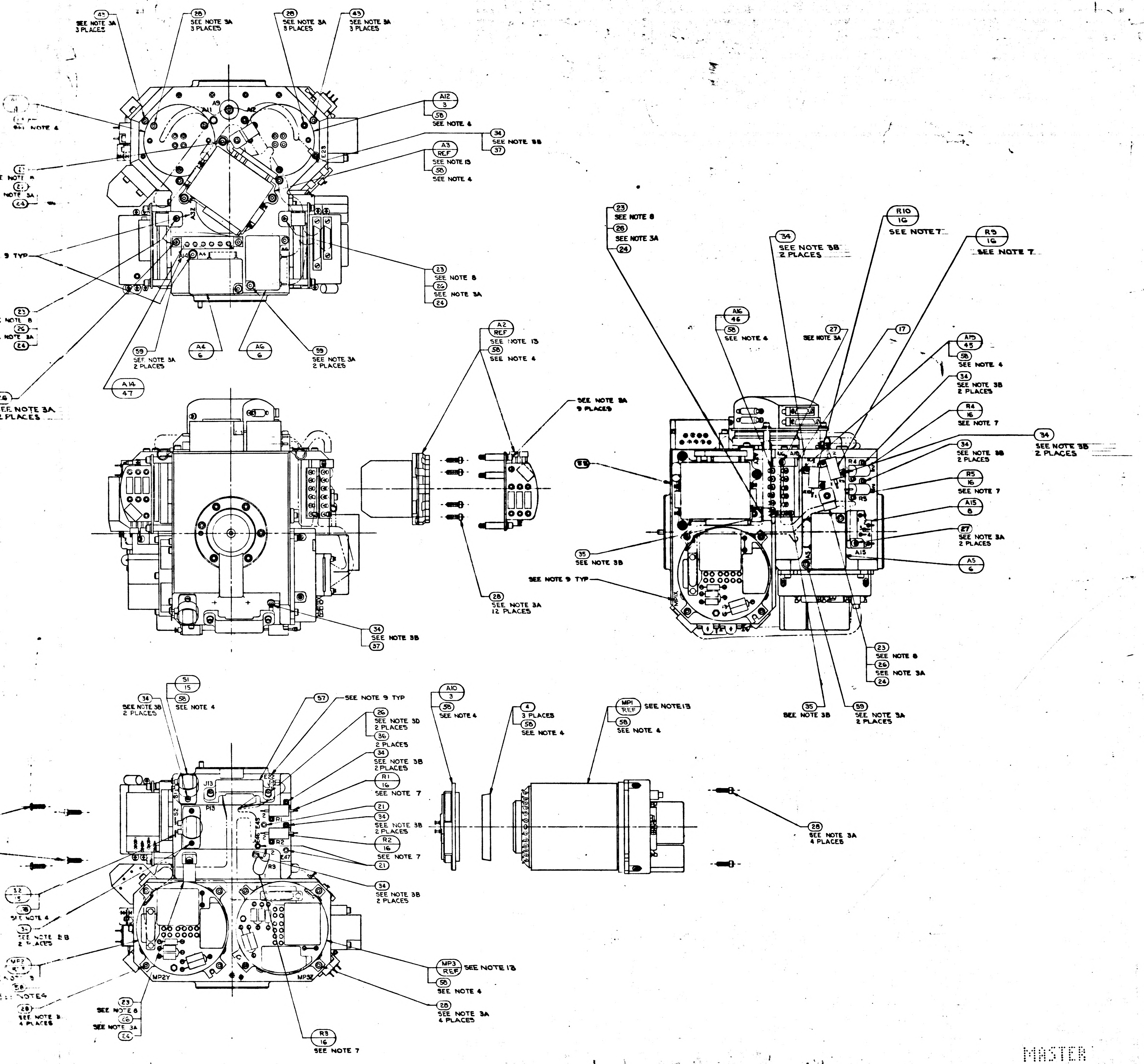

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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A12 3 58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13 58 SEE NOTE 4
9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
59 SEE NOTE 3A 2 PLACES
A4 6
A6 6
59 SEE NOTE 3A 2 PLACES
A14 47
SEE NOTE 3A 2 PLACES
A2 REF SEE NOTE 13 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
35 SEE NOTE 3B
SEE NOTE 9 TYP
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3A 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
23 SEE NOTE 8 26 SEE NOTE 3A 24
35 SEE NOTE 3B
59 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15 58 SEE NOTE 4
57
SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
R3 16 SEE NOTE 7
J13
P13
MP2Y
MP3Z

REVISIONS TDRR 17755				
SYM	DESCRIPTION	DATE	APPROVAL	
M	REPLACES REV L WITH CHANGES TDRR 17755	23 Mar 65		WK
N	REVISED PER TDRR 18608	20 APR 65		WK
P	REVISED PER TDRR 19266	25 May 65		WK
R	REVISED PER TDRR 19267	25 May 65		WK
S	REVISED PER TDRR 20088	7/21/65	AJB	WK
T	REVISED PER TDRR 21190	7/23/65	AJB	WK
U	REVISED PER TDRR 21671	8-31-65		WK
V	REVISED PER TDRR 21686	8-31-65		WK
W	REVISED PER TDRR 22791	28 Sep 65		WK
Y	REVISED PER TDRR 23046	19 Oct 65		WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	19 Oct 65		WK
AA	REVISED PER TDRR 23862			WK
AB	REVISED PER TDRR 24308			WK
AC	REVISED PER TDRR 24898	12 NOV 65		WK
AD	REVISED PER TDRR 24899	12 NOV 65		WK
AE	REVISED PER TDRR 25005			WK
AF	REVISED PER TDRR 25089			WK
AG	REVISED PER TDRR 26244	16 Feb 66		WK
AH	REVISED PER TDRR 26602	24 Feb 66		WK
AJ	REVISED TDRR 26877	19 Mar 66		WK
AK	REVISED PER TDRR 27505	31 Mar 66		WK
AL	REVISED PER TDRR 27508	31 Mar 66		WK
AM	REVISED PER TDRR 27775	12 Apr 66		WK
AN	REVISED PER TDRR 28127	22 Apr 66		WK
AP	REVISED PER TDRR 28285	26 Apr 66		WK
AR	REVISED PER TDRR 29026	23 May 66		WCW

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
6	—	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	2018837	BRACKET, CONN. 44 PIN	56
1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	1	1010928-295	RESISTOR FIXED	54
1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2015825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
~~—~~	~~3~~	~~2021500 SEE NOTE 11~~	~~IRIG PREALIGNED ASSY~~	~~44~~
9	9	1010891-15	SCREW, BUT. HD. SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S/M.~~	~~42~~
~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M.~~	~~41~~
~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M.~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-12~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
~~2~~	~~2~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
—	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
~~1~~	~~1~~	~~2018779~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
~~3~~	~~3~~	~~2018639~~	~~PIP & SUSPENSION CAP, MODULE~~	~~5~~
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
~~3~~	~~—~~	~~2021500-051 SEE NOTE 11~~	~~IRIG PREALIGNED ASS'Y.~~	~~2~~
—	1	2018750	HOUSING STABLE MEMBER	1
021	011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018604	DL 2018601
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL W. J. 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

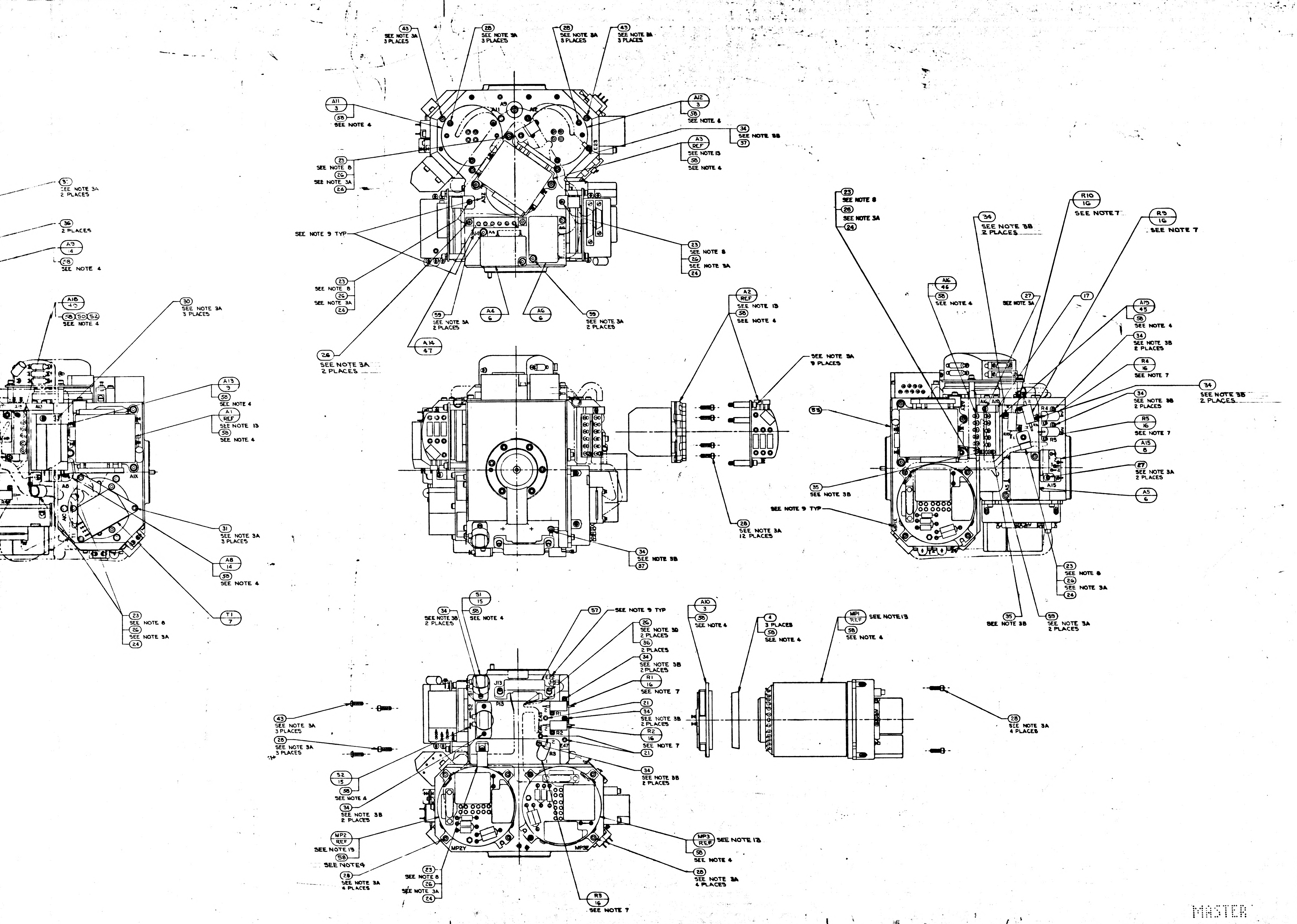
2018605 AR

3H

2018605	REV AR	SHEET 1

MASTER

E3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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3 58 SEE NOTE 4
A12 3 58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13 58 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3A 24
A9
A11
A12
E23
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
23 SEE NOTE 8 26 SEE NOTE 3A 24
59 SEE NOTE 3A 2 PLACES
A4 6
A6 6
59 SEE NOTE 3A 2 PLACES
A14 47
26 SEE NOTE 3A 2 PLACES
57 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 4 58 SEE NOTE 4
A18 45 58 50 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9 58 SEE NOTE 4
A1 REF SEE NOTE 13 58 SEE NOTE 4
A1X
A8
31 SEE NOTE 3A 3 PLACES
A8 14 58 SEE NOTE 4
T1 7
23 SEE NOTE 8 26 SEE NOTE 3A 24
A2 REF SEE NOTE 13 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
59
35 SEE NOTE 3B
SEE NOTE 9 TYP
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3A 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
R4
R5
A15
A5
23 SEE NOTE 8 26 SEE NOTE 3A 24
35 SEE NOTE 3B
59 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
51 15 58 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
R1
R2
R3
E47
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
52 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP2Y
MP3Z

6	–	1001488-9
A/R	—	MIL-I-8660 SE
1	1	2018838
1	1	2018837
1	—	1011625-15
—	1	1010928-295
1	—	2018750-0
1	—	2018830
1	—	2007172-01
1	—	2018829-2
1	—	2018825-9
1	—	2018828
1	—	2018826-0
1	—	2018824-01
1	—	2018823-01
~~—~~	~~3~~	~~2021600 SEE~~
9	9	1010891-15
~~1~~	~~1~~	~~2018811~~
~~1~~	~~1~~	~~2018809~~
~~1~~	~~1~~	~~2018808~~
A/R	A/R	MIL-T-713, TYP
—	A/R	1006879 SE
2	2	MS15795-802
6	6	MS15795-70
2	3	1011625-11
22	18	1011625-9
[illegible]	[illegible]	[illegible]
2	8	1001488-10
3	3	1001488-7
3	3	1001488-6
~~2~~	~~2~~	~~1001488-5~~
33	33	1001458-4
5	3	1001488-3
15	12	1001488-2
—	1	1001488-1
8	8	1000223
8	8	1000220-SE
—	1	2018796
3	3	1001600-1
~~1~~	~~1~~	~~2018780~~
~~1~~	~~1~~	~~2018779~~
1	1	2018778
1	1	2018776
5	5	1010928 - SE
2	2	1001485
2	2	2018641
—	1	2018637
—	1	2018636
—	1	2018635
—	1	2007171-011
1	1	2007064-01
1	1	2007170-01
1	1	2007019-011
3	3	2007060-01
~~3~~	~~3~~	[illegible]
3	3	[illegible]320
3	3	2018741
~~3~~	~~—~~	[illegible]
–	1	2018759
	QTY REQD	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

DRAWN B.J.S.
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL

MASTER

2018605 REV AR SHEET 1

F-2

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2	↑	↑
2-1	A8-BLU	A10-3	│	│
2-2	A8-BLU	A10-4	│	│
3-1	A9-RED	A11-1	│	│
3-2	A9-RED	A11-2	│	│
4-1	A9-BLU	A11-3	↓	↓
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

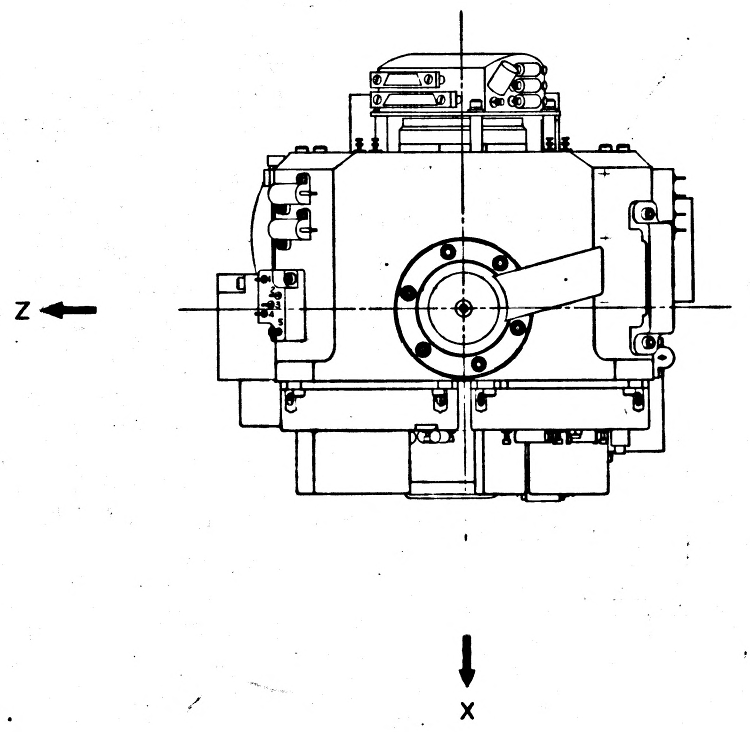
CABLE CLAMP (23)

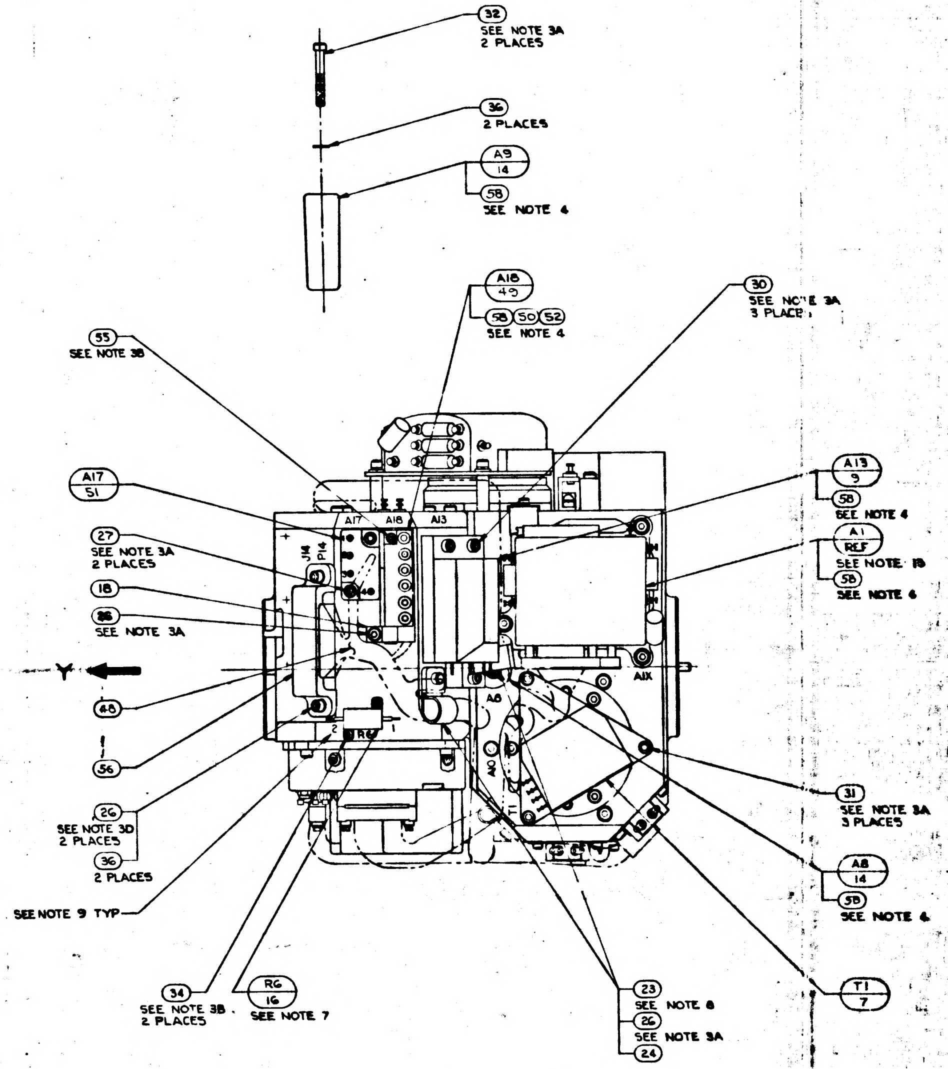
PART NO.	DIA REF
1000220-13	5/32
↑ -4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
↓ -11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
↑ -114	1.5	↑ -256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	↓ -389	1020
↓ -248	37.4	1010928-400	1430
1010928-251	40.2		



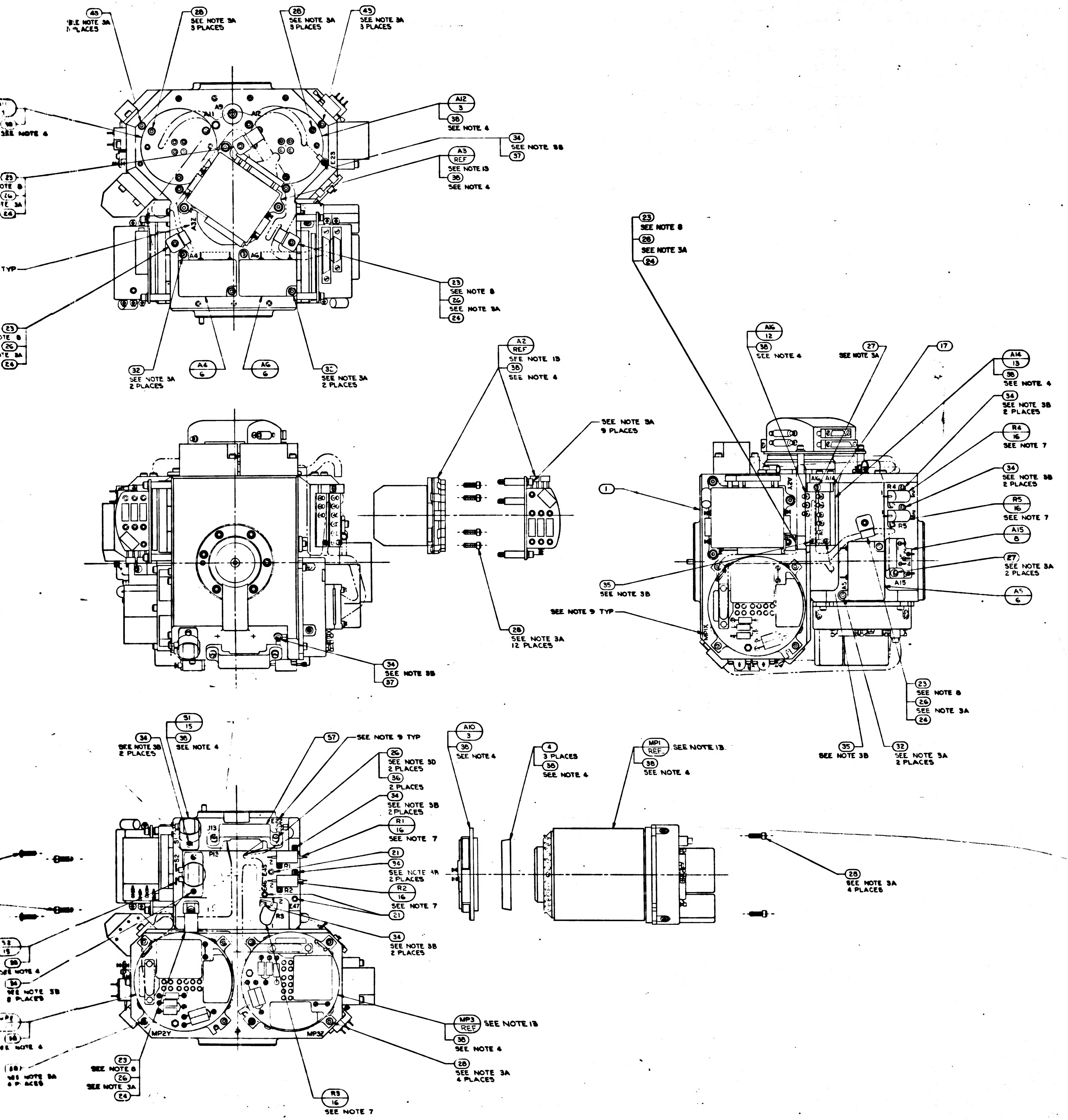

32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
58
SEE NOTE 4
A18
49
58 50 52
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
55
SEE NOTE 3B
A17
51
27
SEE NOTE 3A
2 PLACES
18
36
SEE NOTE 3A
Y
48
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
A17
A18
A13
J14
P14
A1X
A8
A10
T1
A13
9
58
SEE NOTE 4
A1
REF
SEE NOTE 13
58
SEE NOTE 4
31
SEE NOTE 3A
3 PLACES
A8
14
58
SEE NOTE 4
23
SEE NOTE 8
26
SEE NOTE 3A
24
T1
7

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 5.0 IN-LB
   B. 3.5 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14),(15),(45),(46),(47) AND (50), BETWEEN ITEM (2) AND ITEM (3), BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (49) AND ITEM (50)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II PER APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $^{.10}_{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

~~11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY~~
12. R6 SHALL BE ITEM (54) FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.

2018605 REV AR

SYM	DESCRIPTION	DATE	APPROVAL	
Z	THIS SHEET ADDED PER TDRR 23699	19 Oct 65	[illegible]	WK
AA	REVISED PER TDRR 23862	19 Nov 65	[illegible]	WK
AB	REVISED PER TDRR 24308	9 Dec 65	[illegible]	WK
AC	REVISED PER TDRR	[illegible]	[illegible]	WK
AD	REVISED PER TDRR	30 Nov 65	[illegible]	WK
AE	REVISED PER TDRR 25005	15 Feb 66	[illegible]	WK
AF	REVISED PER TDRR 25089	15 Feb 66	[illegible]	WK
AG	REVISED PER TDRR 26244	15 Feb 66	[illegible]	WK
AH	REVISED PER TDRR 26602	1 Mar 66	[illegible]	WK
AJ	REVISED TDRR 26877	[illegible]	[illegible]	WK
AK	REVISED PER TDRR 27505	[illegible]	[illegible]	WK
AL	REVISED PER TDRR 27508	3 Mar 66	[illegible]	WK
AM	REVISED TDRR 27775	12 Apr 66	[illegible]	WK
AN	REVISED TDRR 28127	22 Apr 66	[illegible]	WK
AP	REVISED TDRR 28285	26 Apr 66	[illegible]	WK
AR	REVISED TDRR 29026	23 May 66	[illegible]	[illegible]



45
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
A12
3
38
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
38
SEE NOTE 4
A9
A11
A12
A27
A4
A6
23
SEE NOTE 8
26
SEE NOTE 3A
24
32
SEE NOTE 3A
2 PLACES
A4
6
A6
6
TYP
A2
REF
SEE NOTE 13
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
A16
12
38
SEE NOTE 4
27
SEE NOTE 3A
17
A14
13
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
R5
16
SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A5
6
R4
R5
A15
A5
35
SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
31
15
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
94
SEE NOTE 3A
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
J13
P13
R1
R2
R3
E47
MP2Y
MP3Z
MP3
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
16
SEE NOTE 7
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
SEE NOTE 4
SEE NOTE 3B
SEE NOTE 3A

-011 CONFIGURATION

31

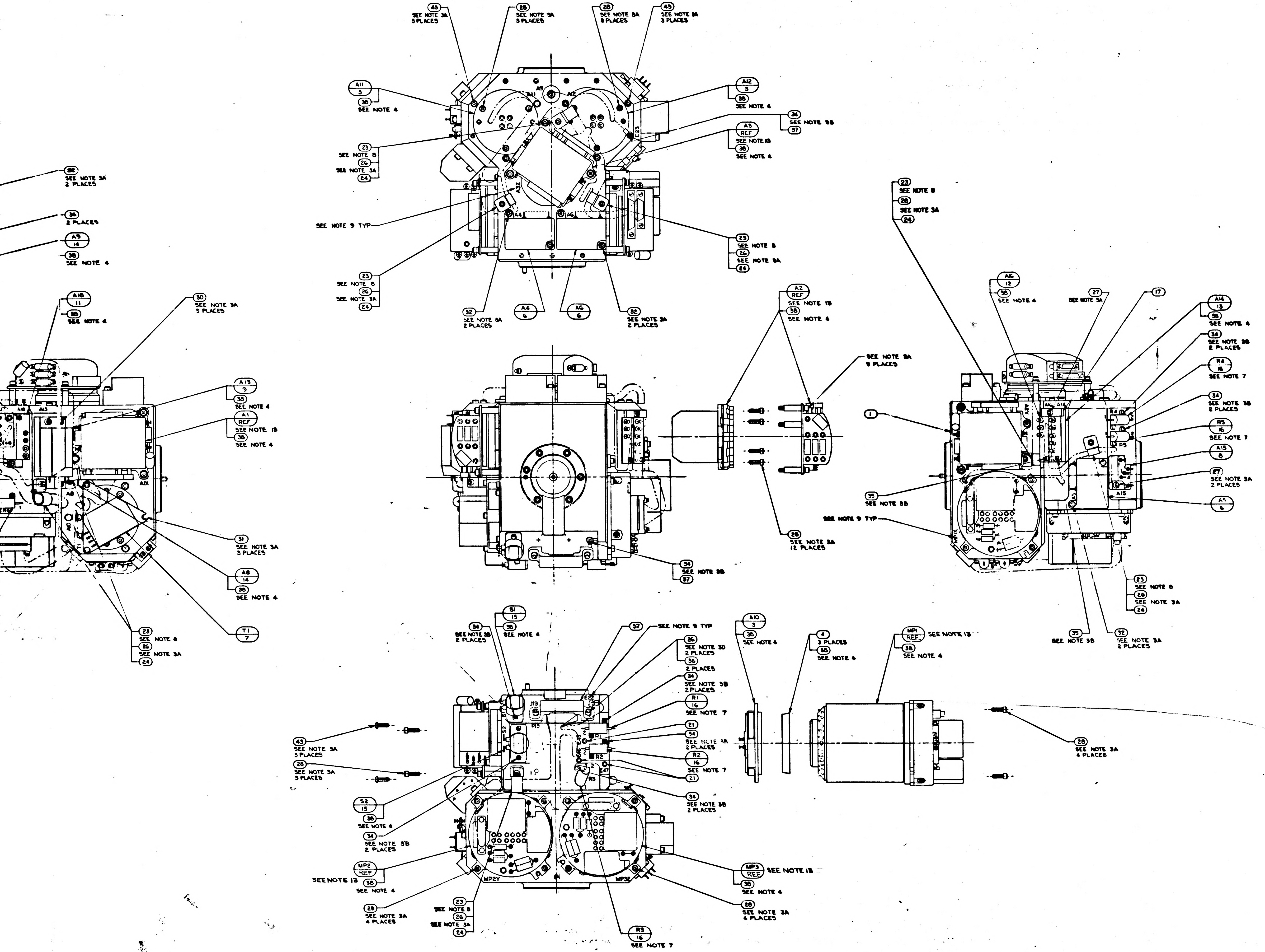
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
		MATERIAL	DRAWN [illegible] DATE CHECKED APPROVAL [illegible] 1 Nov 65 APPROVAL	STABLE MEMBER ASSEMBLY		
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL A. C. [illegible]	CODE IDENT NO 80230	SIZE J	NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL [illegible]	SCALE 1/1	WT	SHEET 2 OF 2
APPLICATION						

MASTER

2018605 AR

2018605 REV AR SHEET 2

F-3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SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
A11
3
38
SEE NOTE 4
A12
3
38
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
38
SEE NOTE 4
23
SEE NOTE 8
26
SEE NOTE 3A
24
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3A
24
23
SEE NOTE 8
26
SEE NOTE 3A
24
32
SEE NOTE 3A
2 PLACES
A4
6
A6
6
32
SEE NOTE 3A
2 PLACES
32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
38
SEE NOTE 4
A16
11
38
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
A13
9
38
SEE NOTE 4
A1
REF
SEE NOTE 13
38
SEE NOTE 4
31
SEE NOTE 3A
3 PLACES
A8
14
38
SEE NOTE 4
T1
7
23
SEE NOTE 8
26
SEE NOTE 3A
24
A2
REF
SEE NOTE 13
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
34
SEE NOTE 3B
37
28
SEE NOTE 3A
12 PLACES
23
SEE NOTE 8
26
SEE NOTE 3A
24
A16
12
38
SEE NOTE 4
27
SEE NOTE 3A
17
A14
13
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A5
6
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3A
24
35
SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
34
SEE NOTE 3B
2 PLACES
S1
15
38
SEE NOTE 4
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 3A
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
S2
15
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
MP2
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3A
24
R3
16
SEE NOTE 7
MP3
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
A9
A11
A12
A4
A6
A13
A16
A8
A15
R4
R5
R1
R2
R3
J13
P13
MP2Y
MP3Z

-D11 CONFIG

MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	DL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

MIT
INSTRUMENTATION
DRAWN
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

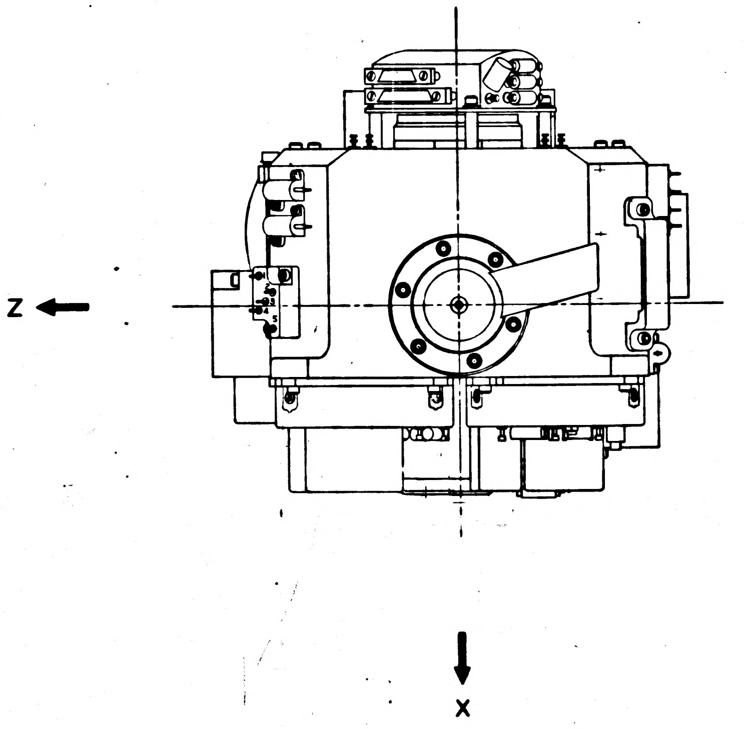
	REV	SHEET
2018605	AR	2

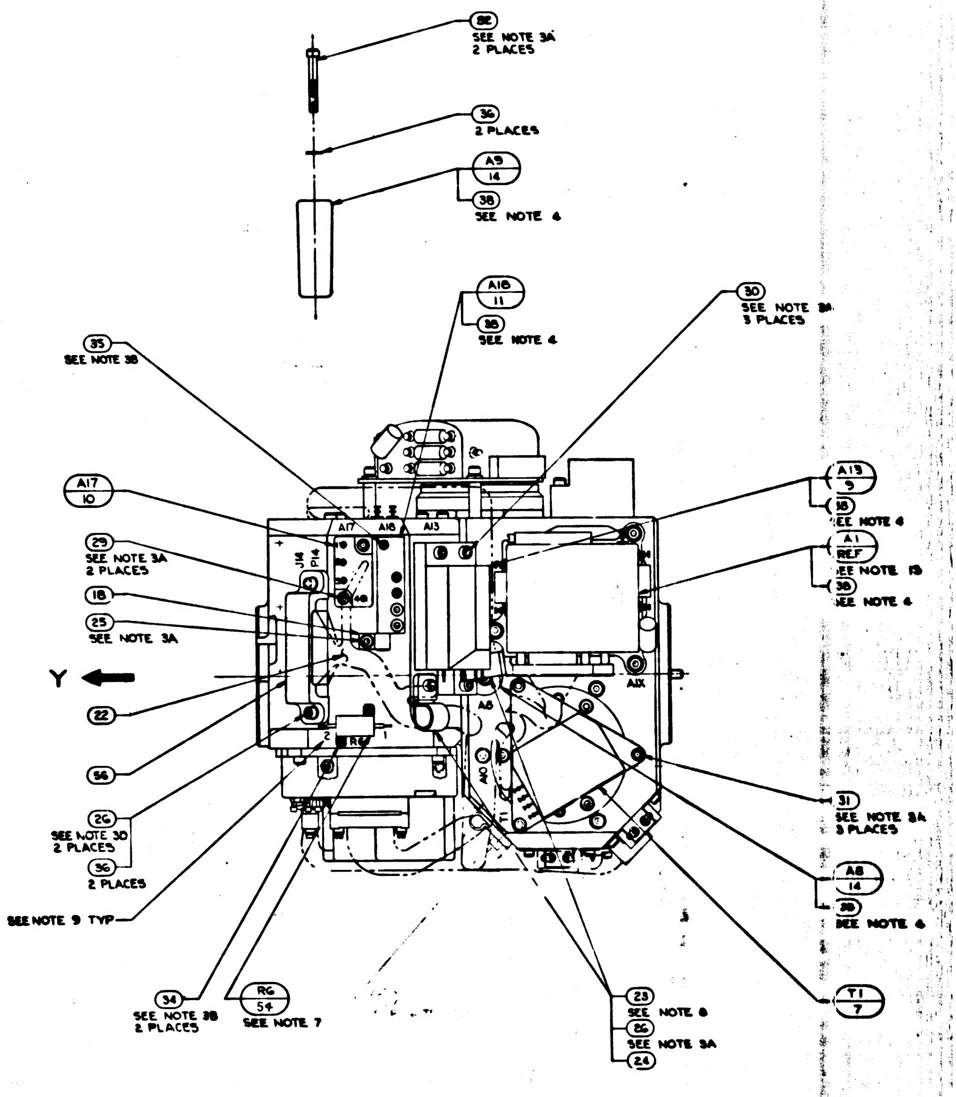
F2

2018605

D

C

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SEE NOTE 3A
2 PLACES
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2 PLACES
A9
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SEE NOTE 4
A16
11
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SEE NOTE 4
30
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3 PLACES
35
SEE NOTE 3B
A17
10
A17
A16
A13
J14
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SEE NOTE 3A
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SEE NOTE 3A
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SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
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SEE NOTE 3B
2 PLACES
R6
54
SEE NOTE 7
A13
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38
SEE NOTE 4
A1
REF
SEE NOTE 13
38
SEE NOTE 4
A1X
A8
A10
T1
31
SEE NOTE 3A
3 PLACES
A8
14
38
SEE NOTE 4
T1
7
23
SEE NOTE 8
26
SEE NOTE 3A
24

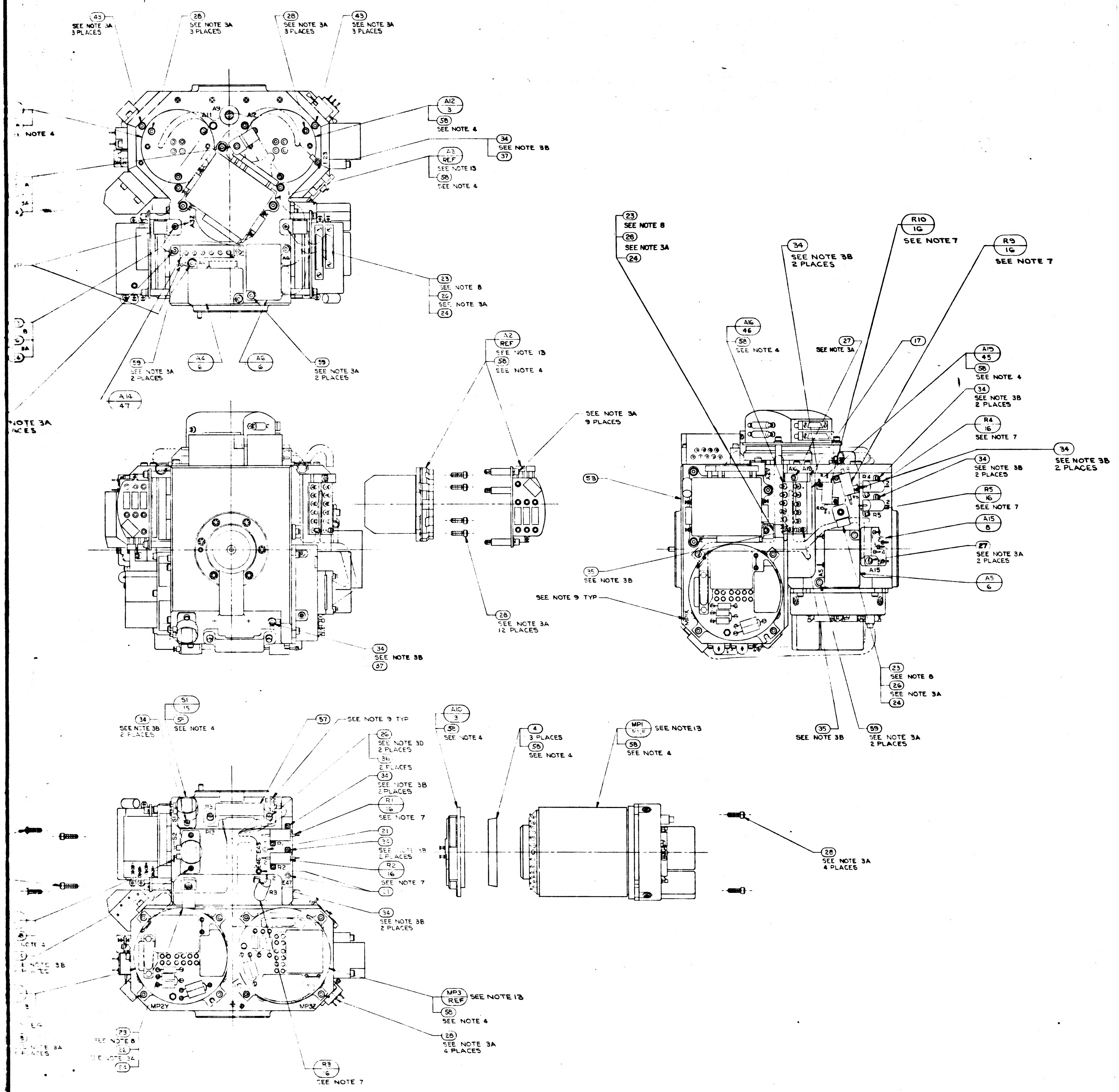
B

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

A

2018605	REV AR	SHEET 2

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17755			
M	REPLACES REV L WITH CHANGES TDRR 17755	23Mar65		WK
N	REVISED PER TDRR 18608	20APR65		WK
P	REVISED PER TDRR 19266	25May65		WK
R	REVISED PER TDRR 19267	25May65		WK
S	REVISED PER TDRR 20088	7/21/65	AJB	WK
T	REVISED PER TDRR 21190	7/23/65	AJB	WK
U	REVISED PER TDRR 21671	8-31-65		WK
V	REVISED PER TDRR 21686	8-31-65		WK
W	REVISED PER TDRR 22791	28Sep65		WK
Y	REVISED PER TDRR 23046	19Oct65		WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	19Oct65		WK
AA	REVISED PER TDRR 23862	19Nov65		WK
AB	REVISED PER TDRR 24308	14Dec65		WK
AC	REVISED PER TDRR 24898	NOV 65		WK
AD	REVISED PER TDRR 24899	12 NOV65		WK
AE	REVISED PER TDRR 25005	16Feb66		WK
AF	REVISED PER TDRR 25089	16Feb66		WK
AG	REVISED PER TDRR 26244	16Feb66		WK
AH	REVISED PER TDRR 26602	24Feb66		WK
AJ	REVISED TDRR 26877	19Mar66		WK
AK	REVISED PER TDRR 27505	31Mar66		WK
AL	REVISED PER TDRR 27508	31Mar66		WK
AM	REVISED PER TDRR 27775	12Apr66		WK
AN	REVISED PER TDRR 28127	22Apr66		WK
AP	REVISED PER TDRR 28285	26Apr66		WK
AR	REVISED PER TDRR 29026	23May66		KKSH
AS	REVISED PER TDRR 30319			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SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
A12
3
58
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
58
SEE NOTE 4
NOTE 4
A9
A11
A12
A13
23
26
SEE NOTE 8
SEE NOTE 3A
24
59
SEE NOTE 3A
2 PLACES
A2
6
A6
6
59
SEE NOTE 3A
2 PLACES
A14
47
NOTE 3A
PLACES
A2
REF
SEE NOTE 13
58
SEE NOTE 4
SEE NOTE 3A
9 PLACES
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
23
SEE NOTE 8
26
SEE NOTE 3A
24
34
SEE NOTE 3B
2 PLACES
R10
16
SEE NOTE 7
R9
16
SEE NOTE 7
A16
46
58
SEE NOTE 4
27
SEE NOTE 3A
17
A19
45
58
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A5
6
53
35
SEE NOTE 3B
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3A
24
35
SEE NOTE 3B
59
SEE NOTE 3A
2 PLACES
R4
R5
A15
34
SEE NOTE 3B
2 PLACES
51
15
51
SEE NOTE 4
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
31
2 PLACES
33
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
52
SEE NOTE 3B
2 PLACES
R2
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
A10
3
58
SEE NOTE 4
4
3 PLACES
58
SEE NOTE 4
MP1
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
MP3
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
6
SEE NOTE 7
23
SEE NOTE 8
SEE NOTE 3A
SEE NOTE 3B
R3
MP2Y
MP3Y
E47

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
6	—	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	2018837	BRACKET, CONN. 44 PIN	56
1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	1	1010928-295	RESISTOR FIXED	54
1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
~~—~~	~~3~~	~~2021500 SEE NOTE 11~~	~~IRIG PREALIGNED ASSY~~	~~44~~
9	9	1010891-5	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S/M.~~	~~42~~
~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M.~~	~~41~~
~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M.~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-12~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
~~2~~	~~2~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
—	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
~~1~~	~~1~~	~~2018779~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
~~3~~	~~3~~	~~2018639~~	~~PIP & SUSPENSION CAP. MODULE~~	~~5~~
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
~~3~~	~~—~~	~~2021500-031 SEE NOTE 11~~	~~IRIG PREALIGNED ASS'Y.~~	~~2~~
—	1	2018750	HOUSING STABLE MEMBER	1
021	011		LIST OF MATERIALS	

2018605 AS

3H

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN R.S.S. DATE
CHECKED
APPROVAL 23Mar65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL W Kupfer 23Mar65

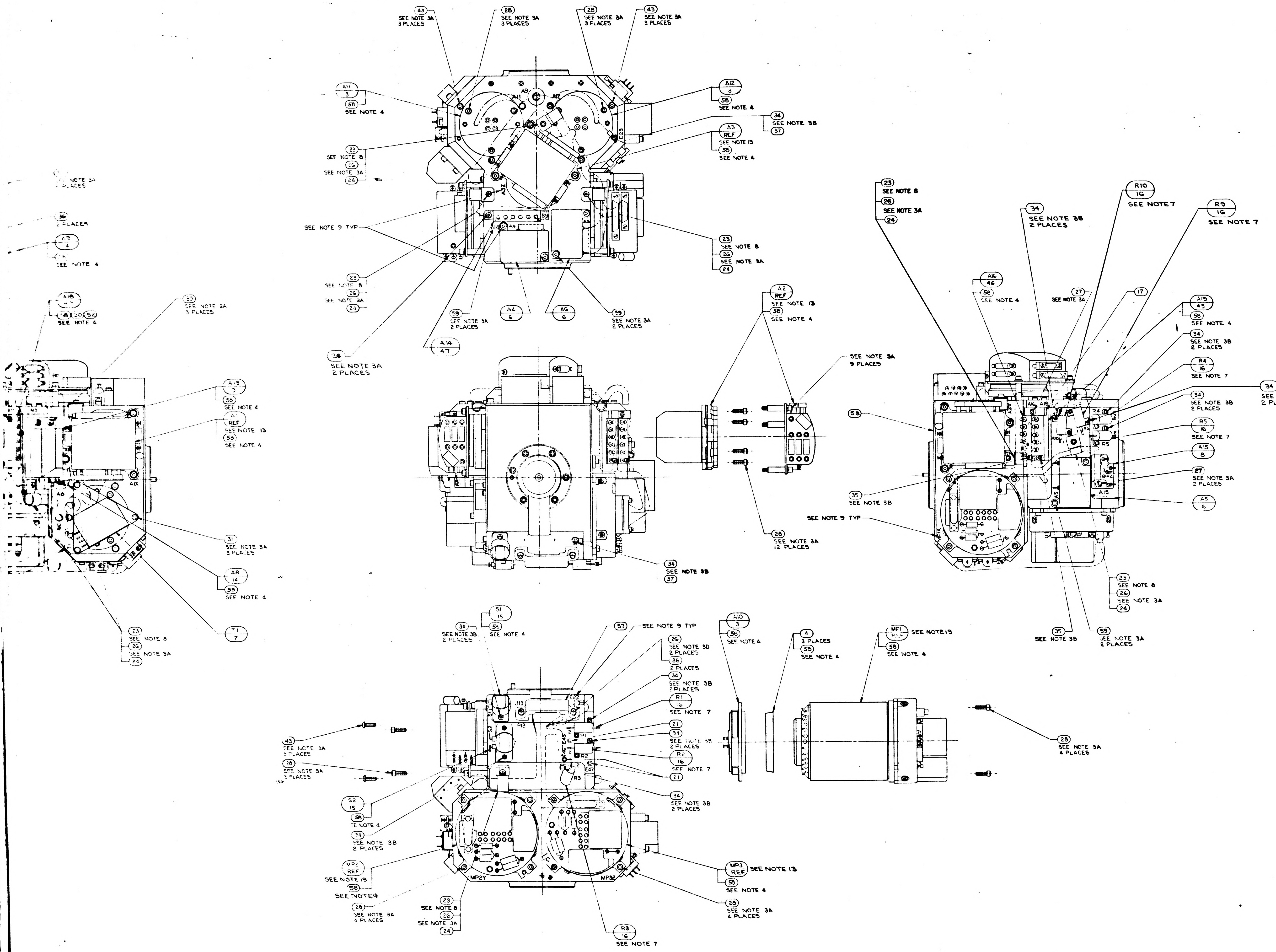
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 REV A- SHEET 1

3/2018605


43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3 58 SEE NOTE 4
A12 3 58 SEE NOTE 4
A9
A11
A12
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13 58 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3A 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
23 SEE NOTE 8 26 SEE NOTE 3A 24
59 SEE NOTE 3A 2 PLACES
A4 6
A6 6
59 SEE NOTE 3A 2 PLACES
A14 47
26 SEE NOTE 3A 2 PLACES
SEE NOTE 3A 2 PLACES
36 2 PLACES
A7 4 SEE NOTE 4
A18 45 58 52 SEE NOTE 4
33 SEE NOTE 3A 3 PLACES
A13 3 58 SEE NOTE 4
A1 REF SEE NOTE 13 58 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14 58 SEE NOTE 4
T1 7
23 SEE NOTE 8 26 SEE NOTE 3A 24
A2 REF SEE NOTE 13 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3A 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
17
A19 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
53
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
35 SEE NOTE 3B
59 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15 58 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
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43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13 58 SEE NOTE4
28 SEE NOTE 3A 4 PLACES
MP2Y
MP3Z
23 SEE NOTE 8 26 SEE NOTE 3A 24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

6	—	100148
A/R	—	MIL-I-8
1	1	20188
1	1	2018
1	—	101162
—	1	10109
1	—	2018
1	—	2018
1	—	2007
1	—	2018
1	—	2018
1	—	2018
1	—	2018
1	—	2018
1	—	2018
—	3	~~20215~~
9	9	101089
~~1~~	~~1~~	~~2018~~
~~1~~	~~1~~	~~2018~~
~~1~~	~~1~~	~~2018~~
A/R	A/R	MIL-T-7
—	A/R	100057
2	2	MS579
6	6	MS1579
2	3	101625
22	8	101625
~~2~~	~~2~~	~~100148~~
2	4	100148
3	3	100148
3	3	100148
~~2~~	~~2~~	~~100148~~
33	33	100148
7	5	100148
15	12	100148
—	1	100148
8	8	1000223
8	8	1000220
—	1	201879
3	3	100160
~~1~~	~~1~~	~~2015720~~
~~1~~	~~1~~	~~2018379~~
1	1	2015778
1	1	2018776
3	5	010928
2	2	001485
2	2	2018641
—	1	2018637
—	1	2018636
—	1	2018635
—	1	2007171
1	1	200706
1	1	200717
1	1	200701
3	3	200706
~~3~~	~~3~~	~~2018~~
3	3	2018520
3	3	2018741
3	—	2018150
—	1	2018750
QTY REQD		

C2

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON:
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

DRAWN
CHECKED
APPR
APPR

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

2018605 REV AS SHEET 1

2/2018605

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

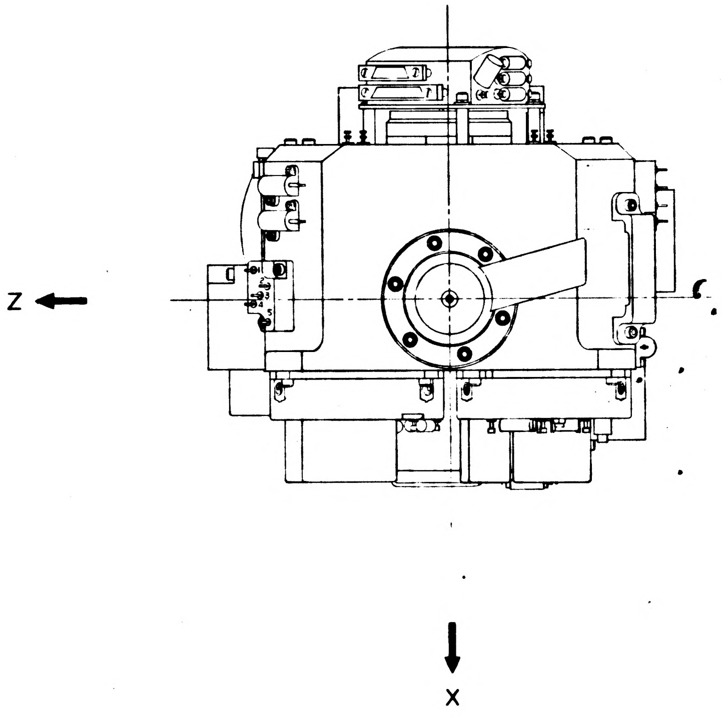
CABLE CLAMP ㉓

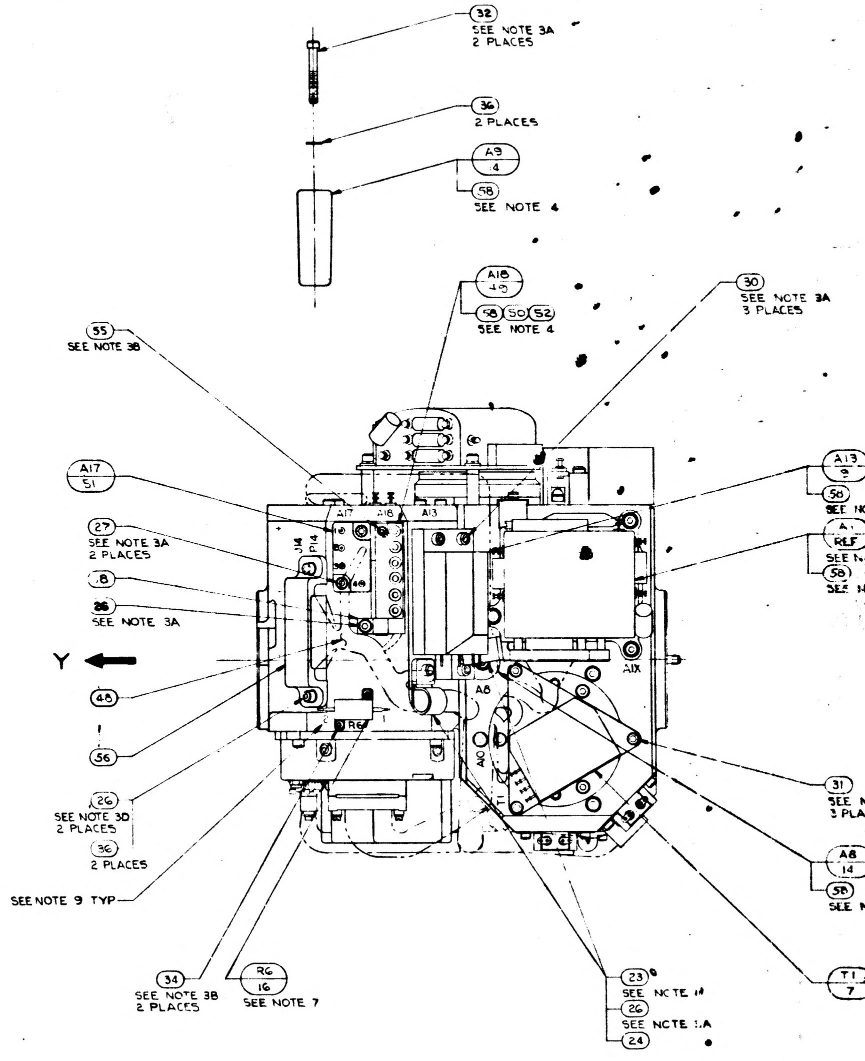
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1, R2, R3, R4, R5, R6, R9, & R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-389	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		

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SEE NOTE 4
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58 50 52
SEE NOTE 4
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SEE NOTE 3A
3 PLACES
55
SEE NOTE 3B
A17
51
27
SEE NOTE 3A
2 PLACES
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SEE NOTE 3A
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48
56
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SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
23
SEE NOTE
26
SEE NOTE
24
A17
A18
A13
J14
P14
R6
A8
A10
A1X
T1
A13
9
58
REF
58
31
A8
14
58
T1
7

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ± 7%
   A. 5.0 IN-LB
   B. 3.5 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) OR (68) TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ②, ③, ⑤, ⑨, ⑪, ⑫, ⑬, ⑭, ⑮, ㊺, ㊻, ㊼ AND ㊿, BETWEEN ITEM ② AND ITEM ③, BETWEEN ITEM ③ AND ITEM ④ AND BETWEEN ITEM ㊾ AND ITEM ㊿
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II PER APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

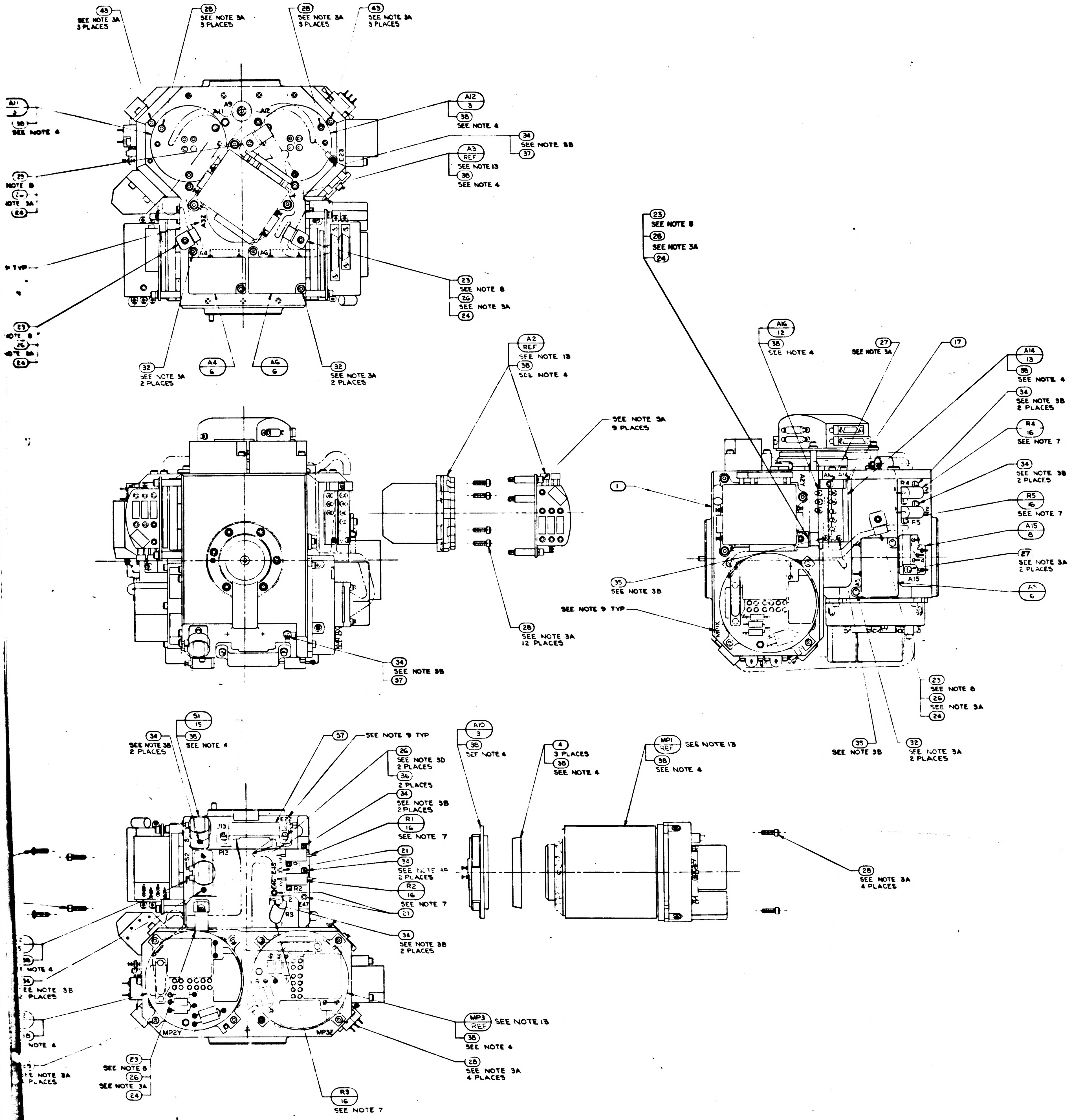
~~11. IRIG PREALIGNED ASSY NASA DWG NO 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY~~

12. R6 SHALL BE ITEM (54) FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.

	REV	SHEET
2018605	AS	1

REVISIONS TDRR 29755

SYM	DESCRIPTION	DATE	APPROVAL
Z	THIS SHEET ADDED PER TDRR 23699	19 Oct 65	WK
AA	REVISED PER TDRR 23862	19 Nov 65	WK
AB	REVISED PER TDRR 24309	19 Dec 65	WK
AC	REVISED PER TDRR	30 NOV 65	WK
AD	REVISED PER TDRR	30 NOV 65	WK
AE	REVISED PER TDRR 25005	15 Feb 66	WK
AF	REVISED PER TDRR 25089	15 Feb 66	WK
AG	REVISED PER TDRR 26244	15 Feb 66	WK
AH	REVISED PER TDRR 26602	1 Mar 66	WK
AJ	REVISED TDRR 26877	4 Mar 66	WK
AK	REVISED PER TDRR 27505	Mar 66	WK
AL	REVISED PER TDRR 27508	31 Mar 66	WK
AM	REVISED TDRR 27775	12 Apr 66	WK
AN	REVISED TDRR 28127	22 Apr 66	JK
AP	REVISED TDRR 28285	26 Apr 66	JK
AR	REVISED TDRR 29026	23 May 66	
AS	REVISION STATUS CHANGED	3 AUG 66	



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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 2
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
A9
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23 SEE NOTE 8
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32 SEE NOTE 3A 2 PLACES
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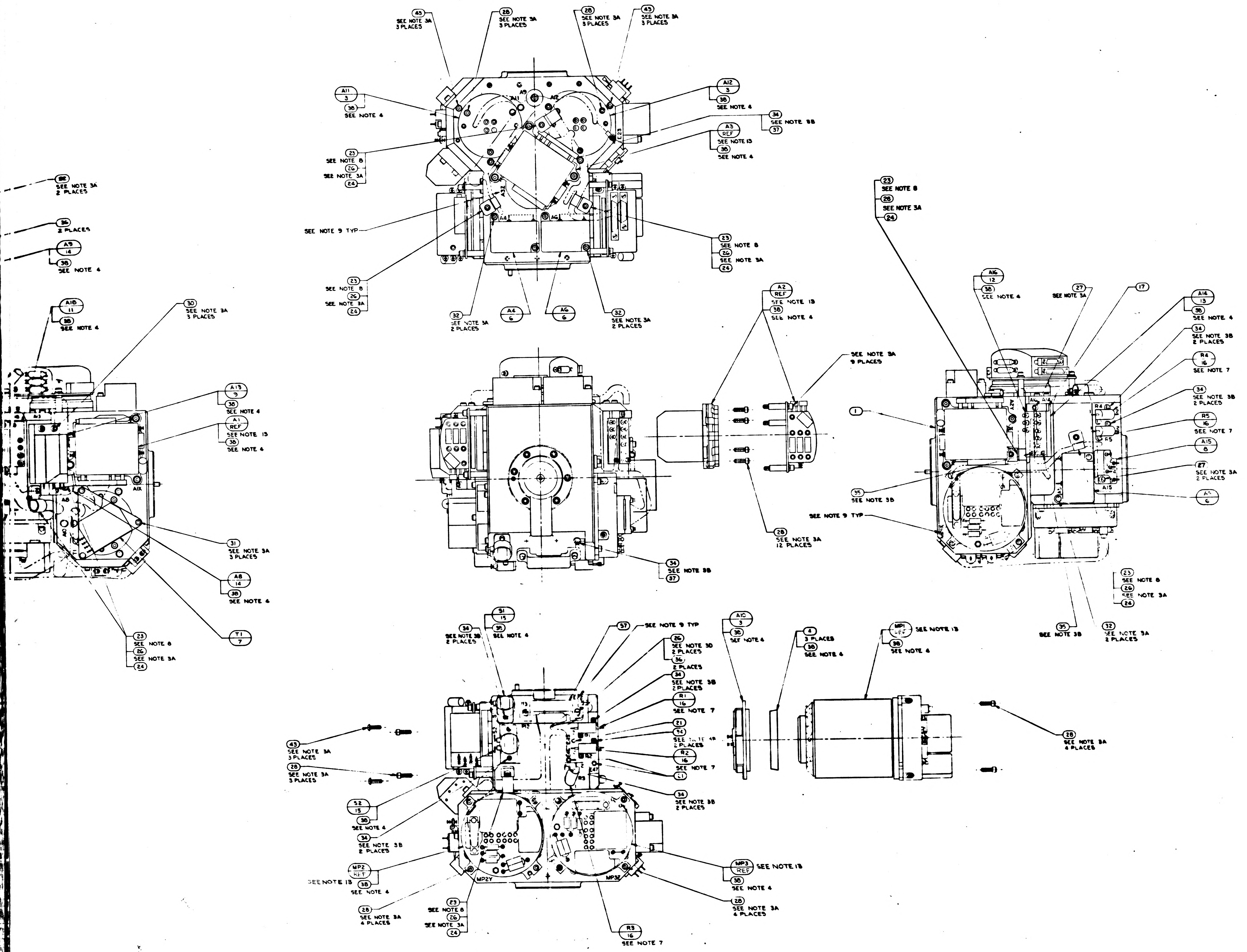
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7
23 SEE NOTE 8
26 SEE NOTE 3A

-011 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB Cambridge Mass	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN DATE CHECKED APPROVAL Mettoff 19 Oct 65 APPROVAL	STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230 SIZE J NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	SCALE 1/1 WT SHEET 2 OF 2
APPLICATION				

2018605 REV AS SHEET 2

31+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A1X
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SEE NOTE 8
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SEE NOTE 3A
4 PLACES

-011 CON

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

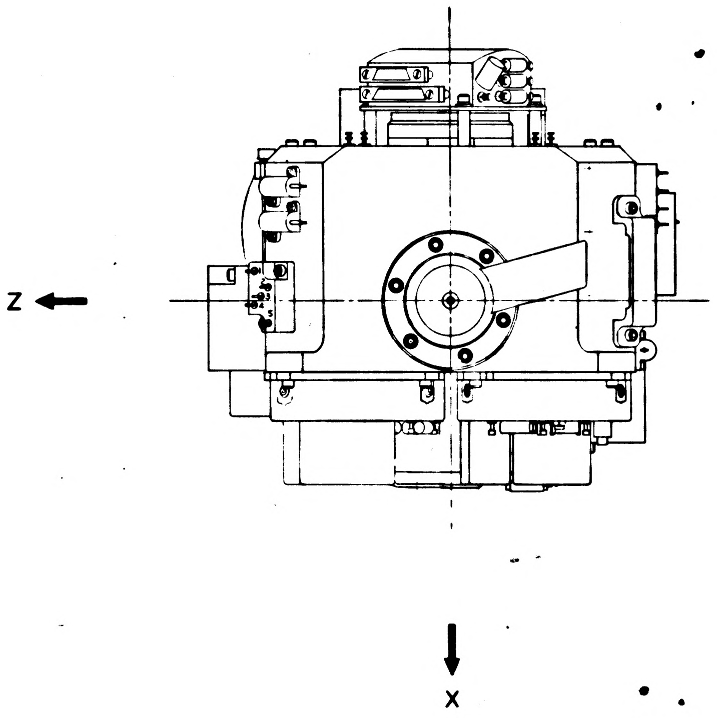
FINAL FINISH

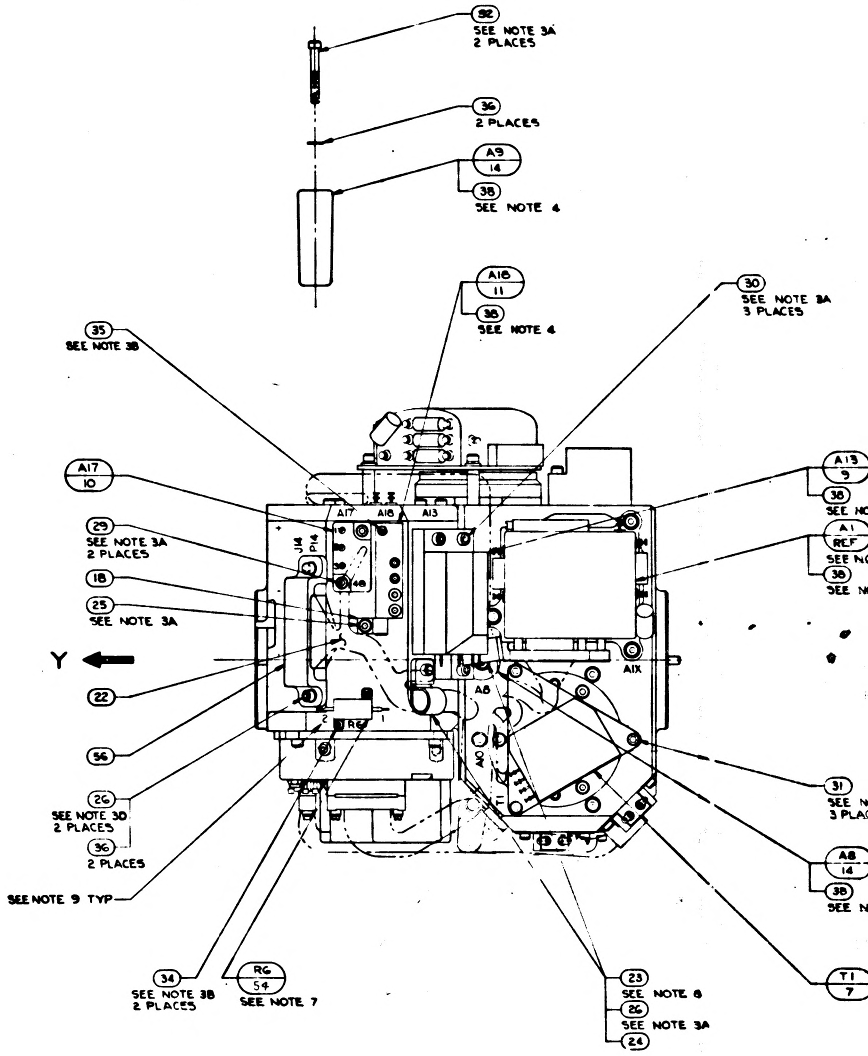
DRAWN
CHECKED
APPROVED
APPROVED

2018605	REV AS	SHEET 2

2/2018605

5018802

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A10
R6

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

	REV	SHEET
2018605	AS	2

1/2018605

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A1C-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE -I

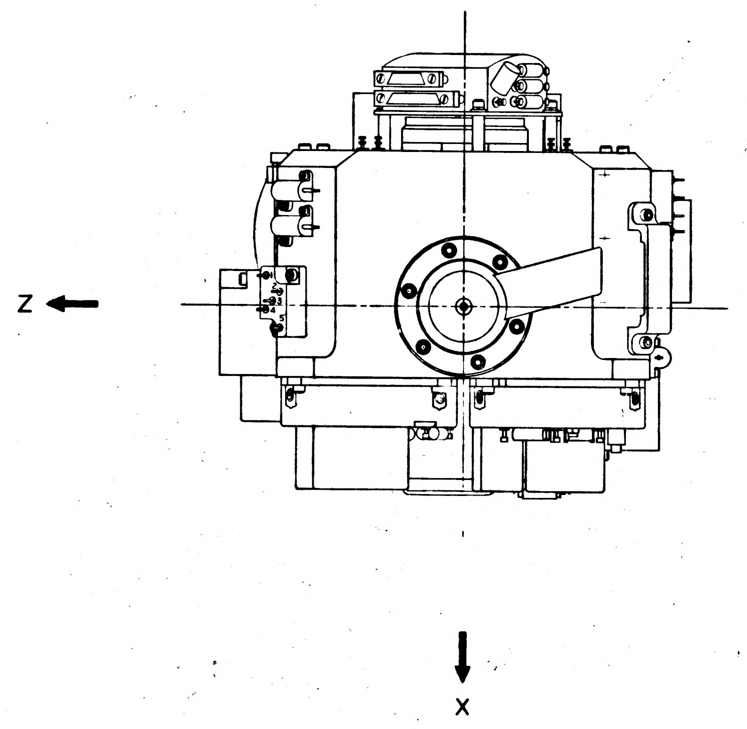
CABLE CLAMP (23)

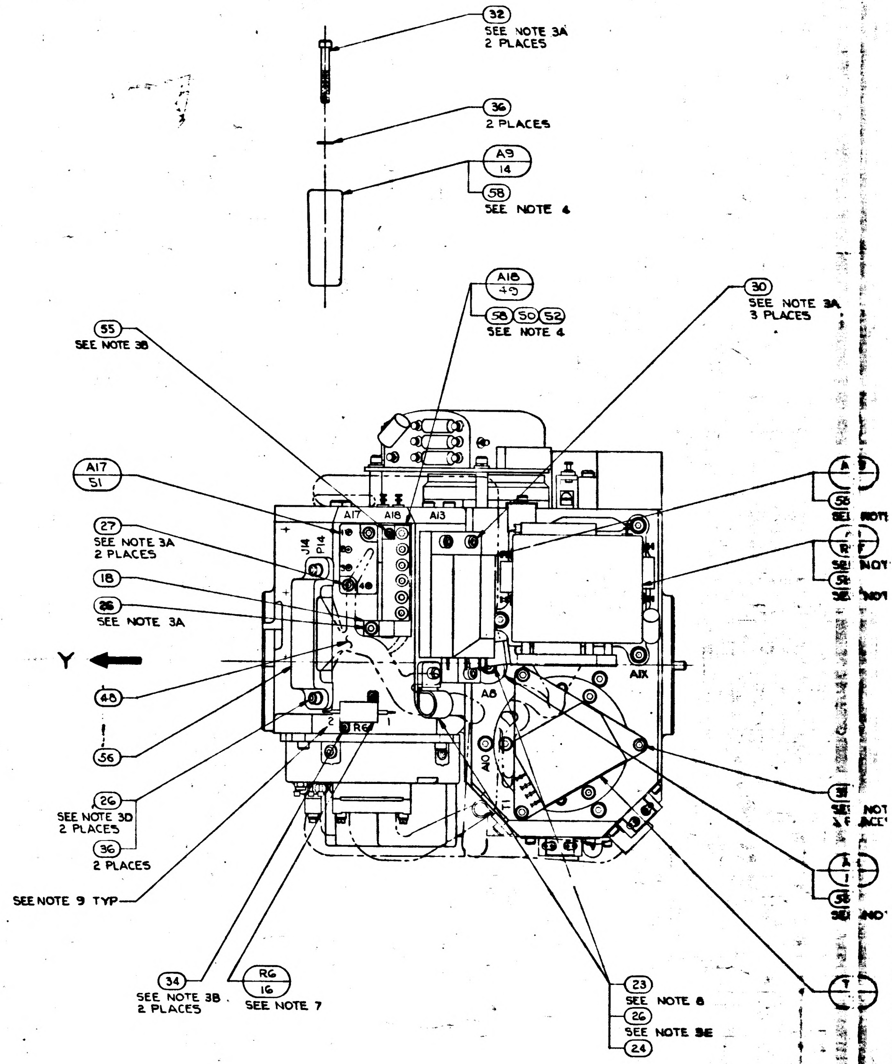
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10.

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-389	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		

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SEE NOTE 3A
3 PLACES
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SEE NOTE 3B
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SEE NOTE 3A
2 PLACES
18
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SEE NOTE 3A
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SEE NOTE 3E
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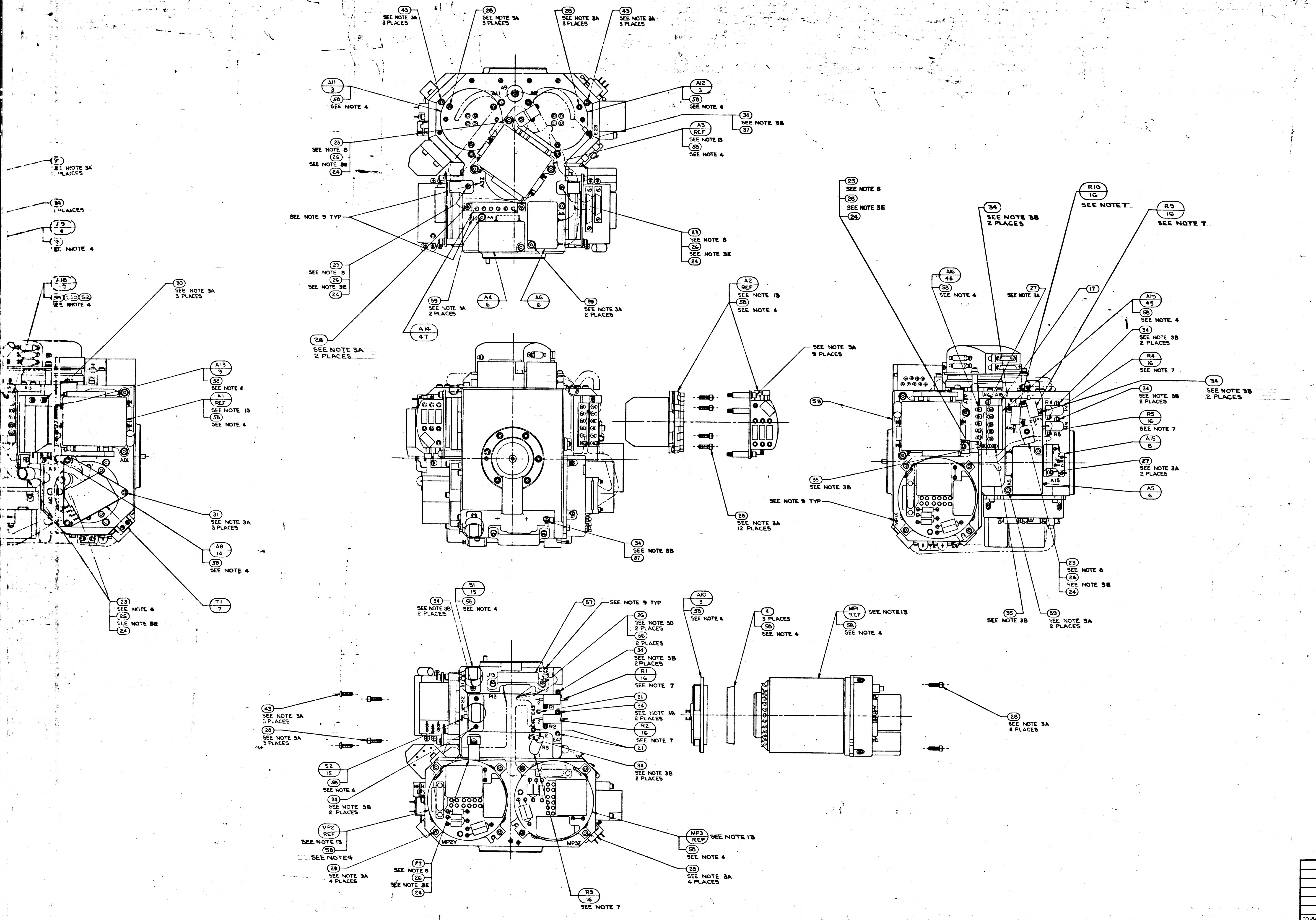
J14
P14
A8
A10
A1X
R6
T1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TQROUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14),(15),(45),(46),(47) AND (50), BETWEEN ITEM (2) AND ITEM (3), BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (49) AND ITEM (50)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II PER APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $^{.10}_{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

~~11. IRIG PREALIGNED ASSY NASA DWG NO 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY~~
12. R6 SHALL BE ITEM (54) FOR-011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.



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SEE NOTE 3A
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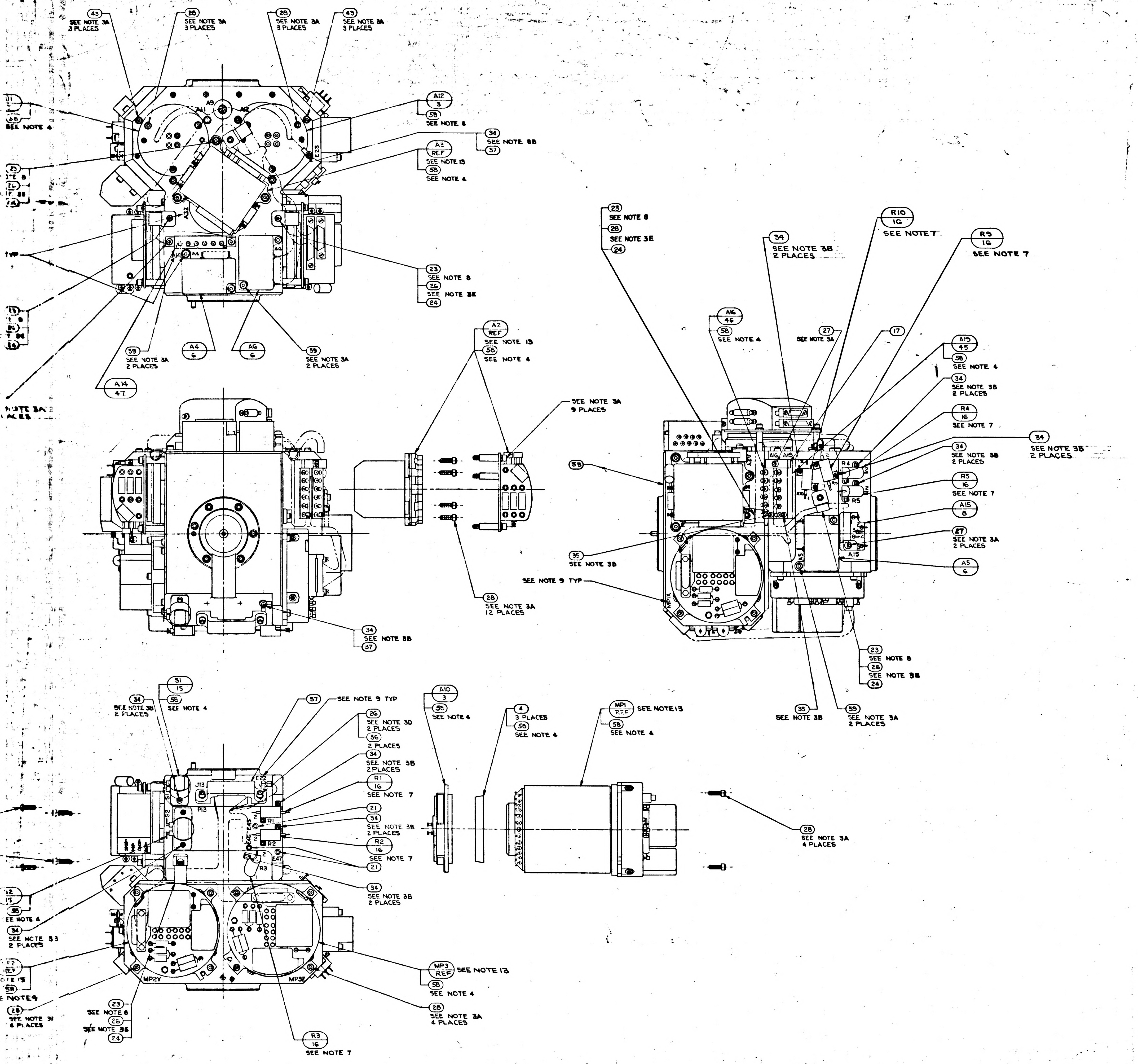
A/R	A/R	MIL-I-15
6	—	100488
A/R	—	MIL-I-26
1	1	2018
1	1	20183
1	—	10162
—	1	10092
1	—	20187
1	—	[illegible]
1	—	20227
1	—	20188
1	—	20156
1	—	20188
1	—	20168
1	—	20188
1	—	20168
—	3	2021505
9	3	101089
~~1~~	1	20168
~~1~~	1	20168
~~1~~	1	20166
A/R	A/R	MIL-T-7
—	A/R	100687
2	2	MS1579
6	6	MS1579
2	3	[illegible]
22	6	101462
~~8~~	[illegible]	[illegible]
2	8	100148
3	[illegible]	100148
3	[illegible]	[illegible]
~~2~~	2	[illegible]
33	33	10048
7	5	100148
15	12	100148
—	1	100143
8	8	10002
8	3	10002
—	1	201873
3	3	100160
~~1~~	1	[illegible]
~~1~~	1	[illegible]
1	1	201877
1	—	201871
B	5	101092
2	2	[illegible]
2	2	20176
—	1	20163
—	1	20163
—	1	20166
—	1	20171
1	1	20076
1	1	20079
1	—	200701
3	3	20078
~~3~~	8	[illegible]
3	3	20163
3	3	20174
~~3~~	—	20210
—	—	[illegible]
021	C	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

2018605 REV AT SHEET 1

2/2018605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SEE NOTE 3A
4 PLACES

REVISIONS TDRR 17755

SYM	DESCRIPTION	DATE	APPROVAL	
M	REPLACES REV L WITH CHANGES TDRR 17755	23 Mar 65		WK
N	REVISED PER TDRR 18608	20APR65		WK
P	REVISED PER TDRR 19266	25May65		WK
R	REVISED PER TDRR 19267	25May65		WK
S	REVISED PER TDRR 20088	7/21/65	AJB	WK
T	REVISED PER TDRR 21190	7/23/65	AJB	WK
U	REVISED PER TDRR 21671	8-31-65		WK
V	REVISED PER TDRR 21686	8-31-65		WK
W	REVISED PER TDRR 22791	28Sep65		WK
Y	REVISED PER TDRR 23046	19Oct65		WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	19Oct65		WK
AA	REVISED PER TDRR 23862	19Nov65		WK
AB	REVISED PER TDRR 24308	14Dec65		WK
AC	REVISED PER TDRR 24898	12 NOV 65		WK
AD	REVISED PER TDRR 24899	12 NOV65		WK
AE	REVISED PER TDRR 25005	16Feb66		WK
AF	REVISED PER TDRR 25089	16Feb66		WK
AG	REVISED PER TDRR 26244	16Feb66		WK
AH	REVISED PER TDRR 26602	24Feb66		WK
AJ	REVISED TDRR 26877	19Mar66		WK
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AN	REVISED PER TDRR 28127	22Apr66		WK
AP	REVISED PER TDRR 28285	26Apr66		WK
AR	REVISED PER TDRR 29026	23May66		WKW
AS	REVISED PER TDRR 30319	3AUG66	RPK/JI	
AT	REVISED PER TDRR 32108	3 DEC 66	ME/EFS	

SEE NOTE 14

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
6	—	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	2018837	BRACKET, CONN. 44 PIN	56
1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	1	1010928-295	RESISTOR FIXED	54
1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
~~—~~	~~3~~	~~2021500 SEE NOTE 11~~	~~IRIG PREALIGNED ASSY~~	~~44~~
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S/M.~~	~~42~~
~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M.~~	~~41~~
~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M.~~	~~40~~
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~[illegible]~~	~~[illegible]~~	~~1001488-12~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
~~2~~	~~2~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
—	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
~~1~~	~~1~~	~~2018779~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
~~3~~	~~3~~	~~2018639~~	~~PIP & SUSPENSION CAP. MODULE~~	~~5~~
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
~~3~~	~~—~~	~~2021500-031 SEE NOTE 11~~	~~IRIG PREALIGNED ASS'Y.~~	~~2~~
—	1	2018750	HOUSING STABLE MEMBER	1
021	011	LIST OF MATERIALS		

2018605 AT

3H

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23Mar65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23Mar65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

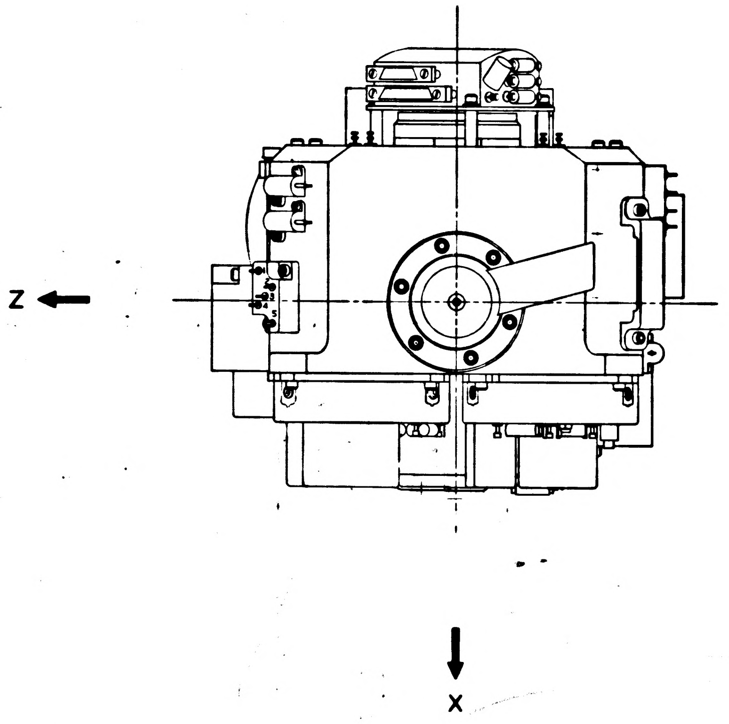
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

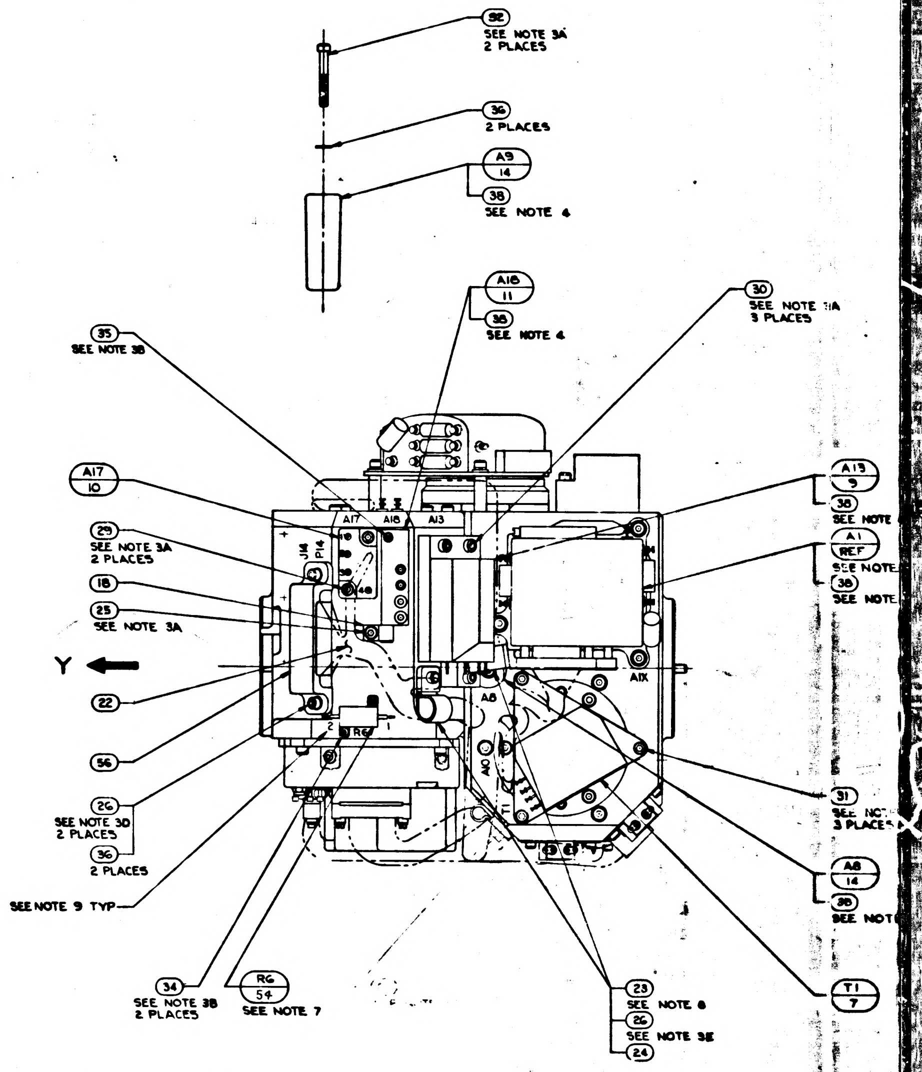
2018605 REV AT SHEET 1

2018605

3/2018605

2018602

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A9
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SEE NOTE 4
A18
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SEE NOTE 4
30
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3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
54
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3E
24
A13
9
38
SEE NOTE
A1
REF
SEE NOTE
38
SEE NOTE
31
SEE NOTE
3 PLACES
A8
14
38
SEE NOTE
T1
7
A17
A18
A13
J14
P14
A8
A10
A1X
T1
R6

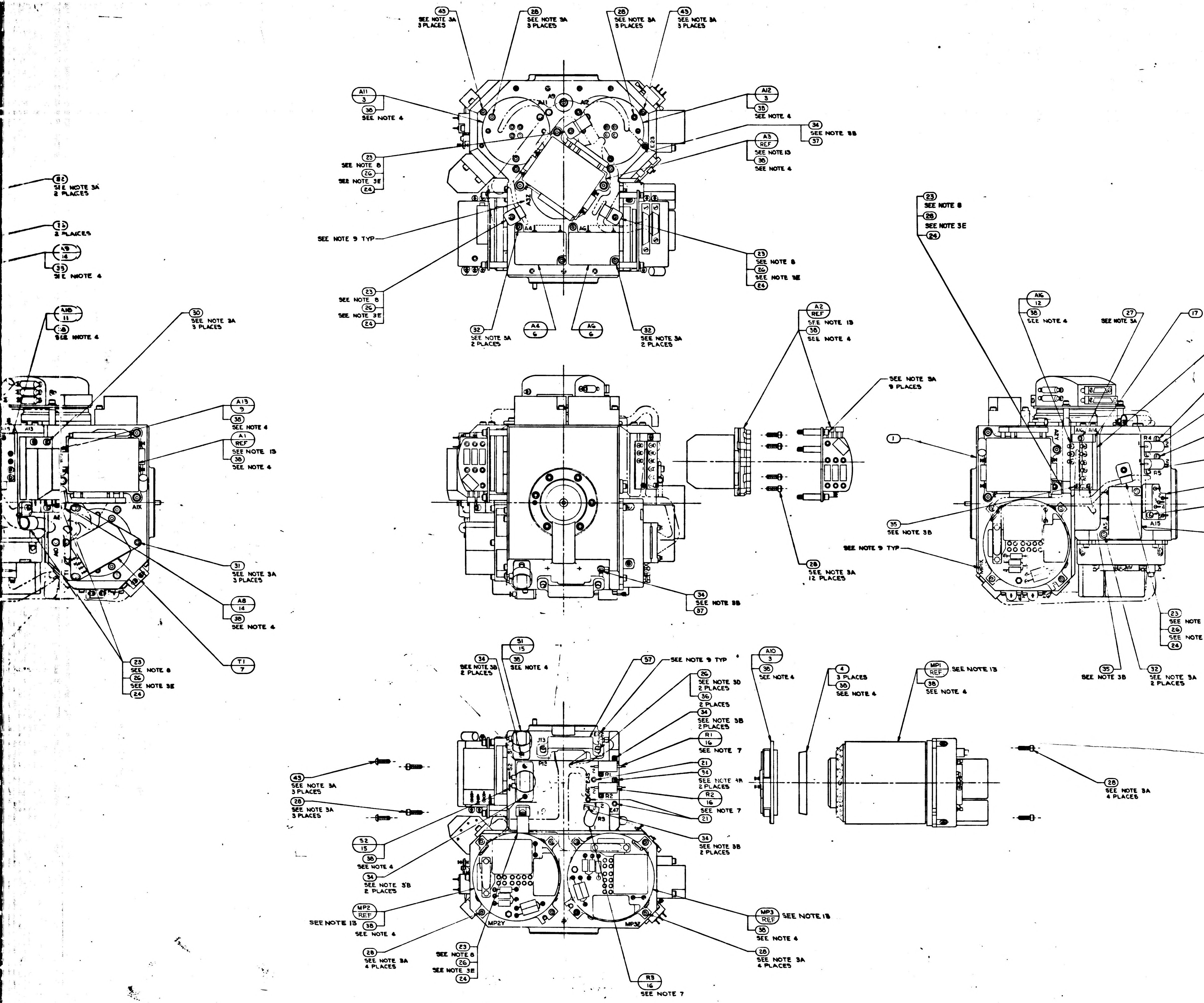
NOTES:

1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

	REV	SHEET
2018605	AT	2

1/2018605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SEE NOTE 3A
3 PLACES
A11
3
38
SEE NOTE 4
A12
3
38
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
38
SEE NOTE 4
23
SEE NOTE 8
26
SEE NOTE 3E
24
SEE NOTE 9 TYP
A4
6
A6
6
32
SEE NOTE 3A
2 PLACES
A9
A16
11
38
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
A13
9
38
SEE NOTE 4
A1
REF
SEE NOTE 13
38
SEE NOTE 4
A1X
31
SEE NOTE 3A
3 PLACES
A8
14
38
SEE NOTE 4
T1
7
A2
REF
SEE NOTE 13
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
1
A16
12
38
SEE NOTE 4
27
SEE NOTE 3A
17
A14
13
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
R5
16
SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A5
6
35
SEE NOTE 3B
SEE NOTE 9 TYP
32
SEE NOTE 3A
2 PLACES
51
15
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
R1
16
SEE NOTE 7
21
36
SEE NOTE 4R
2 PLACES
R2
16
SEE NOTE 7
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
52
15
38
SEE NOTE 4
MP2
REF
SEE NOTE 13
MP3
REF
SEE NOTE 13
R3
16
SEE NOTE 7
J13
P12
MP2Y
MP3Z

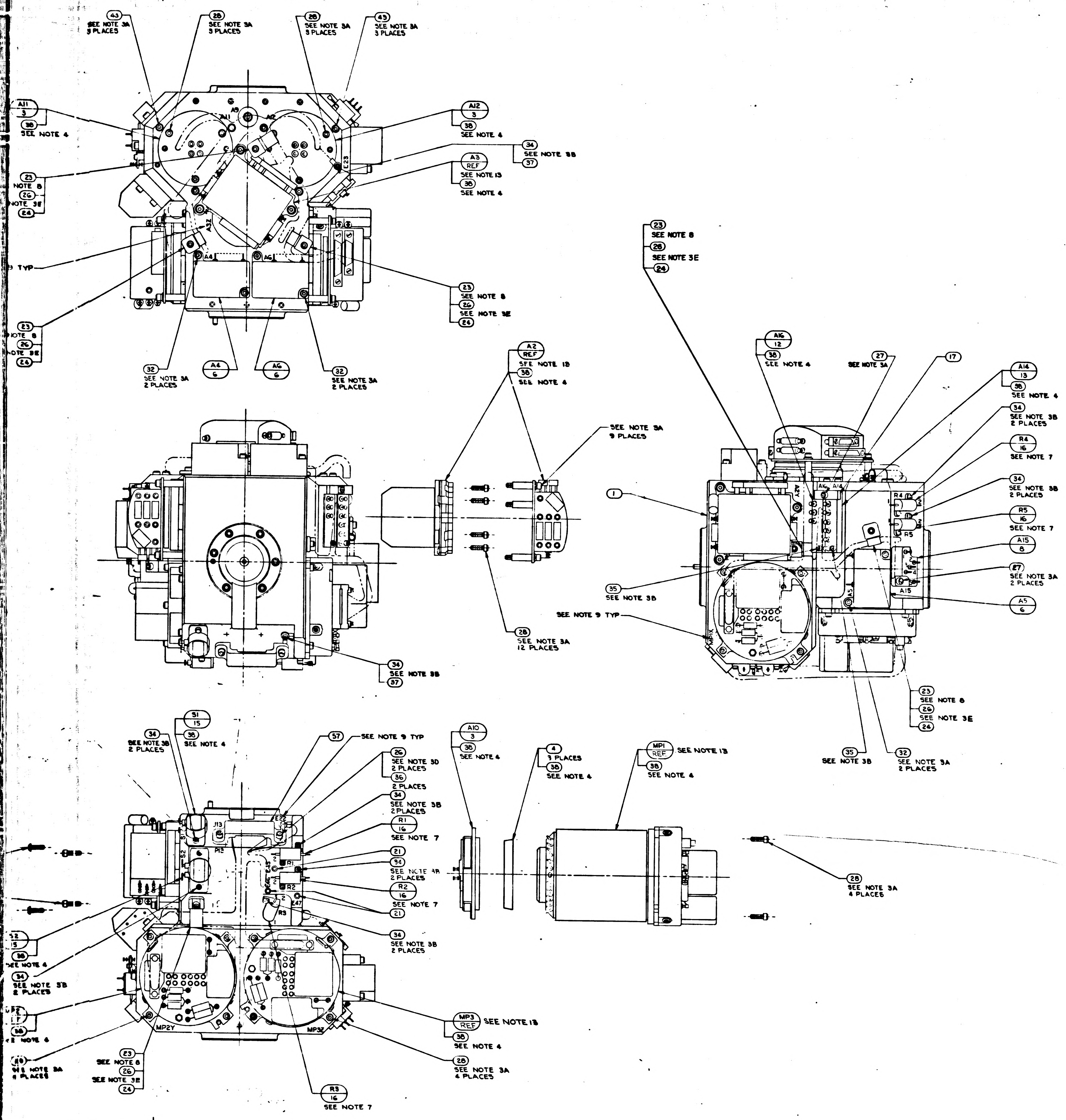
-011 ONF

2018605	REV AT	SHEET 2

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

REVISIONS ~~TDRR 23755~~			
SYM	DESCRIPTION	DATE	APPROVAL
Z	THIS SHEET ADDED PER TDRR 23699	19 Oct 65	WK
AA	REVISED PER TDRR 23862	19 Nov 65	WK
AB	REVISED PER TDRR 24506	14 Dec 65	WK
AC	REVISED PER TDRR	30 NOV 65	WK
AD	REVISED PER TDRR	30 NOV 65	WK
AE	REVISED PER TDRR 25005	15 Feb 66	WK
AF	REVISED PER TDRR 25089	15 Feb 66	WK
AG	REVISED PER TDRR 26244	15 Feb 66	WK
AH	REVISED PER TDRR 26602	1 Mar 66	WK
AJ	REVISED TDRR 26877	14 Mar 66	WK
AK	REVISED PER TDRR 27505	31 Mar 66	WK
AL	REVISED PER TDRR 27508	31 Mar 66	WK
AM	REVISED TDRR 27775	12 Apr 66	WK
AN	REVISED TDRR 28127	22 Apr 66	WK
AP	REVISED TDRR 28285	26 Apr 66	WK
AR	REVISED TDRR 29026	23 May 66	[illegible]
AS	REVISION STATUS CHANGED	3 AUG 66	RS
AT	REVISED PER TDRR 32108	3 DEC 66	[illegible]



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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF
SEE NOTE 13
38 SEE NOTE 4
23 NOTE 8
26 NOTE 3E
24
TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
23 NOTE 8
26 NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A9
A11
A12
A32
E23
A4
A6
A2 REF
SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16
SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16
SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
A16
A14
R4
R5
A15
A5
MP1X
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
38 SEE NOTE 4
57
SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16
SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16
SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
E22
S1
S2
R1
R2
R3
E47
MP2Y
MP3Z
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 17
38 SEE NOTE 4
48 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16
SEE NOTE 7
MP3 REF
SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF
SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

2018605	REV AT	SHEET 2

-011 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN L.S.S. DATE CHECKED APPROVAL 19 Oct 65 APPROVAL	STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL A. C. METZGER	CODE IDENT NO. 80230
NEXT ASSY	USED ON			SIZE J
APPLICATION		FINAL FINISH	MIT APPROVAL W Kupfer 24 Nov 65	NASA DRAWING NO. 2018605
				SCALE 1/1 WT SHEET 2 OF 2

2018605 AT

3/7

3/2018605

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

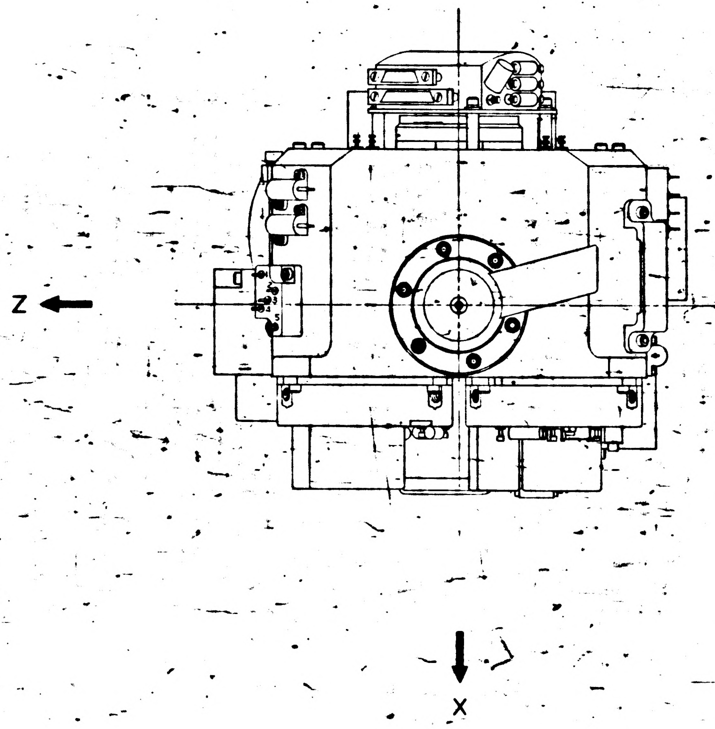
CABLE CLAMP (23)

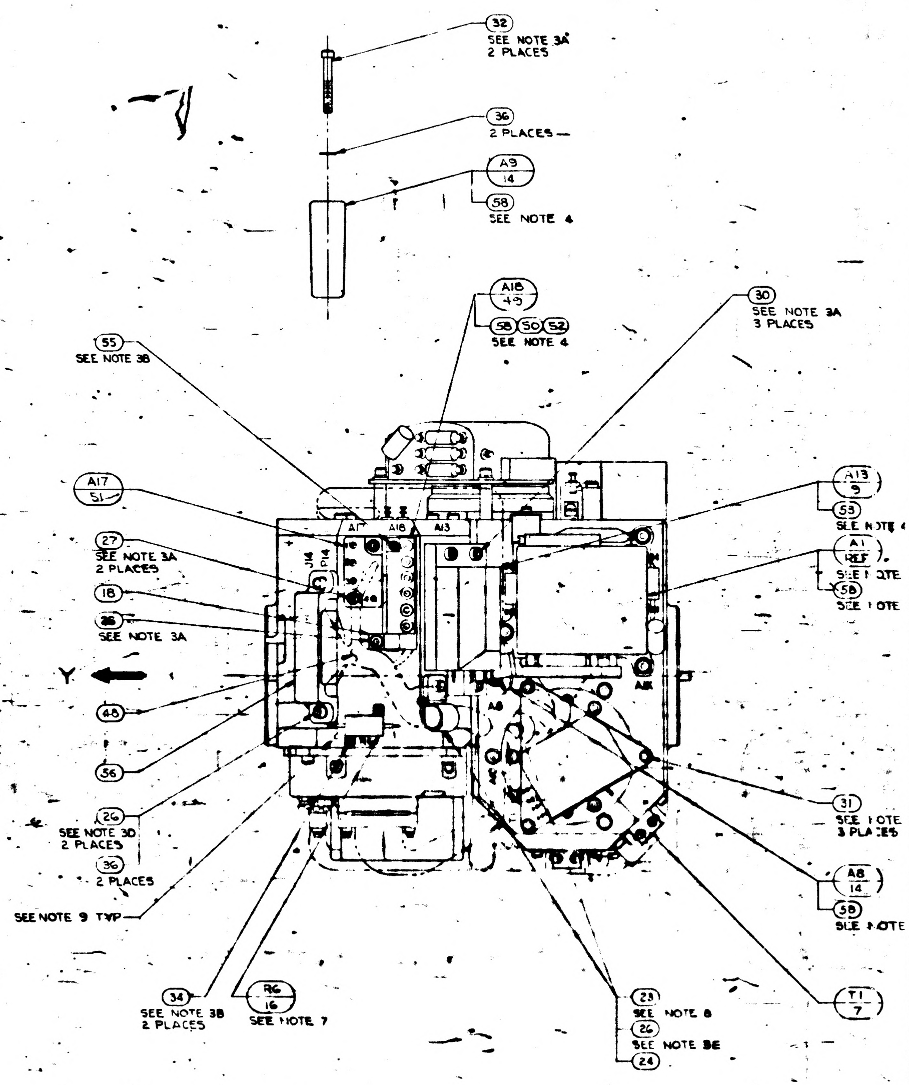
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1, R2, R3, R4, R5, R6, R9, & R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-389	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		

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36
2 PLACES
A9
14
58
SEE NOTE 4
A18
49
58 50 52
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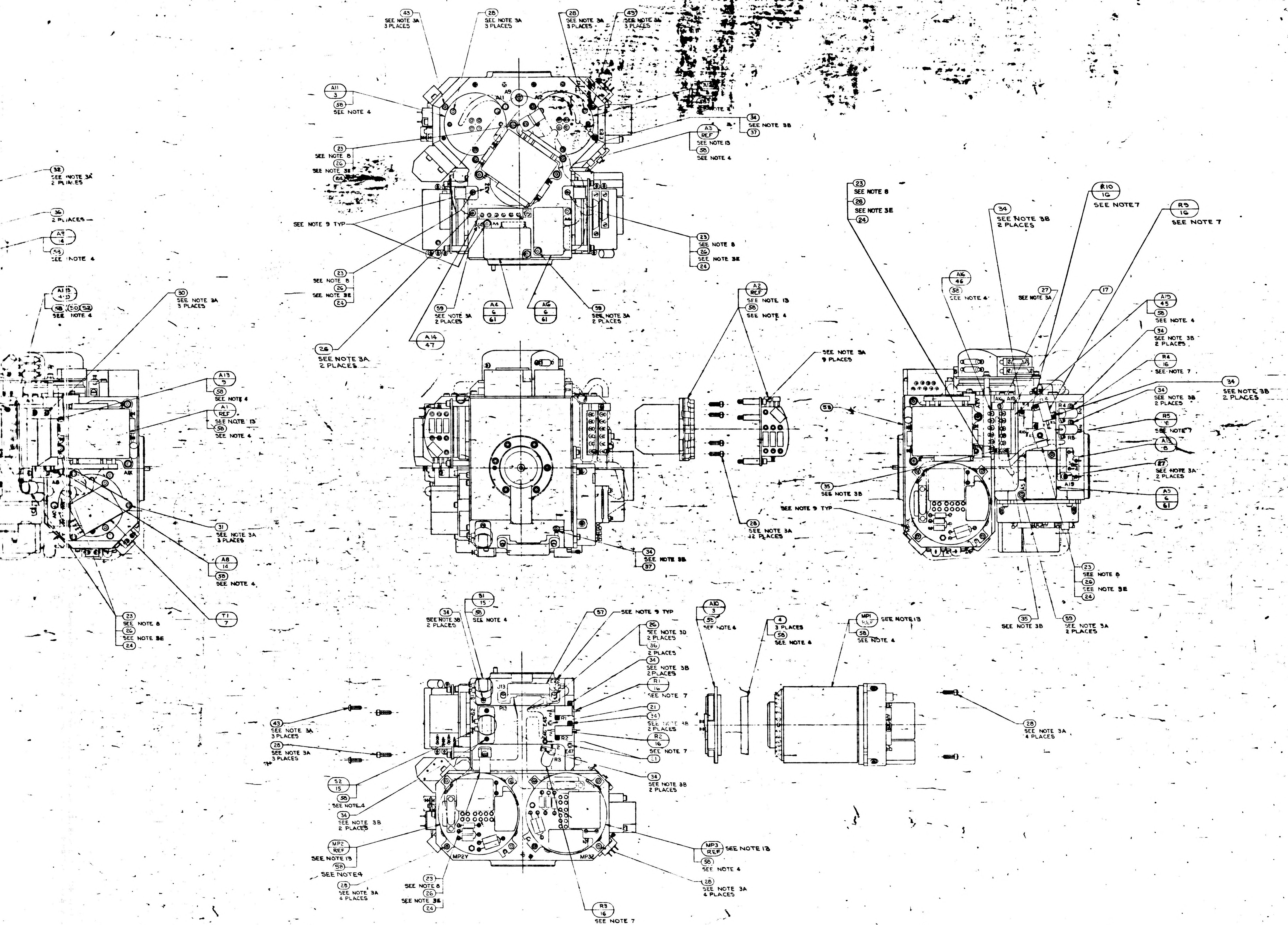
SEE NOTE 3A
3 PLACES
55
SEE NOTE 3B
A17
51
27
SEE NOTE 3A
2 PLACES
18
36
SEE NOTE 3A
Y
48
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
A17
A18
A13
J14
P14
A8
A13
9
58
SEE NOTE 4
A1
REF
SEE NOTE
58
SEE NOTE
31
SEE NOTE
3 PLACES
A8
14
58
SEE NOTE
T1
7
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3E
24

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2), (3), (5), (9), (11), (12), (13), (14), (15), (45), (46), (47) AND (50), BETWEEN ITEM (2) AND ITEM (3), BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (49) AND ITEM (50)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II PER APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.
11. ~~IRIG PREALIGNED ASSY NASA DWG NO 2021500-031 & -04 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY~~
12. R6 SHALL BE ITEM (54) FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

2018605 AU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SEE NOTE 3A
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3 PLACES
A11
3
58
SEE NOTE 4
A9
A11
A12
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
58
SEE NOTE 4
23
SEE NOTE 8
26
SEE NOTE 3E
64
32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
58
SEE NOTE 4
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3E
24
23
SEE NOTE 8
26
SEE NOTE 3E
24
A13
4
58
59
52
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
59
SEE NOTE 3A
2 PLACES
A4
6
61
A6
6
61
59
SEE NOTE 3A
2 PLACES
A14
47
26
SEE NOTE 3A
2 PLACES
A13
9
58
SEE NOTE 4
A1
REF
SEE NOTE 13
58
SEE NOTE 4
A16
31
SEE NOTE 3A
3 PLACES
A8
14
58
SEE NOTE 4
T1
7
23
SEE NOTE 8
26
SEE NOTE 3E
24
A2
REF
SEE NOTE 13
58
SEE NOTE 4
SEE NOTE 3A
9 PLACES
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
23
SEE NOTE 8
26
SEE NOTE 3E
24
34
SEE NOTE 3B
2 PLACES
R10
16
SEE NOTE 7
R9
16
SEE NOTE 7
A16
46
58
SEE NOTE 4
27
SEE NOTE 3A
17
A15
45
58
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
6
27
SEE NOTE 3A
2 PLACES
A5
6
61
58
35
SEE NOTE 3B
SEE NOTE 9 TYP
A19
23
SEE NOTE 8
26
SEE NOTE 3E
24
35
SEE NOTE 3B
59
SEE NOTE 3A
2 PLACES
34
SEE NOTE 3B
2 PLACES
31
15
58
SEE NOTE 4
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 4B
2 PLACES
R2
16
SEE NOTE 7
C1
34
SEE NOTE 3B
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J13
P13
R1
R2
R3
E47
A10
35
SEE NOTE 4
4
3 PLACES
58
SEE NOTE 4
MP1
REF
SEE NOTE 13
58
SEE NOTE 4
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SEE NOTE 3A
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43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
52
15
58
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
MP2
REF
SEE NOTE 13
58
SEE NOTE 4
MP2Y
MP3Z
28
SEE NOTE 3A
4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3E
24
MP3
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
16
SEE NOTE 7

SEE NOTE 14

3	—	—	2007060
A/R	A/R	A/R	MIL-I-1512
6	6	—	1001488-
A/R	A/R	—	MIL-I-8660
1	1	1	2018838
1	1	1	2018837
1	1	—	1011625-
—	—	1	1010928
1	1	—	[illegible]
1	1	—	201883
1	1	—	2007172
1	1	—	201882
1	1	—	201882
1	1	—	201882
1	1	—	201882
1	1	—	201882
1	1	—	201882
~~—~~	~~—~~	~~3~~	~~2021500~~
9	9	9	1010891
—	~~1~~	~~1~~	~~201884~~
—	~~1~~	~~1~~	~~2018809~~
—	~~1~~	~~1~~	~~20188C~~
A/R	A/R	A/R	MIL-T-71
—	—	A/R	100687
2	2	2	MS1579
6	6	6	MS1579
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7	7	5	1001488-
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8	8	8	100022
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—	~~1~~	~~1~~	~~20187~~
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1	1	1	201877
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2	2	2	201864
—	—	1	2018637
—	—	1	201863
—	—		201863
—	—	1	200717
1	1	1	200706
1	1	1	200717
1	1	1	2007019
—	3	3	200706
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3	3	3	201882
3	3	3	201874
—	~~3~~	—	~~202150~~
—	—	1	201675
QTY REQ'D	QTY REQD	QTY REQ'D	
051	021	01	

2018604	UL 2018601
NEXT ASSY	USED ON
APPLICATION	

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APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

	REV	SHEET
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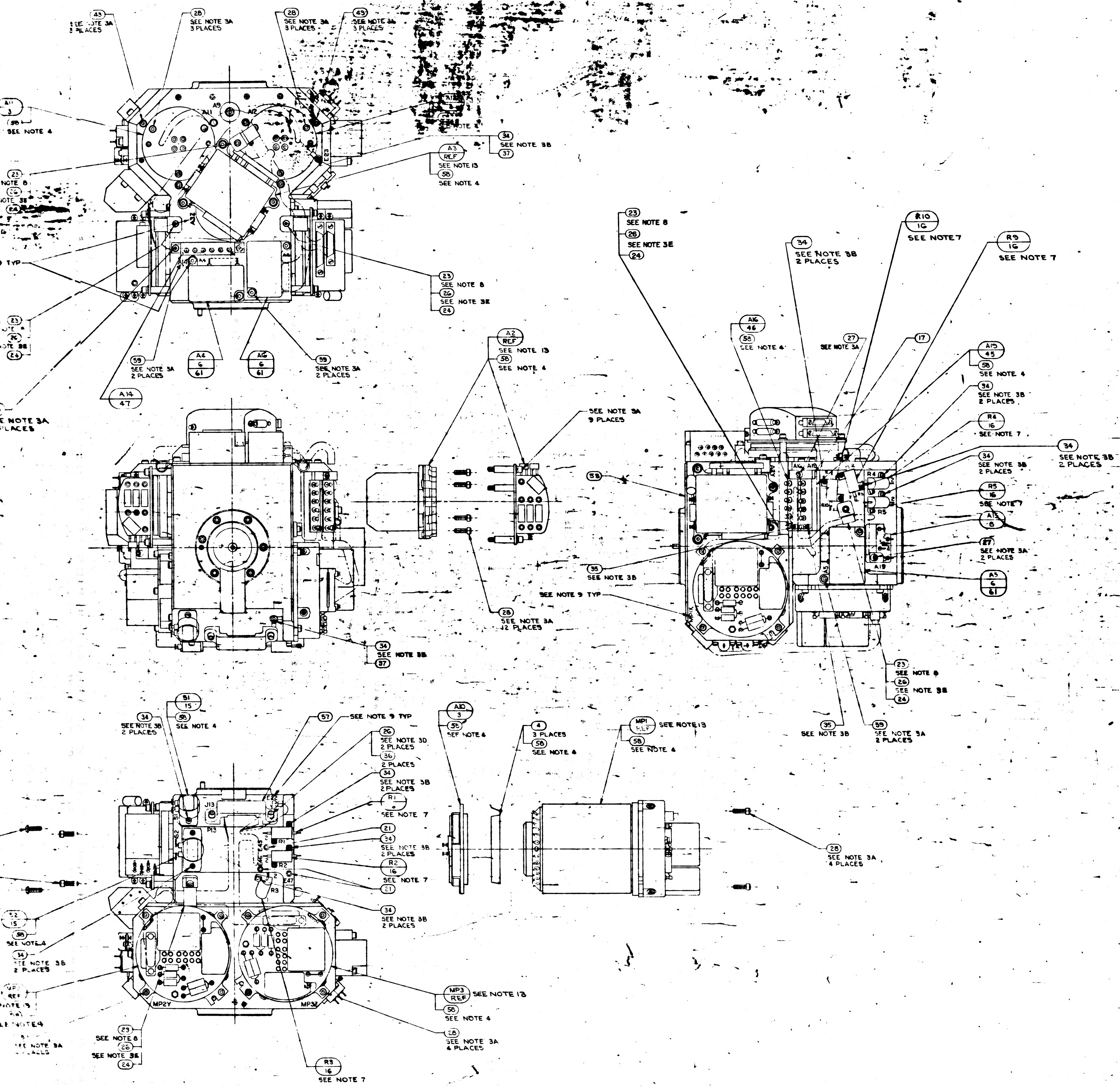
21/2018605



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SEE NOTE 3A
3 PLACES
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3 PLACES
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3 PLACES
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58
SEE NOTE 4
A9
A11
A12
A3
REF
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SEE NOTE 13
SEE NOTE 4
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NOTE 8
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TYP
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SEE NOTE 8
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SEE NOTE 3E
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SEE NOTE 7
R9
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SEE NOTE 7
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SEE NOTE 4
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SEE NOTE 7
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SEE NOTE 4
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SEE NOTE 3B
SEE NOTE 9 TYP
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SEE NOTE 3B
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SEE NOTE 8
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SEE NOTE 3E
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SEE NOTE 3B
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SEE NOTE 3A
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
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SEE NOTE 9 TYP
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R1
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
R2
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SEE NOTE 7
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J13
P13
R1
R2
R3
MP2Y
MP3Z
A10
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SEE NOTE 4
4
3 PLACES
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SEE NOTE 4
MP1
REF
SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
MP3
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
16
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3E
24
22
15
58
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
SEE NOTE 13
SEE NOTE 4
SEE NOTE 3A

REVISIONS TDRR 17755

SYM	DESCRIPTION	DATE	APPROVAL	
M	REPLACES REV L WITH CHANGES TDRR 17755	23 Mar 65		WK
N	REVISED PER TDRR 18608	20 APR 65		WK
P	REVISED PER TDRR 19266	25 May 65		WK
R	REVISED PER TDRR 19267	25 May 65		WK
S	REVISED PER TDRR 20088	7/21/65	AJB	WK
T	REVISED PER TDRR 21190	7/23/65	AJB	WK
U	REVISED PER TDRR 21671	8-31-65		WK
V	REVISED PER TDRR 21686	8-31-65		WK
W	REVISED PER TDRR 22791	28 Sep 65		WK
Y	REVISED PER TDRR 23046	19 Oct 65		WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	19 Oct 65		WK
AA	REVISED PER TDRR 23862	19 Nov 65		WK
AB	REVISED PER TDRR 24308	14 Dec 65		WK
AC	REVISED PER TDRR 24898	12 NOV 65		WK
AD	REVISED PER TDRR 24899	12 NOV 65		WK
AE	REVISED PER TDRR 25005	16 Feb 66		WK
AF	REVISED PER TDRR 25089	16 Feb 66		WK
AG	REVISED PER TDRR 26244	16 Feb 66		WK
AH	REVISED PER TDRR 26602	24 Feb 66		WK
AJ	REVISED TDRR 26877	11 Mar 66		WK
AK	REVISED PER TDRR 27505	31 Mar 66		WK
AL	REVISED PER TDRR 27508	31 Mar 66		WK
AM	REVISED PER TDRR 27775	12 Apr 66		WK
AN	REVISED PER TDRR 28127	22 Apr 66		WK
AP	REVISED PER TDRR 28285	26 Apr 66		WK
AR	REVISED PER TDRR 29026	23 May 66		WK
AS	REVISED PER TDRR 30319	3 AUG 66		
AT	REVISED PER TDRR 32108	3 DEC 66	ME EFS	
AU	REVISED PER TDRR 33320	5 APR 67	LEE	WA

D

C

SEE NOTE 14

3	—	—	2007060-021	PIP PREAMP ASSEMBLY	61
A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
6	6	—	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
A/R	A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	1	2018837	BRACKET, CONN. 44 PIN	56
1	1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	—	1	1010928-295	RESISTOR FIXED	54
1	1	—	2018750-011	HOUSING STABLE MEMBER	53
1	1	—	2018830	SHIELD THERMOSTAT	52
1	1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
~~—~~	~~—~~	~~3~~	~~2021500 SEE NOTE 11~~	~~IRIG PREALIGNED ASSY~~	~~44~~
9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC., SELF-LOCKING	43
—	~~1~~	~~1~~	~~2018811~~	~~WEIGHT, BALANCE, S/M~~	~~42~~
—	~~1~~	~~1~~	~~2018809~~	~~WEIGHT, BALANCE, S/M~~	~~41~~
—	~~1~~	~~1~~	~~2018808~~	~~WEIGHT, BALANCE, S/M~~	~~40~~
A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
—	—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
—	~~8~~	~~8~~	~~1001488-12~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~33~~
2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
—	~~2~~	~~9~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
15	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
—	—	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	8	1000223	WASHER, CABLE CLAMP	24
8	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	1001600-1	TERMINAL, INSULATED	21
—	~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
—	~~1~~	~~1~~	~~2018779~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	2018776	CLAMP, THERMOSTAT	17
8	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
—	3	3	2007060-011	PIP PREAMP ASS'Y.	6
—	~~3~~	~~3~~	~~2018639~~	~~PIP & SUSPENSION CAP. MODULE~~	~~5~~
3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
—	~~3~~	—	~~2021500-031 SEE NOTE 11~~	~~IRIG PREALIGNED ASS'Y.~~	~~2~~
—	—	1	2018750	HOUSING STABLE MEMBER	1
QTY REQ'D	QTY REQ'D	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
031	021	011	LIST OF MATERIALS		

B

A

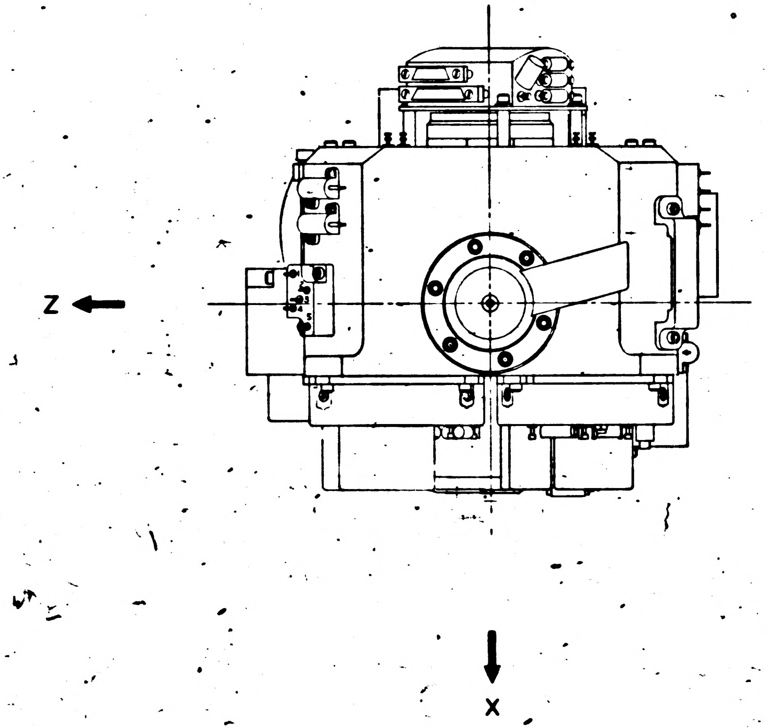
2018604	UL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	MATERIAL	DRAWN DATE CHECKED APPROVAL 23 Mar 65 APPROVAL	STABLE MEMBER ASSEMBLY
APPLICATION		HEAT TREATMENT FINAL FINISH	NASA APPROVAL 3-23-65 MIT APPROVAL 23 Mar 65	CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018605 SCALE 1/1 WT SHEET 1 OF 2

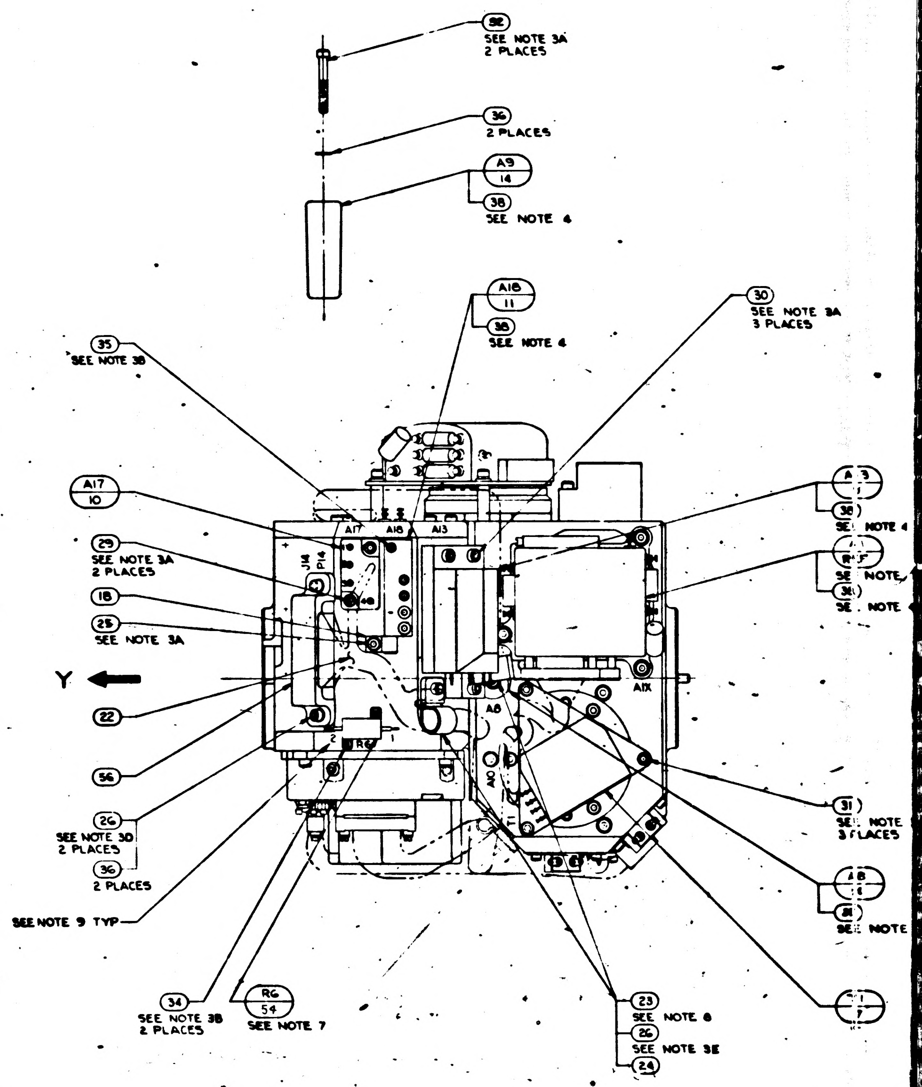
2018605 REV AU SHEET 1

2018605 AU

3/4 2018605

2018602





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3 PLACES
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SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
54
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3E
24
38
NOTE 4
NOTE
NOTE
31
NOTE
3 PLACES
A8
NOTE
A17
A18
A13
J14
P14
A1X
A8
A10
T1
R6

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

	REV	SHEET
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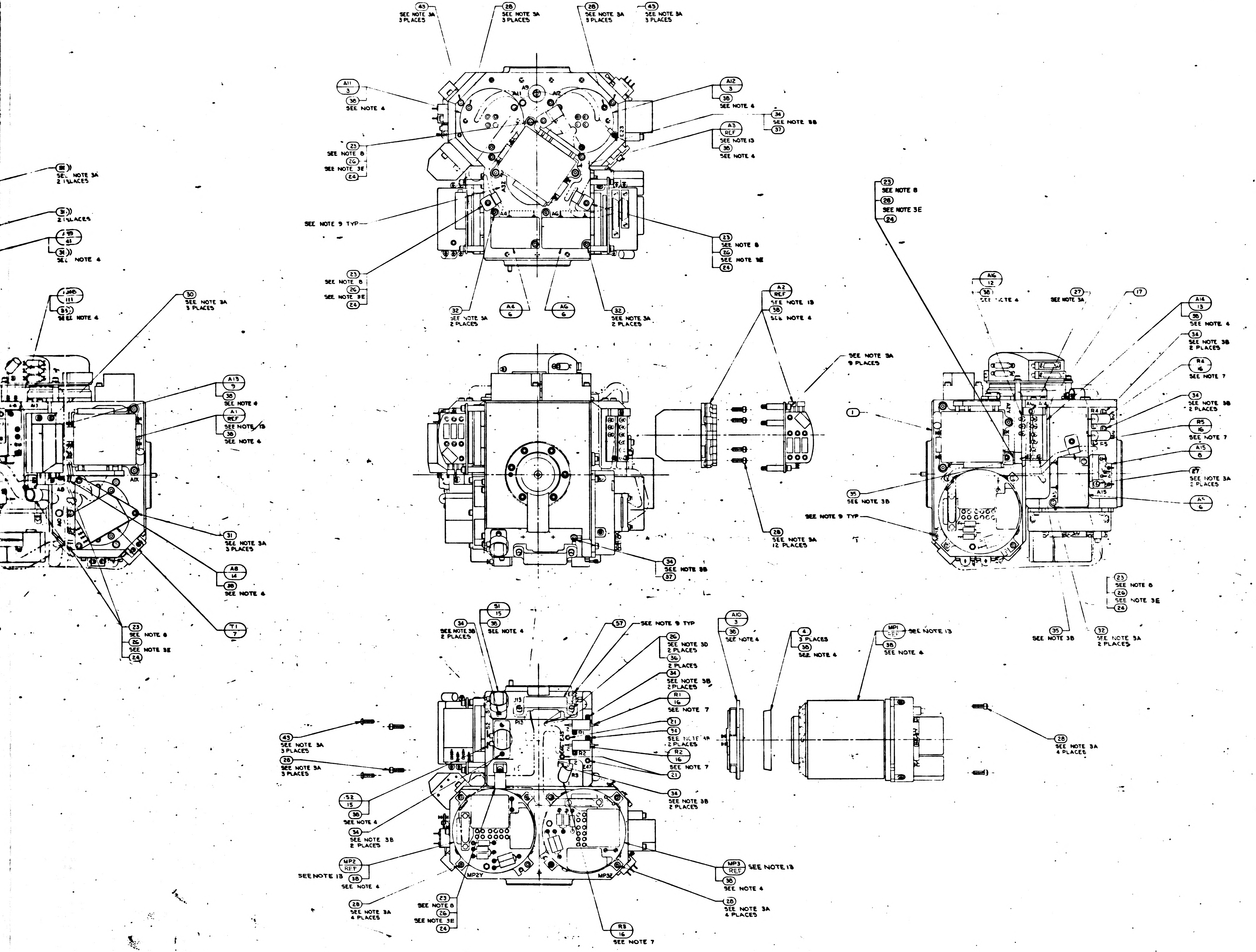
1/2018605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3 PLACES
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SEE NOTE 4
A9
A11
A12
A12
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SEE NOTE 3B
37
A3
REF
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SEE NOTE 3E
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SEE NOTE 9 TYP
A4
A6
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SEE NOTE 3E
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SEE NOTE 3E
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A1
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SEE NOTE 4
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A8
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SEE NOTE 4
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SEE NOTE 8
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SEE NOTE 3B
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SEE NOTE 3A
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SEE NOTE 3A
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SEE NOTE 8
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SEE NOTE 3E
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SEE NOTE 4
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SEE NOTE 3A
17
A14
13
38
SEE NOTE 4
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SEE NOTE 3B
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R4
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
R5
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SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A5
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A2Y
R4
R5
A15
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SEE NOTE 3B
SEE NOTE 9 TYP
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SEE NOTE 3E
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SEE NOTE 3B
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2 PLACES
S1
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SEE NOTE 3B
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SEE NOTE 4
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SEE NOTE 9 TYP
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2 PLACES
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SEE NOTE 3B
2 PLACES
R1
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SEE NOTE 3B
2 PLACES
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34
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P13
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S1
S2
E45
E46
E47
R1
R2
R3
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3 PLACES
S2
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MP3Z
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SEE NOTE 8
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SEE NOTE 3E
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R3
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SEE NOTE 7
MP3
REF
SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 3A
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3
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SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

-011 CONF

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APPROVAL
NASA APPROVAL
MIT APPROVAL

2018605	REV AU	SHEET 2

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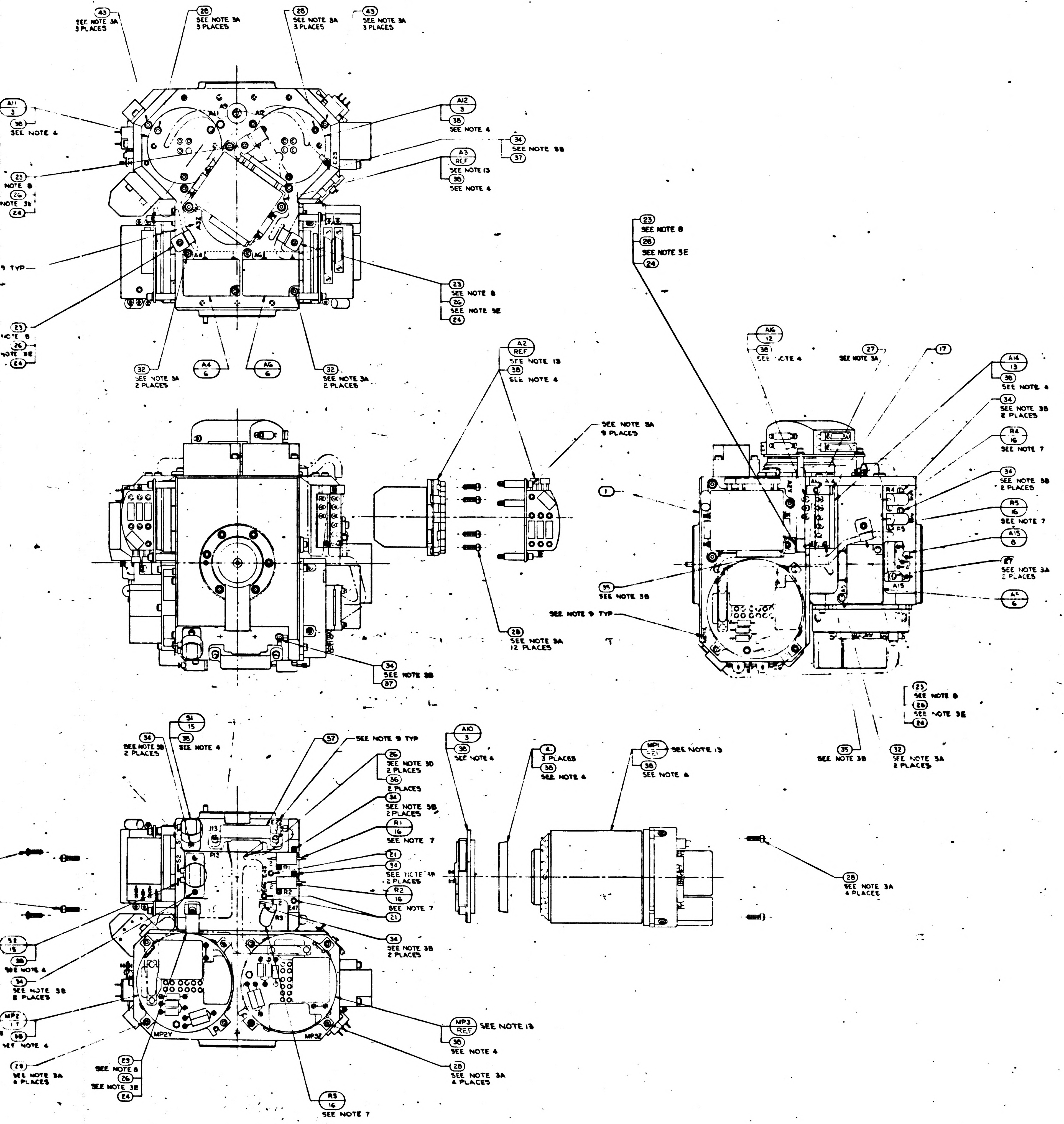
2/2018605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A3 REF SEE NOTE 13
38 SEE NOTE 4
23 NOTE 8
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23 SEE NOTE 8
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24
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A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A9
A11
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E23
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
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37
23 SEE NOTE 8
26 SEE NOTE 3E
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35 SEE NOTE 3B
SEE NOTE 9 TYP
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
R4
R5
A15
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
31 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3A 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
R1
R2
R3
E47
MP2Y
MP3Z
32 15
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34 SEE NOTE 3B 8 PLACES
MP2 17
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7

REVISIONS TDRR 23755

SYM	DESCRIPTION	DATE	APPROVAL	
Z	THIS SHEET ADDED PER TDRR 23699	19 Oct 65		WK
AA	REVISED PER TDRR 23862	10 Nov 65		WK
AB	REVISED PER TDRR [illegible]	14 Dec 65		WK
A.	REVISED PER TDRR	30 NOV 65		WK
AD	REVISED PER TDRR	30 NOV 65		WK
AE	REVISED PER TDRR 25005	15 Feb 66		WK
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AR	REVISED TDRR 29026	23 May 66		
AS	REVISION STATUS CHANGED	3 AUG 66	RS	
AT	REVISED PER TDRR 32108	3 DEC 66		
AU	REVISION STATUS CHANGED	5 APR 67	LEE	WA

-011 CONFIGURATION

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CHECKED
APPROVAL 19 Oct 65
APPROVAL
NASA APPROVAL
MIT APPROVAL 2 Nov 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 2018605
SCALE 1/1
WT
SHEET 2 OF 2

2018605 REV AU SHEET 2

2018605 AU

3/2018605

314

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

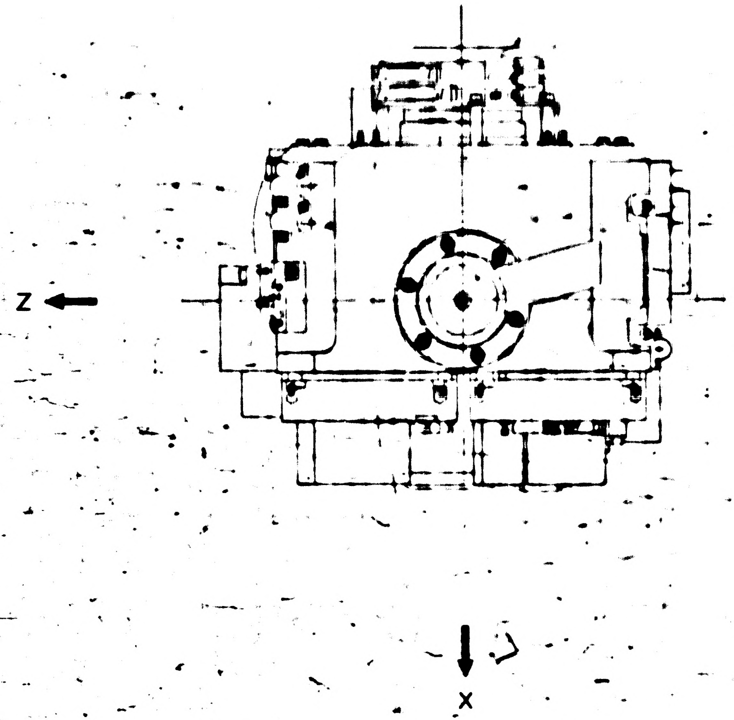
CABLE CLAMP ㉓

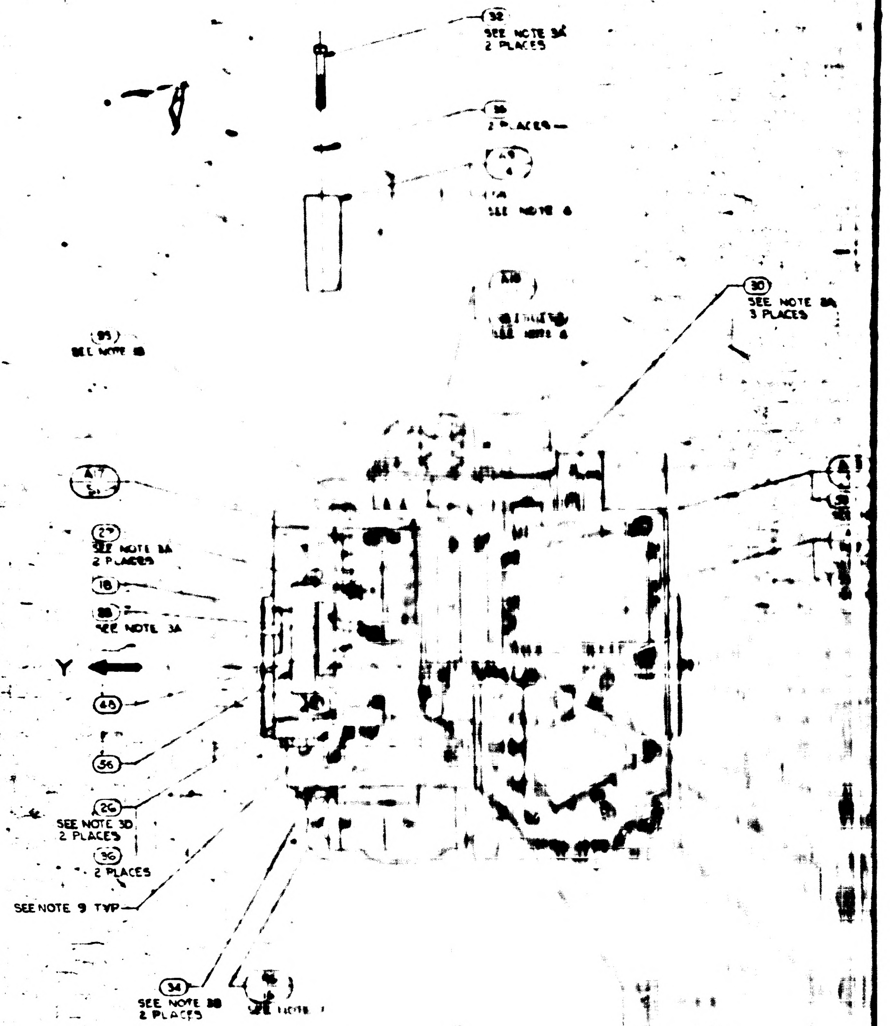
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	249
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	348
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	[illegible]
-244	34.0	-385	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		





32
SEE NOTE 3A
2 PLACES
36
2 PLACES
SEE NOTE 6
30
SEE NOTE 3A
3 PLACES
SEE NOTE 6
SEE NOTE 3B
A17
27
SEE NOTE 3A
2 PLACES
18
88
SEE NOTE 3A
Y
48
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES

NOTES:

[illegible] IN ACCORDANCE WITH MIL-D-70327.

[illegible] NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.

[illegible] SURFACE BETWEEN ITEM ① AND ITEMS [illegible] AND ㊿ BETWEEN ITEM ② AND ITEM ③, [illegible] BETWEEN ITEM ㊺ AND ITEM ㊿

[illegible] SHALL BE TWISTED TOGETHER PER ND1002032

[illegible] APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)

[illegible] AT ASSEMBLY, CLAMP TO PREVENT CABLE

[illegible] AT LOCATIONS SHOWN PER ND1002019

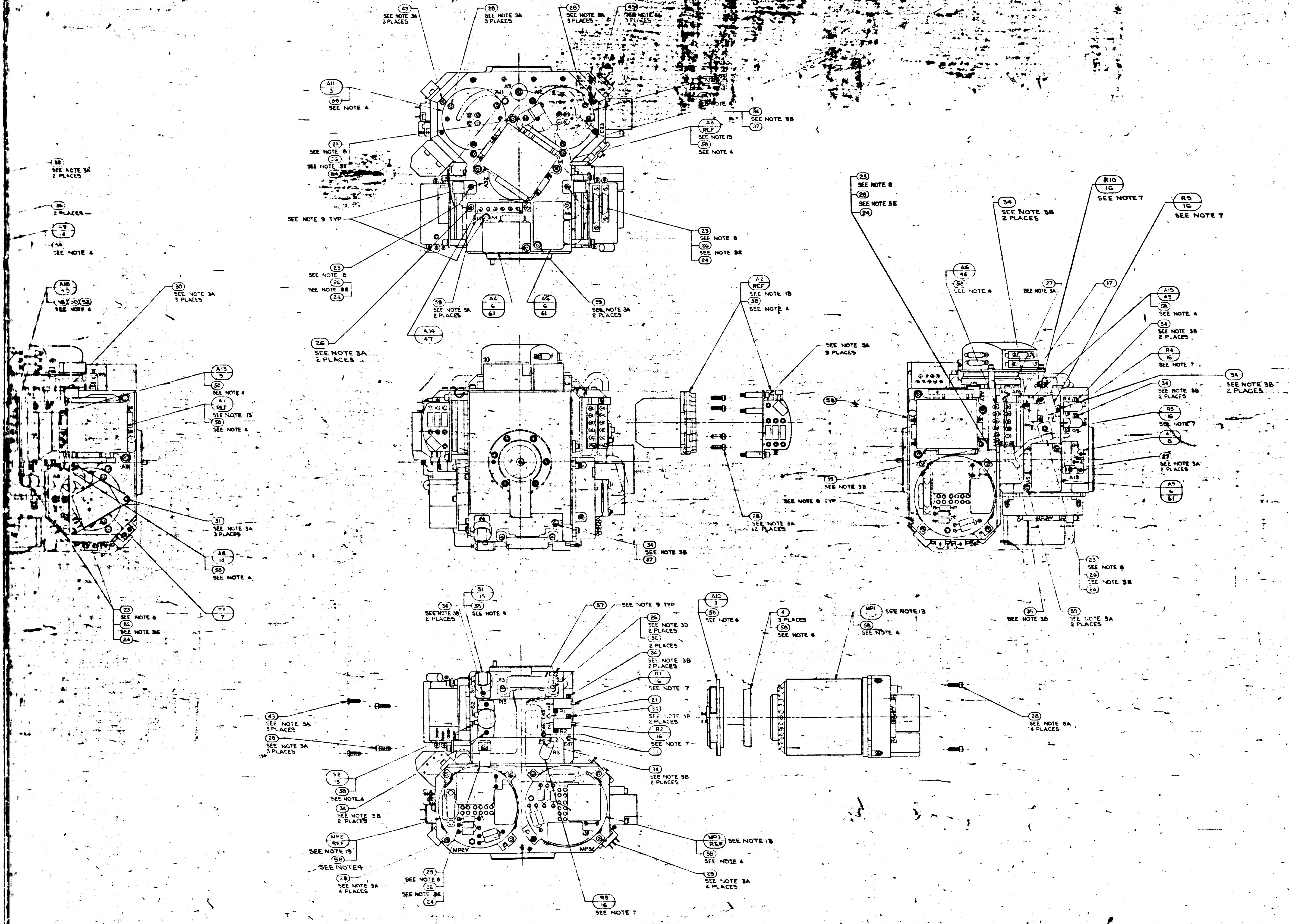
[illegible] ~~MAY BE USED IN ON CONFIGURATION OF THIS ASSY~~

[illegible] OF THIS ASSY.

[illegible] INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.

[illegible] TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

[illegible] IN PLACE OF P/N 2007060-021.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3 PLACES
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SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
A11
3
58
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
58
SEE NOTE 4
23
SEE NOTE 8
26
SEE NOTE 3E
24
32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
58
SEE NOTE 4
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3E
24
23
SEE NOTE 8
26
SEE NOTE 3E
24
A16
13
58
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
59
SEE NOTE 3A
2 PLACES
A4
6
61
A6
6
61
59
SEE NOTE 3A
2 PLACES
A14
47
26
SEE NOTE 3A
2 PLACES
A13
5
58
SEE NOTE 4
A1
REF
SEE NOTE 13
58
SEE NOTE 4
31
SEE NOTE 3A
3 PLACES
A8
14
58
SEE NOTE 4
T1
7
23
SEE NOTE 8
26
SEE NOTE 3E
24
A2
REF
SEE NOTE 13
58
SEE NOTE 4
SEE NOTE 3A
3 PLACES
59
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
23
SEE NOTE 8
26
SEE NOTE 3E
24
R10
16
SEE NOTE 7
R9
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
A16
46
58
SEE NOTE 4
27
SEE NOTE 3A
17
A15
45
58
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A7
6
27
SEE NOTE 3A
2 PLACES
A5
6
61
35
SEE NOTE 3B
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3E
24
35
SEE NOTE 3B
59
SEE NOTE 3A
2 PLACES
S1
15
58
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
30
2 PLACES
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SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
30
SEE NOTE 3A
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
A10
3
58
SEE NOTE 4
4
3 PLACES
58
SEE NOTE 4
MP1
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
S2
15
58
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
MP2
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3E
24
R3
16
SEE NOTE 7
MP3
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
MP2Y
MP3Z
J13
R3
R2
E47
A19
A18
R4
R5

SEE NOTE 16	3	—	—
SEE NOTE 16	A/R	A/R	A/R
	6	6	—
	A/R	A/R	—
	1	1	1
	1	1	1
	1	1	—
	—	—	1
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	1	1	—
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	9	9	9
	—	[illegible]	[illegible]
	—	[illegible]	[illegible]
	—	[illegible]	[illegible]
	A/R	A/R	A/R
	—	—	A/R
	2	2	2
	6	6	6
	2	2	3
	22	22	16
	—	[illegible]	[illegible]
	2	2	6
	3	3	3
	3	3	3
	—	[illegible]	[illegible]
	33	33	33
	7	7	5
	15	15	[illegible]
	—	—	1
	8	8	8
	8	8	8
	—	—	1
	3	3	3
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	1	1	1
	8	8	5
	2	2	2
	2	2	2
	—	—	1
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	—	—	1
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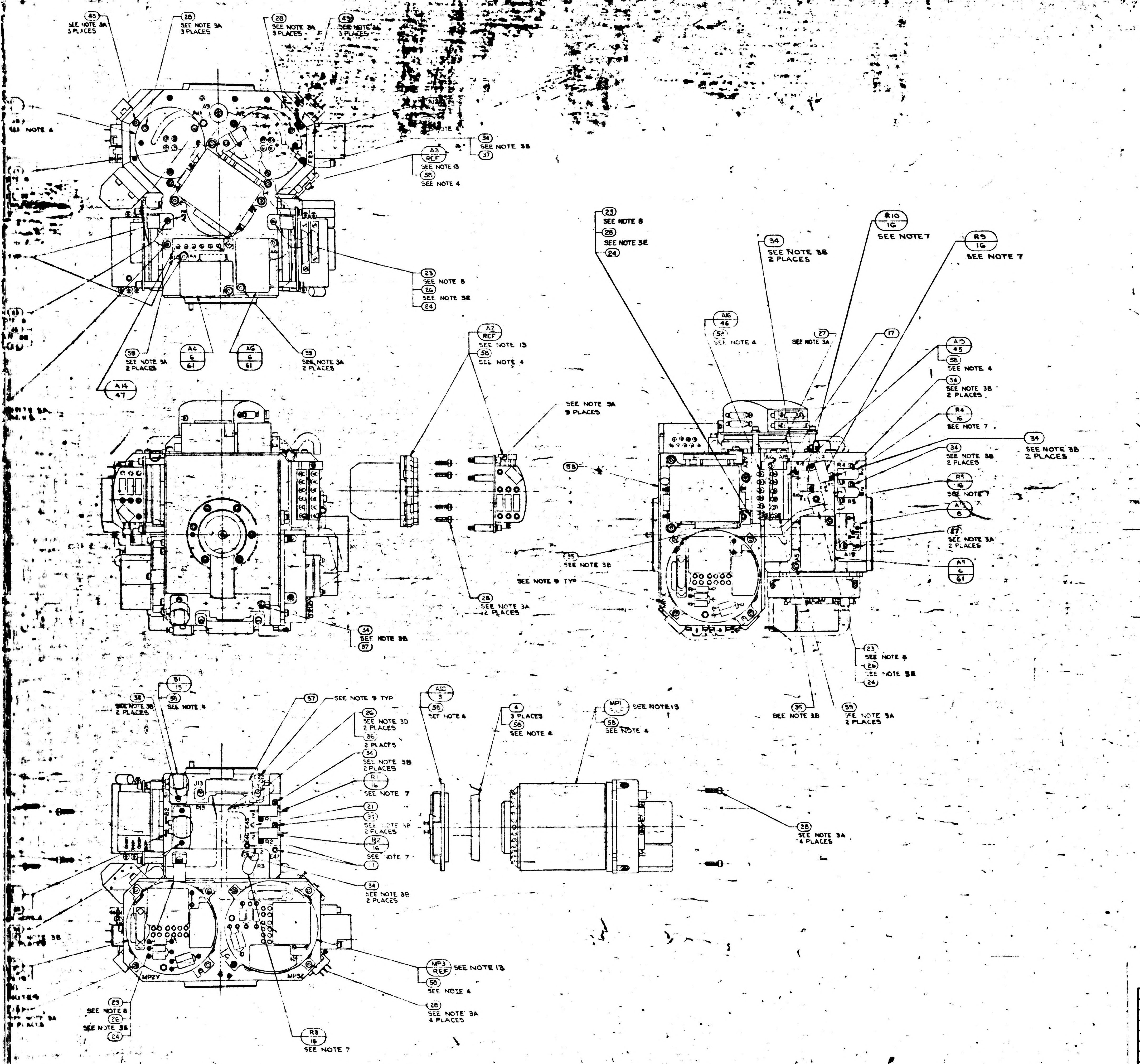
	1	[illegible]	1
	—	3	[illegible]
	—	3	[illegible]
	3	3	3
	[illegible]	3	[illegible]
	—	3	[illegible]
	—	—	1
	QTY REQD	QTY REQD	QTY REQD
	031	021	C1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

2018605 REV AV SHEET 1

2/2018605



43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
SEE NOTE 4
A9
A11
A2 REF SEE NOTE 13
56 SEE NOTE 4
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
A2 REF SEE NOTE 13
56 SEE NOTE 4
SEE NOTE 3A 9 PLACES
58
35 SEE NOTE 3B
SEE NOTE 9 TYP
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
28 SEE NOTE 3E
24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46
52 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A5 6
27 SEE NOTE 3A 2 PLACES
A9 6 61
23 SEE NOTE 8
26 SEE NOTE 3B
24
35 SEE NOTE 3B
59 SEE NOTE 3A 2 PLACES
38 SEE NOTE 3B 2 PLACES
51 15
55 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
R2 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
A10 3
58 SEE NOTE 4
4 3 PLACES
56 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
MP2Y
MP3Z
MP3 REF SEE NOTE 13
56 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
28 SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7

REVISIONS TDRR 17755

SYM	DESCRIPTION	DATE		APPROVAL
M	REPLACES REV L WITH CHANGES TDRR 17755	[illegible]		
N	REVISED PER TDRR 8608	20APR65		WR
P	REVISED PER TDRR 19266	25May65		WR
R	REVISED PER TDRR 19267	[illegible]		WR
S	REVISED PER TDRR 20088	7/21/65		WR
T	REVISED PER TDRR 21180	7/23/65		WR
U	REVISED PER TDRR 21671	8-31-65		WR
V	REVISED PER TDRR 21606	8-31-65		WR
W	REVISED PER TDRR 22791	28Sep65		WR
Y	REVISED PER TDRR 23046	[illegible]		WR
Z	SHEET TWO ADDED REVISED PER TDRR 23699	[illegible]		WR
AA	REVISED PER TDRR 23862	[illegible]		
AB	REVISED PER TDRR 24308	[illegible]		WR
AC	REVISED PER TDRR 24898	12 NOV 65		WR
AD	REVISED PER TDRR 24899	12 NOV65		WR
AE	REVISED PER TDRR 25005	[illegible]		
AF	REVISED PER TDRR 25089	[illegible]		
AG	REVISED PER TDRR 26244	[illegible]		
AH	REVISED PER TDRR 26602	[illegible]		
AJ	REVISED TDRR 26877	[illegible]		WR
AK	REVISED PER TDRR 27505	[illegible]		
AL	REVISED PER TDRR 27508	[illegible]		
AM	REVISED PER TDRR 27775	[illegible]		WR
AN	REVISED PER TDRR 28127	[illegible]		
AP	REVISED PER TDRR 28285	[illegible]		
AR	REVISED PER TDRR 29026	[illegible]		
AS	REVISED PER TDRR 30319	3AUG66		
AT	REVISED PER TDRR 32108	8 DEC 66	ME EFS	
AU	REVISED PER TDRR 33320	5 APR 67	LEE	
AV	REVISED PER TDRR 33339	6 APR 67	LEE	

	QTY REQ'D	QTY REQ'D	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
SEE NOTE 15	3	—	—	2007060-021	PIP PREAMP ASSEMBLY	61
SEE NOTE 14	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
	6	6	—	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
	A/R	A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
	1	1	1	2018838	BRACKET, CONN. 34 PIN	57
	1	1	1	2018837	BRACKET, CONN. 44 PIN	56
	1	1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
	—	—	1	1010928-295	RESISTOR FIXED	54
	1	1	—	2018730-011	HOUSING STABLE MEMBER	53
	1	1	—	2018830	SHIELD THERMOSTAT	52
	1	1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
	1	1	—	2018829-2	SHIM BLOWER CONT THERMO	50
	1	1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT.	49
	1	1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
	1	1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
	1	1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
	1	1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
	~~—~~	~~—~~	~~3~~	~~2021500 SEE NOTE 11~~	~~IRIG PREALIGNED ASSY~~	~~44~~
	9	9	9	1010891-18	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
	~~—~~	~~1~~	~~1~~	~~[illegible]~~	~~WEIGHT, BALANCE, S/M~~	~~42~~
	~~—~~	~~1~~	~~1~~	~~[illegible]~~	~~WEIGHT, BALANCE, S/M~~	~~41~~
	~~—~~	~~1~~	~~1~~	~~[illegible]~~	~~WEIGHT, BALANCE, S/M~~	~~40~~
	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
	—	—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO	38
	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
	2	2	3	1011625-31	SCREW, HEX., SOC. HD., SELF-LOCKING	35
	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
	~~—~~	~~[illegible]~~	~~[illegible]~~	~~1001488-10~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~33~~
	2	2	6	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
	~~—~~	~~3~~	~~[illegible]~~	~~1001488-5~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	~~29~~
	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
	15	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
	—	—	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
	8	8	8	1000223	WASHER, CABLE CLAMP	24
	8	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
	—	—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
	3	3	3	1001600-1	TERMINAL, INSULATED	21
	~~—~~	~~1~~	~~1~~	~~2018780~~	~~BRACKET, CONN. 34 PIN~~	~~20~~
	~~—~~	~~1~~	~~1~~	~~[illegible]~~	~~BRACKET, CONN. 44 PIN~~	~~19~~
	1	1	1	2018778	CLAMP, THERMOSTAT	18
	1	1	1	2018776	CLAMP, THERMOSTAT	17
	8	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9, R10	16
	2	2	2	1001485	THERMOSTAT, SAFETY	15
	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
	—	—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
	—	—	1	2018686	THERMO. ASS'Y. TEMP. ALARM	12
	—	—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
	—	—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
	—	3	3	2007060-011	PIP PREAMP ASS'Y.	6
	~~—~~	~~3~~	~~3~~	~~[illegible]~~	~~PIP & SUSPENSION CAR MODULE~~	~~5~~
	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
	~~—~~	~~3~~	~~—~~	~~2021500-031 SEE NOTE 11~~	~~IRIG PREALIGNED ASSY~~	~~2~~
	—	—	1	2018750	HOUSING STABLE MEMBER	1
	031	021	011		LIST OF MATERIALS	

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
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FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23Mar65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

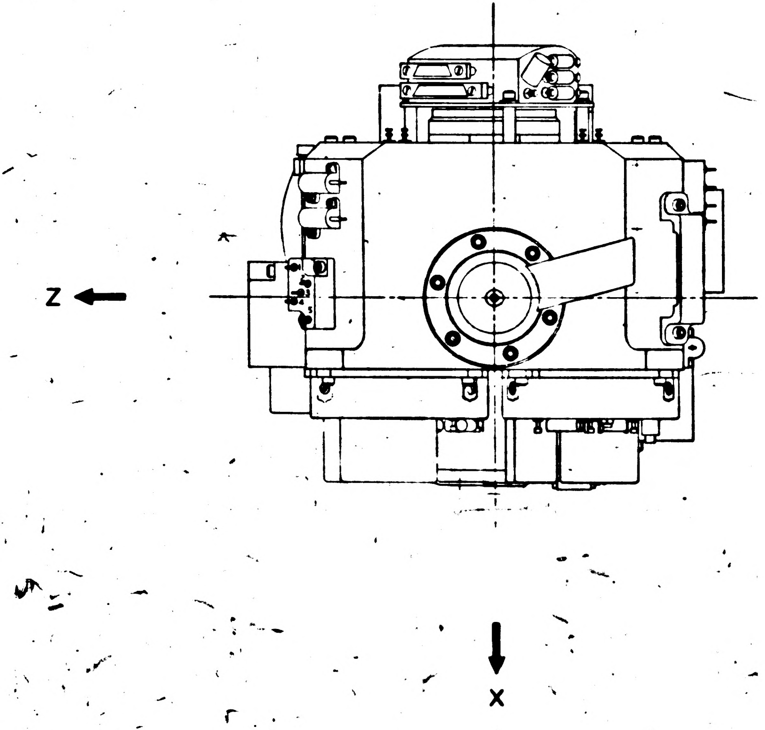
STABLE MEMBER ASSEMBLY

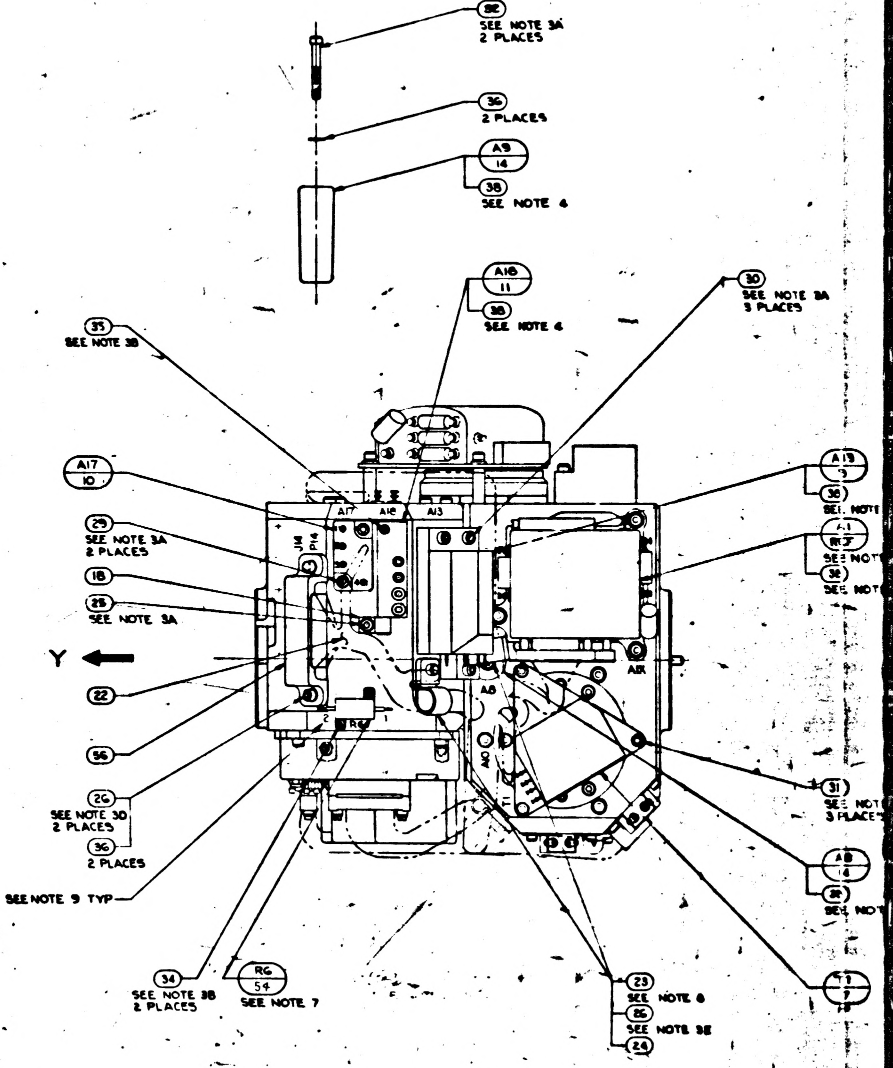
CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018605
SCALE 1/1 WT SHEET 1 OF 2

2018605 AV

2018605 AV 1

3/2018605





32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
38
SEE NOTE 4
A16
11
38
SEE NOTE 4
30
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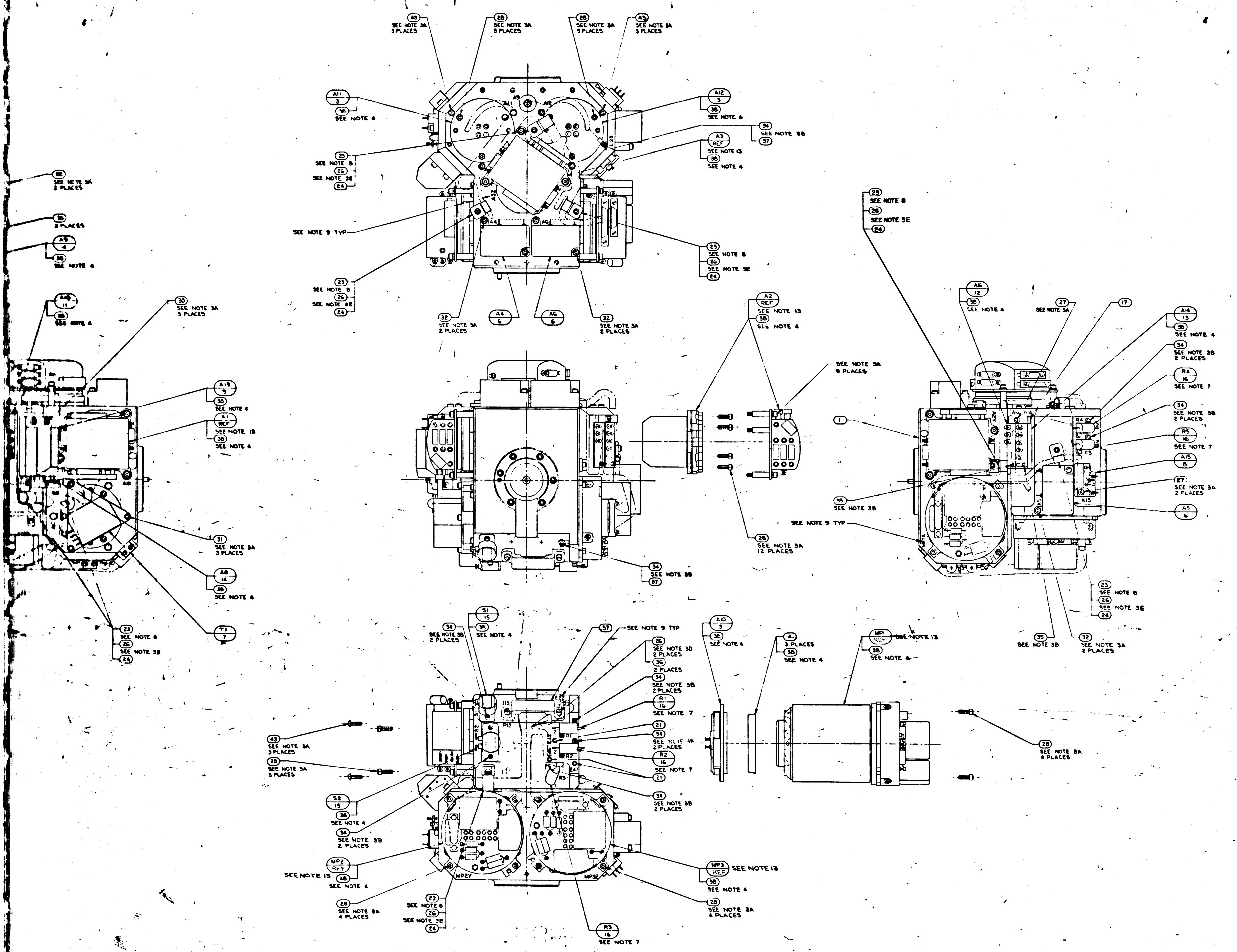
3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
28
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
RG
54
SEE NOTE 7
23
SEE NOTE 6
25
SEE NOTE 3E
24
A13
36
A1
38
A8
14
31
3 PLACES
7
A17
A16
A13
J14
P14
A8
A10
RG

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

2018605 AV 2

1/2018605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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
A9
A11
A12
E23
A32
A4
A6
23 SEE NOTE 8
26 SEE NOTE 3E
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
32 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 4
38 SEE NOTE 4
A10 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 REF SEE NOTE 13
38 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
23 SEE NOTE 8
26 SEE NOTE 3E
24
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
A2Y
A16
A14
R4
R5
A15
A5
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
S1 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
S1
S2
E22
E47
R1
R2
R3
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
MP2Y
MP3Z
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

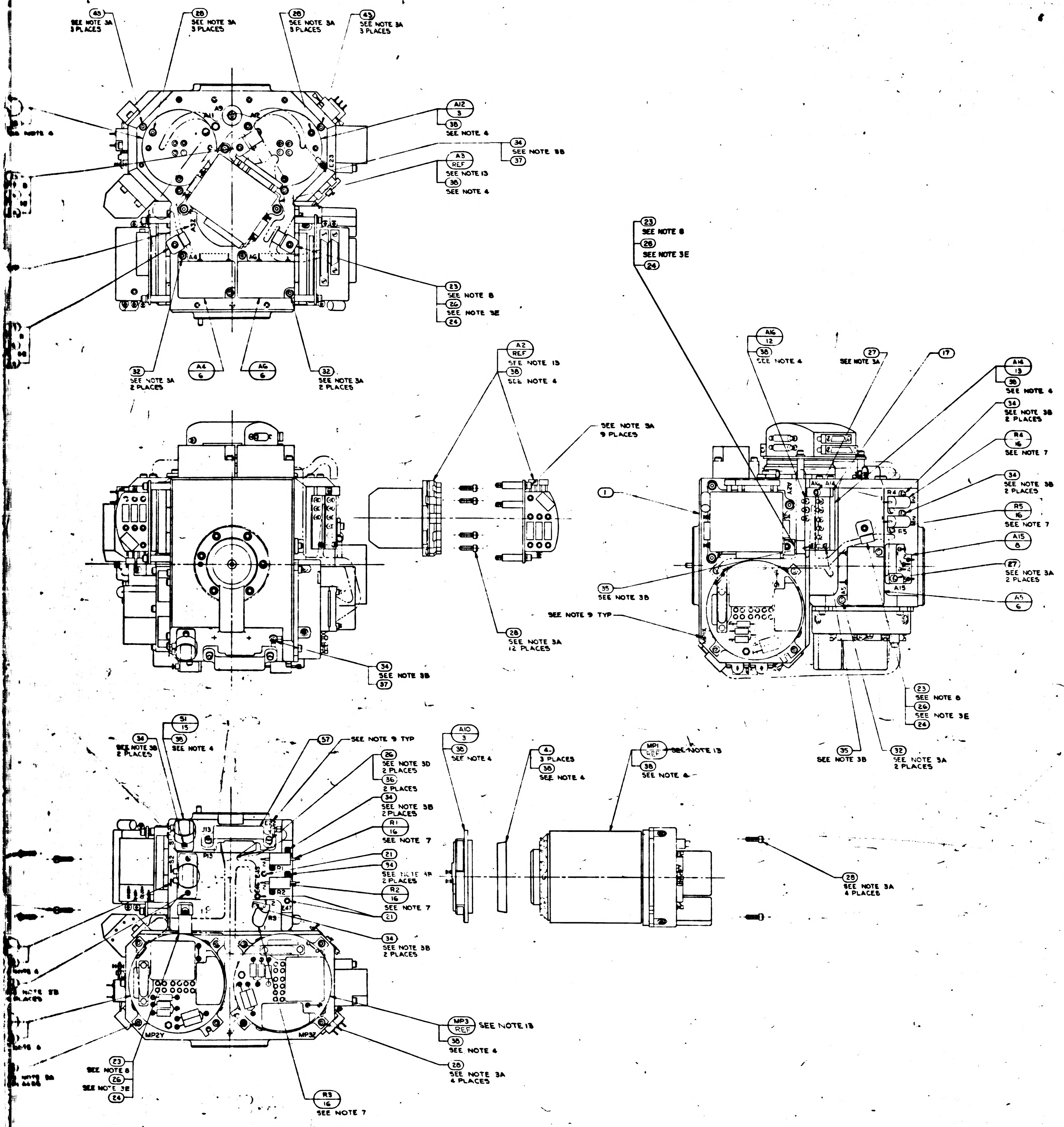
2018605	REV AV	SHEET 2

-011 CONF

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	DL2018601	HEAT TREATMENT
NEXT ASSY	USED ON	
APPLICATION		FINAL FINISH

2/2018605

		REVISIONS			
	SYM	DESCRIPTION	DATE	APPROVAL	
M	Z	THIS SHEET ADDED PER TDRR 23699			WK
	AA	REVISED PER TDRR 23862			WK
	AB	REVISED PER TDRR 24508			WK
	AC	REVISED PER TDRR	NOV 64		WK
	AD	REVISED PER TDRR	30 NOV 64		WK
	AE	REVISED PER TDRR 25005	15 Feb 66		WK
	AF	REVISED PER TDRR 25089	15 Feb 66		WK
	AG	REVISED PER TDRR 26244	15 Feb 66		WK
	AH	REVISED PER TDRR 26602	1 Mar 66		WK
	AJ	REVISED TDRR 26877			WK
	AK	REVISED PER TDRR 27508	3 Mar 66		WK
	AL	REVISED PER TDRR 27508	3 Mar 66		WK
	AM	REVISED TDRR 27775	12 Apr 66		WK
	AN	REVISED TDRR 28127	22 Apr 66		WK
	AP	REVISED TDRR 28285	26 Apr 66		WK.
	AR	REVISED TDRR 29026	23 May 66		
M	AS	REVISION STATUS CHANGED	3 Aug 66		
M	AT	REVISED PER TDRR 32108	3 DEC 66	ME	
	AU	REVISION STATUS CHANGED	5 APR 67	LEE	
	AV	REVISION STATUS CHANGED	6 APR 67	LEE	



43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
A12
3
38
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
38
SEE NOTE 4
A9
A11
A2
A8
A6
A4
23
SEE NOTE 8
26
SEE NOTE 3E
24
32
SEE NOTE 3A
2 PLACES
A4
6
A6
6
32
SEE NOTE 3A
2 PLACES
A2
REF
SEE NOTE 13
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
23
SEE NOTE 8
26
SEE NOTE 3E
24
A16
12
38
SEE NOTE 4
27
SEE NOTE 3A
17
A14
13
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A5
6
A7
A14
A16
R4
R5
F5
A15
23
SEE NOTE 8
26
SEE NOTE 3E
24
35
SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
34
SEE NOTE 3B
2 PLACES
51
15
38
SEE NOTE 4
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
J13
P13
R1
R2
R3
MP2Y
MP3Z
MP3
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
16
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3E
24
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

-011 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN DATE CHECKED APPROVAL 19 23 65 APPROVAL	STABLE MEMBER - ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230 · SIZE J · NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	SCALE 1/1 · WT · SHEET 2 OF 2
APPLICATION				

2018605 AV

2018605 AV 2

3/2018605

2018602

WIRING LEGEND

COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

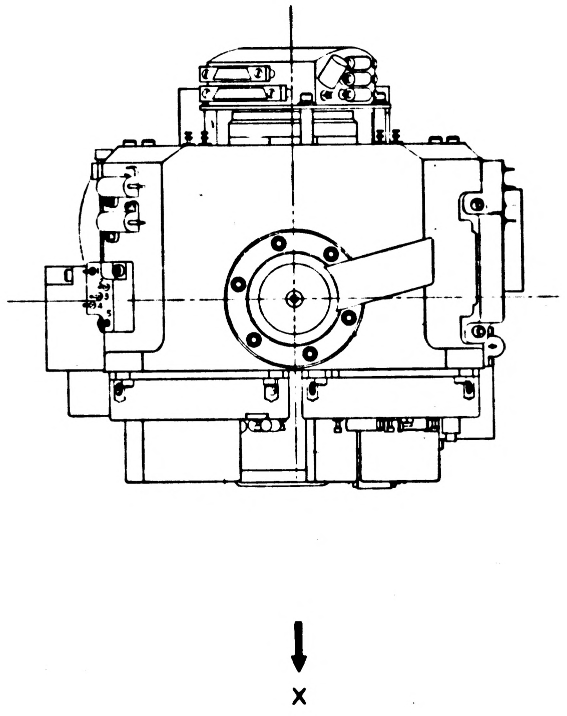
CABLE CLAMP (23)

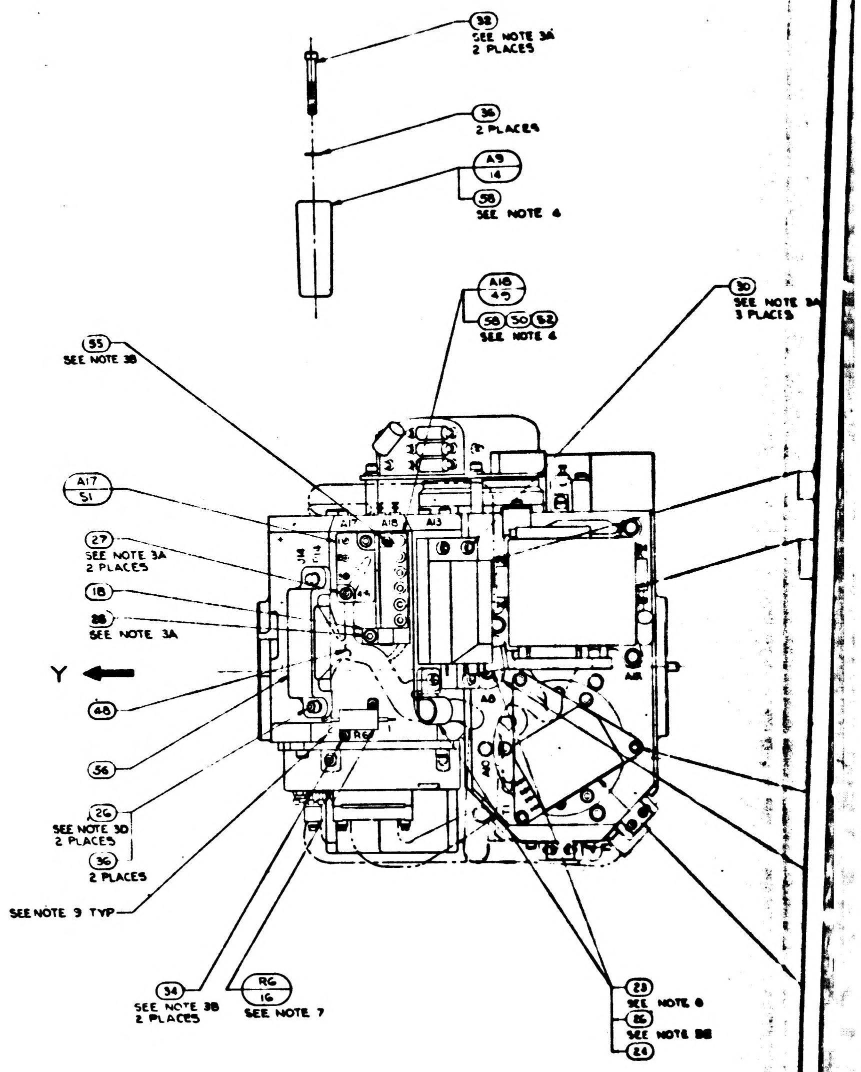
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1, R2, R3, R4, R5, R6, R9, & R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-389	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		



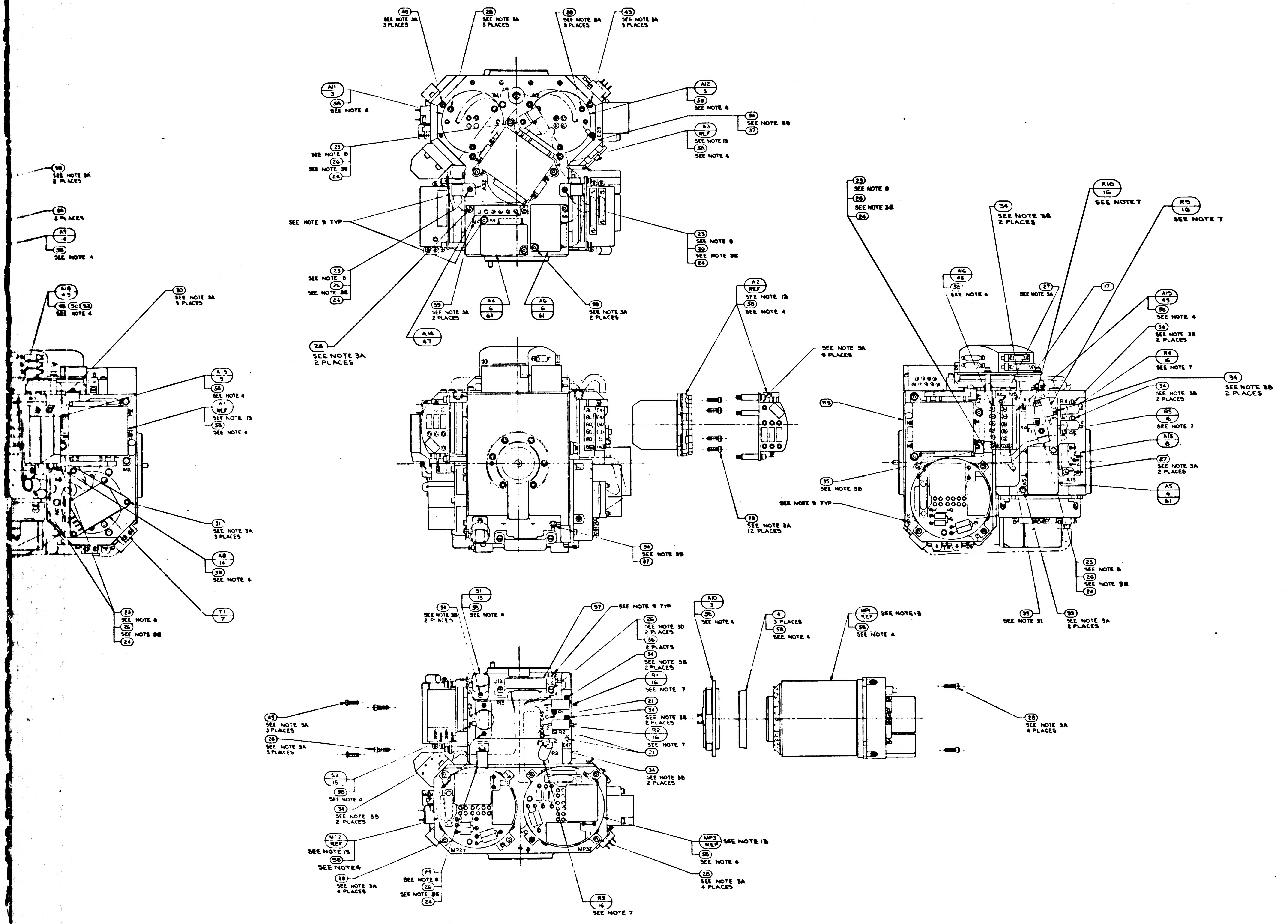

(32) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9 / 14
(58) SEE NOTE 4
A18 / 49
(58)(50)(52) SEE NOTE 4
(30) SEE NOTE 3A 3 PLACES
(55) SEE NOTE 3B
A17 / 51
(27) SEE NOTE 3A 2 PLACES
(18)
(28) SEE NOTE 3A
Y
(48)
(56)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
(34) SEE NOTE 3B 2 PLACES
R6 / 16 SEE NOTE 7
(23) SEE NOTE 8
(26) SEE NOTE 3E
(24)
A17
A18
A13
R6

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM (38) OR (53) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14),(15),(45),(46),(47) AND (50), BETWEEN ITEM (2) AND ITEM (3). BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (49) AND ITEM (50)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM (24) FOR-011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
15. PIP PREAMP P/N 2021269-011 MAY BE USED IN PLACE OF P/N 2007060-021.

	REV	SHEET
2018605	AW	1

1/2018605


5
4
3
2
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
58 SEE NOTE 4
A12 3
58 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
A9
A11
A12
E23
A32
A14
A4
A6
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
28 SEE NOTE 3A 2 PLACES
98 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
58 SEE NOTE 4
A18 45
58 50 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
58 SEE NOTE 4
A1 REF SEE NOTE 13
58 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14
58 SEE NOTE 4
T1 7
23 SEE NOTE 8
26 SEE NOTE 3E
24
34 SEE NOTE 3B
37
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
23 SEE NOTE 8
28 SEE NOTE 3E
24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A19 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
58
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
A16
A19
R4
R5
R10
A5
A15
M31X
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 31
99 SEE NOTE 3A 2 PLACES
S1 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 30 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
94 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
S1
S2
E22
E45
E46
E47
R1
R2
R3
MP2Y
MP3Z
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

SEE NOTE 16	3	—	—
SEE NOTE 14	A/R	A/R	A/R
	6	6	—
	A/R	A/R	—
	1	1	1
	1	1	1
	1	1	—
	—	—	1
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	1	1	—
	9	9	9
	A/R	A/R	A/R
	—	—	A/R
	2	2	2
	6	6	6
	2	2	3
	22	22	18
	2	2	6
	3	3	3
	3	3	3
	33	33	33
	7	7	6
	15	15	12
	—	—	1
	8	8	8
	8	8	8
	—	—	1
	3	3	3
	1	1	1
	1	1	1
	8	8	5
	2	2	2
	2	2	2
	—	—	1
	—	—	1
	—	—	1
	—	—	1
	1	1	1
	1	1	1
	1	1	1
	—	3	3
	3	3	3
	3	3	3
	—	—	
	QTY REQD	QTY REQD	QTY REQD
	031	021	0

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

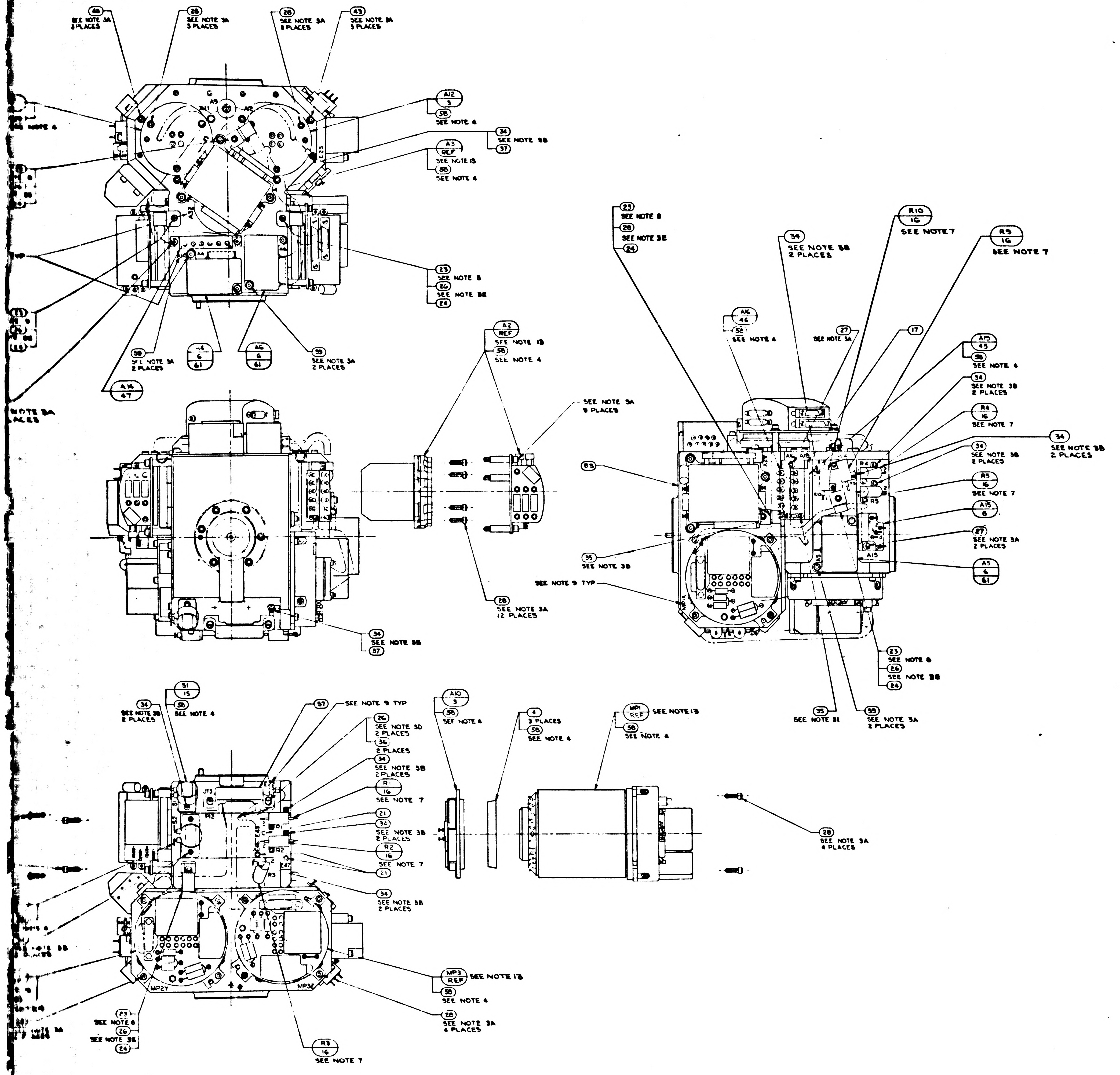
2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

2018605 REV AW SHEET 1

27/2018605

REV	DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	EF

REVISIONS TDRR 17755



48 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A12 3 58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13 58 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3E 24
59 SEE NOTE 3A 2 PLACES
A6 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
A2 REF SEE NOTE 13 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
53
35 SEE NOTE 3B
SEE NOTE 9 TYP
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 28 SEE NOTE 3E 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
17
A13 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
23 SEE NOTE 8 26 SEE NOTE 3B 24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
31 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
R3 16 SEE NOTE 7
J13
MP2Y
MP3Z

QTY REQ'D 031	QTY REQ'D 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
3	—	—	2007060-021	PIP PREAMP ASSEMBLY	61
A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
6	6	—	1001488-9	SCREW, HEX, SOC. HD SELF-LOCKING	59
A/R	A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO 4	58
1	1	1	2018838	BRACKET, CONN 34 PIN	57
1	1	1	2018837	BRACKET, CONN 44 PIN	56
1	1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
—	—	1	1010928-295	RESISTOR FIXED	54
1	1	—	2018750-011	HOUSING STABLE MEMBER	53
1	1	—	2018830	SHIELD THERMOSTAT	52
1	1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	1	—	2018828	WIRING HARNESS 'A' STABLE MEMBER	48
1	1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC, SELF-LOCKING	43
A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
—	—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
2	2	8	1001488-10	SCREW, HEX., SOC. HD, SELF-LOCKING	32
3	3	3	1001488-7	SCREW, HEX., SOC. HD, SELF-LOCKING	31
3	3	3	1001488-6	SCREW, HEX., SOC. HD, SELF-LOCKING	30
33	33	33	1001488-4	SCREW, HEX., SOC. HD, SELF-LOCKING	28
7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
15	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
—	—	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	8	1000223	WASHER, CABLE CLAMP	24
8	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	2018776	CLAMP, THERMOSTAT	17
8	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
—	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
—	—	1	2018750	HOUSING STABLE MEMBER	1

SEE NOTE 15 (find no. 61)
SEE NOTE 14 (find no. 60)

LIST OF MATERIALS

NEXT ASSY	USED ON
2018604	DL 2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

CODE IDENT NO 80230 | SIZE J | NASA DRAWING NO 2018605
SCALE 1/1 | WT | SHEET 1 OF 2

2018605 AW

2018605 AW 1

3/2018605

9 8 7 6

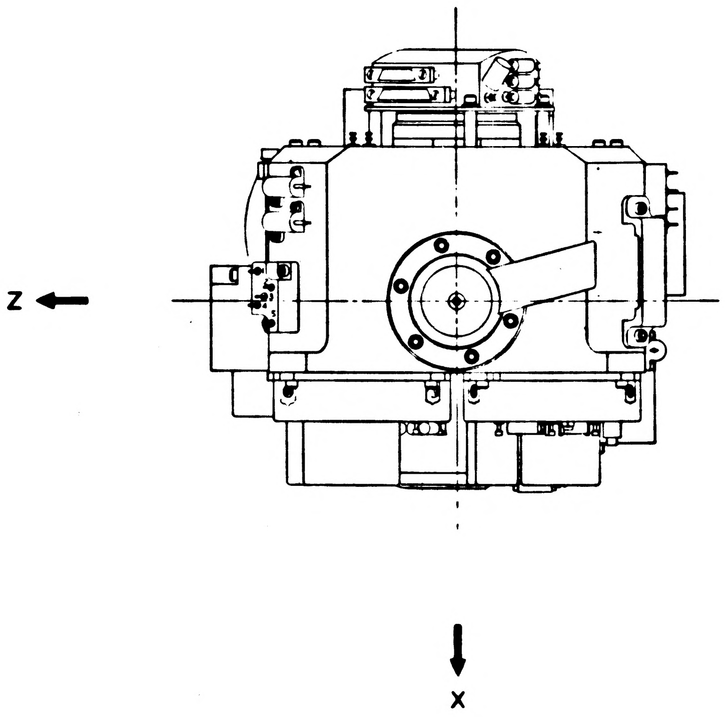
D

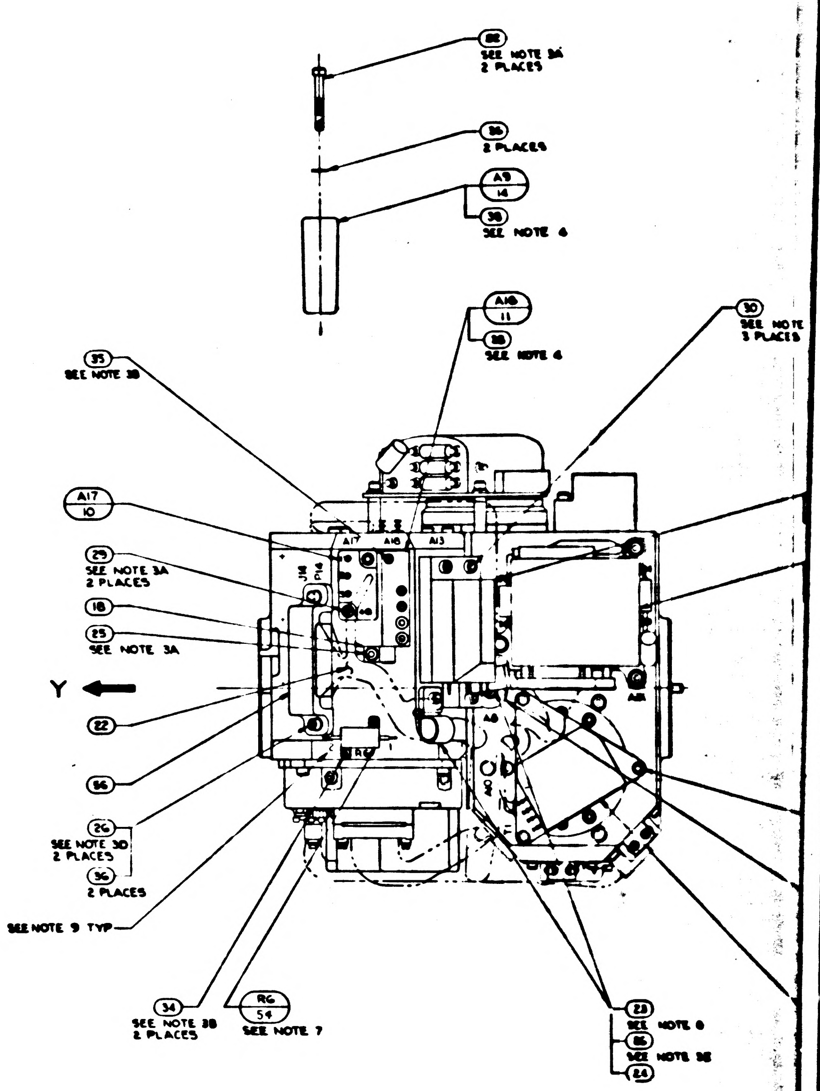
C

B

A

2018605




82
SEE NOTE 3A
2 PLACES
86
2 PLACES
A9
14
38
SEE NOTE 4
A16
11
38
SEE NOTE 4
30
SEE NOTE
3 PLACES
35
SEE NOTE 3B
A17
10
A17
A16
A13
J18
P14
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
96
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
54
SEE NOTE 7
23
SEE NOTE 8
86
SEE NOTE 3E
24

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

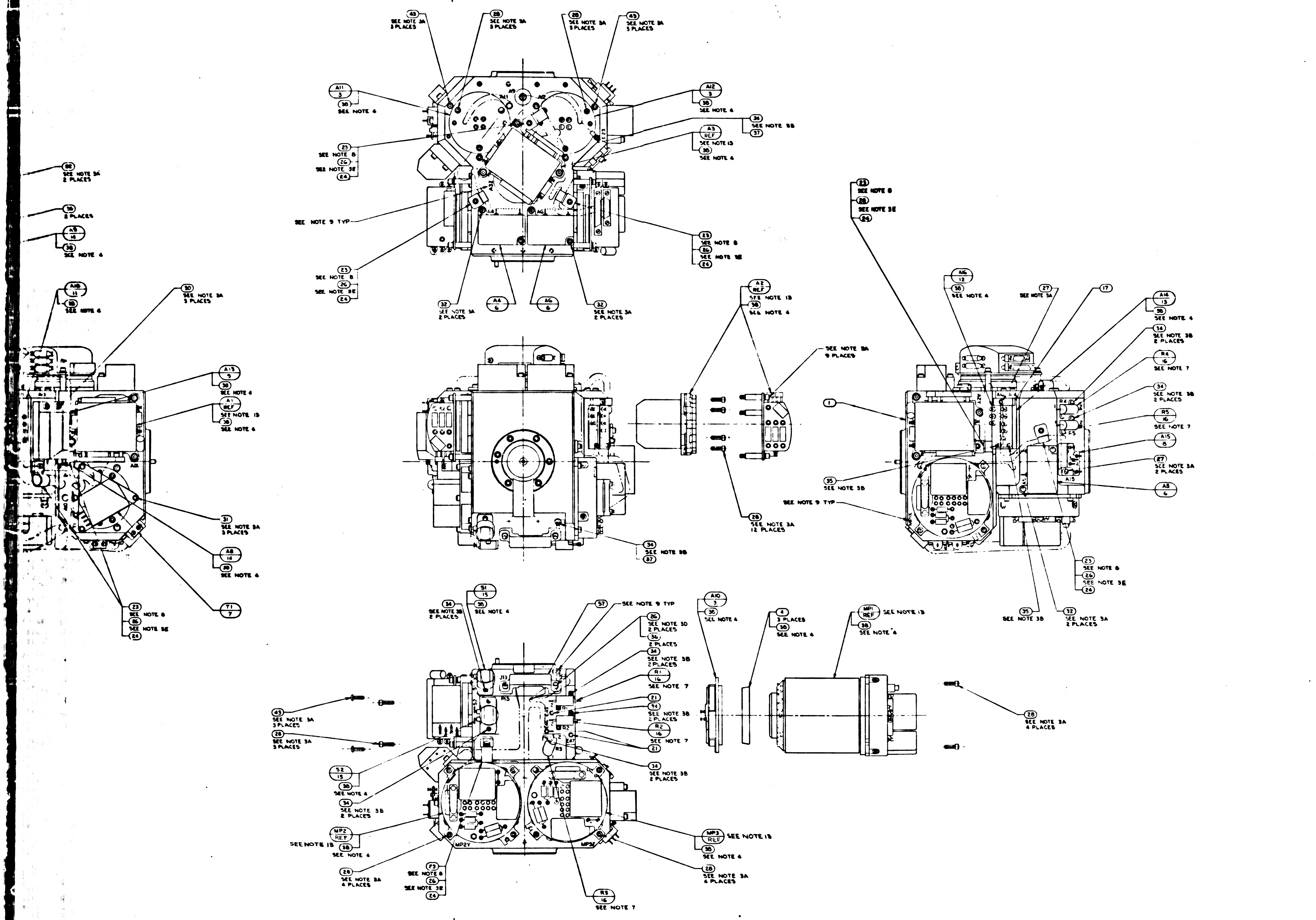
3H

2018605	REV	SHEET
	AW	2

9 8 7 6

1/2018605

5 4 3 2



43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A9
A11
A12
E23
A32
A4
A6
32 SEE NOTE 3A 2 PLACES
38 2 PLACES
A9 14
38 SEE NOTE 4
A10 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 REF SEE NOTE 13
38 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
23 SEE NOTE 8
86 SEE NOTE 3E
24
34 SEE NOTE 3B
37
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
R4
R5
A15
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
E22
S1
S2
R1
R2
R3
E45
E46
E47
MP2Y
MP3Z
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

-01. CON

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	UL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

2018605	REV AW	SHEET 2

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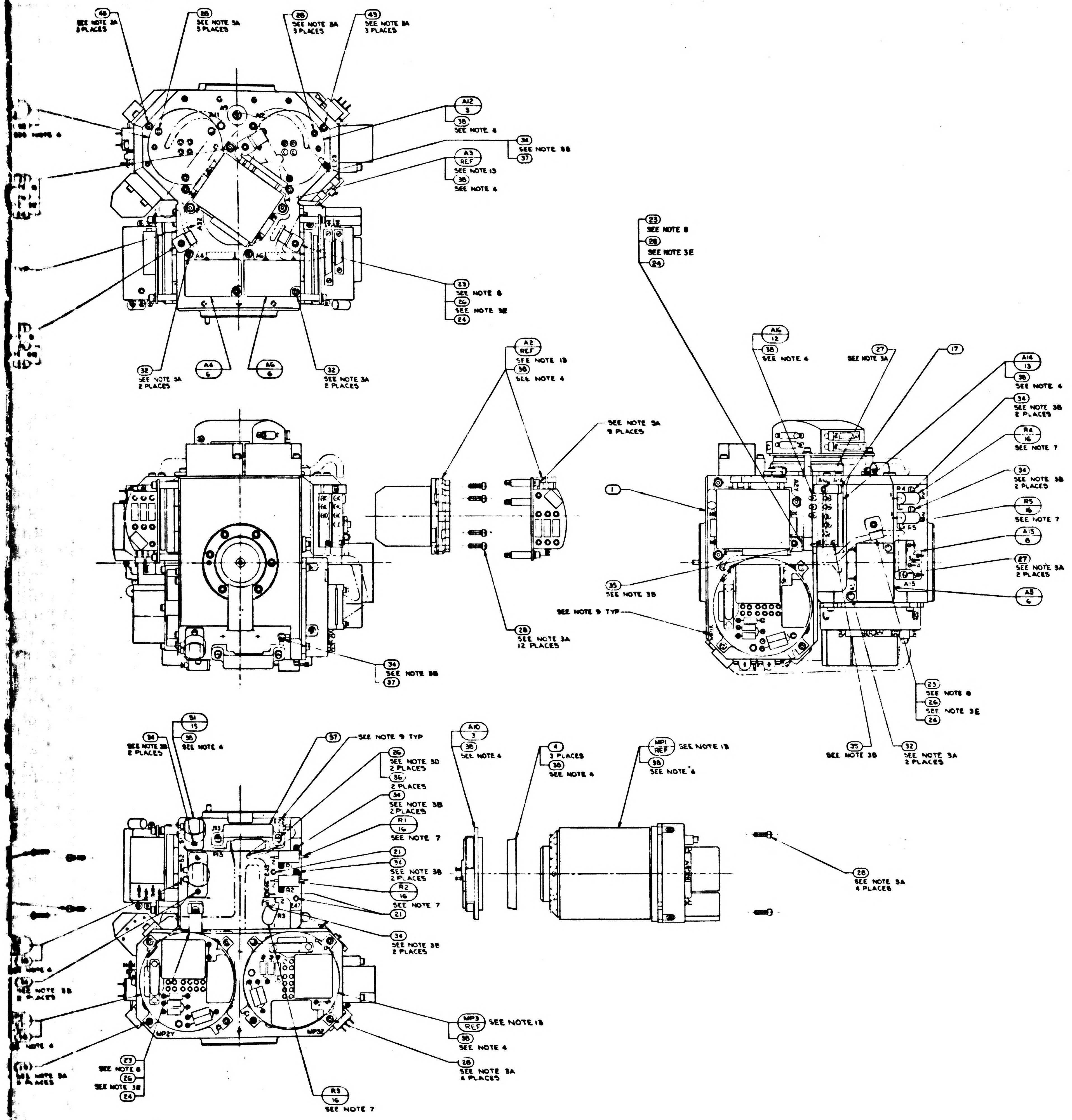
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	EF



48 SEE NOTE 3A 8 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A9
A11
A12
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
A32
A4
A6
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
R4
R5
A15
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
S1 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
R1
R2
R3
E47
MP2Y
MP3Z
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

-011 CONFIGURATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON TEXAS		
MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL 19 0 3 65 APPROVAL	STABLE MEMBER ASSEMBLY		
HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230	SIZE J	NASA DRAWING NO 2018605
FINAL FINISH	MIT APPROVAL	SCALE 1/1	WT	SHEET 2 OF 2

NEXT ASSY	USED ON
2018604	DL 2018601
APPLICATION	

2018605 REV AW SHEET 2

2018605 AW

2018605

3/-2018605

2018605

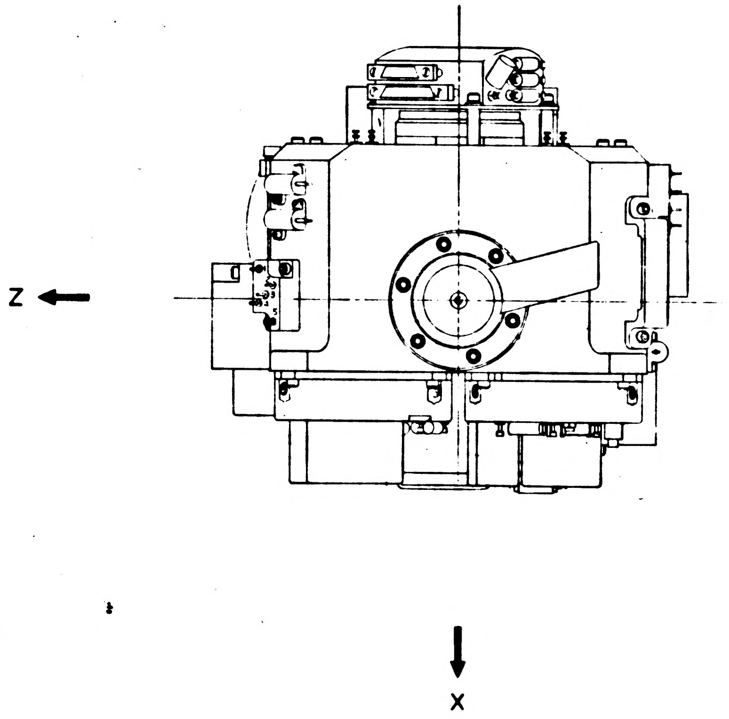
WIRING LEGEND				
COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

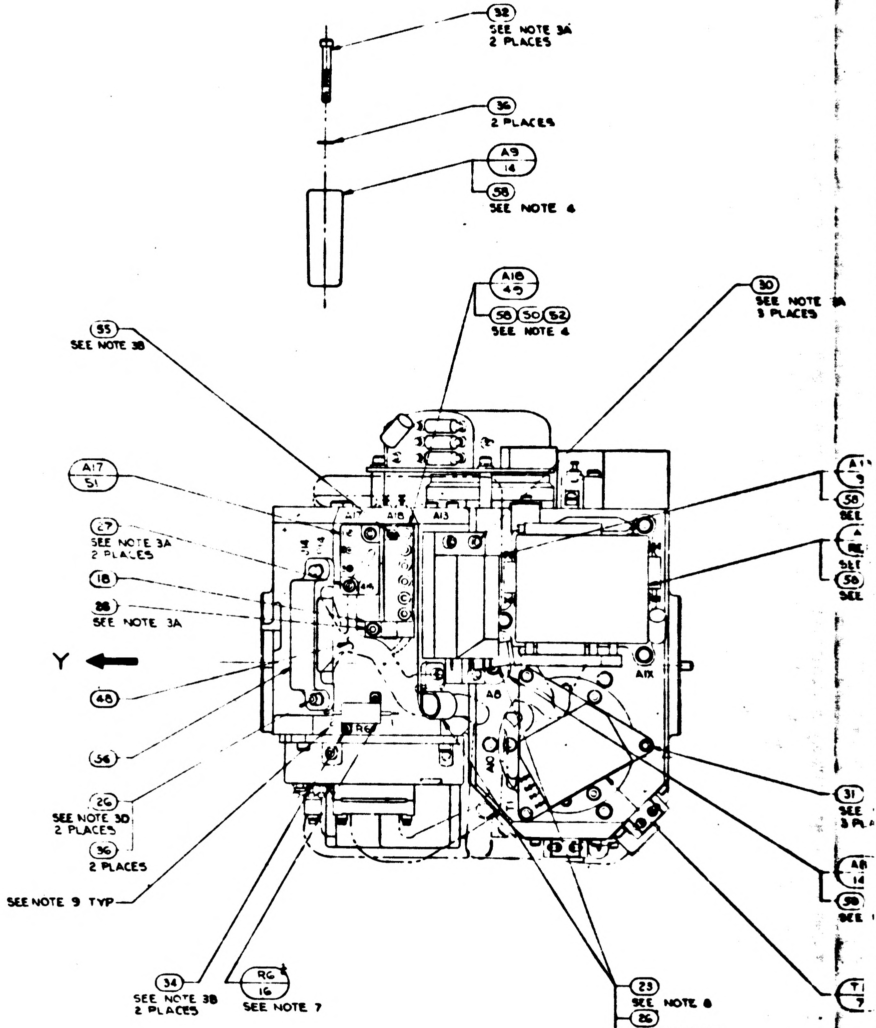
TABLE I

CABLE CLAMP (23)	
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10			
PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-365	681
-244	34.0	-385	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		




(32) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9 14
(58) SEE NOTE 4
A18 49
(58) (50) (52) SEE NOTE 4
(30) SEE NOTE 3A 3 PLACES
(55) SEE NOTE 3B
A17 51
(27) SEE NOTE 3A 2 PLACES
(18)
(28) SEE NOTE 3A
Y
(48)
(56)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
(34) SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
(23) SEE NOTE 8
(26) SEE NOTE 3E
(24)
A17
A18
A13
A8
A1X
R6
(58) SEE
(58) SEE
(31) SEE 3 PL
14
(58) SEE
7

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TQROUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.6 IN-LB
4. APPLY A THIN FILM OF ITEM (38) OR (59) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14),(15),(45),(46),(47) AND (50), BETWEEN ITEM (2) AND ITEM (3). BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (39) AND ITEM (50)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM (34) FOR-011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
15. PIP PREAMP P/N 2021269-011 MAY BE USED IN PLACE OF P/N 2007060-021.

2018605	REV AY	SHEET 1

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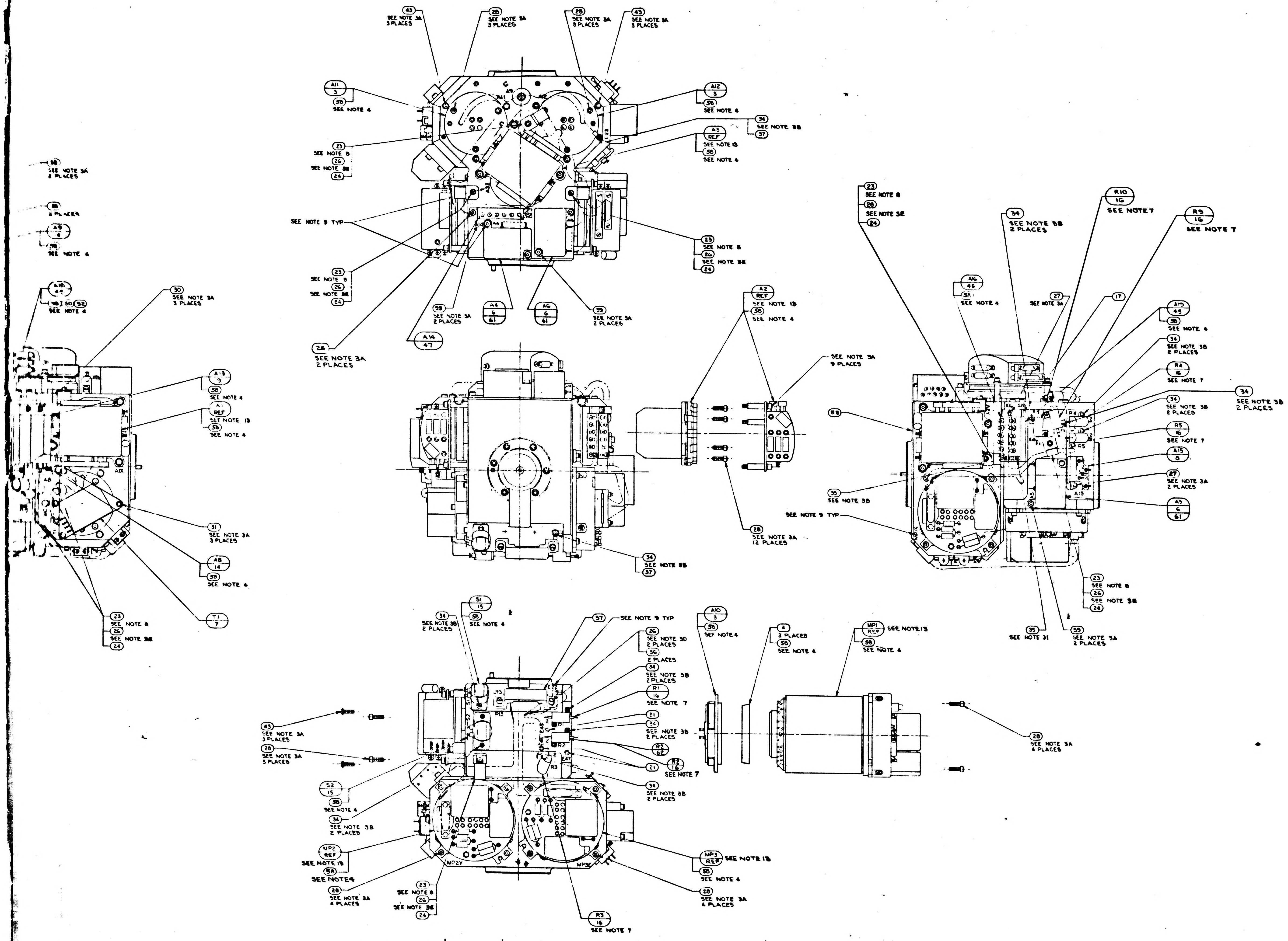

43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
A11
3
58
SEE NOTE 4
A12
3
58
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
58
SEE NOTE 4
23
SEE NOTE 8
26
SEE NOTE 3E
24
SEE NOTE 9 TYP
59
SEE NOTE 3A
2 PLACES
A4
6
61
A6
6
61
A14
47
28
SEE NOTE 3A
2 PLACES
A9
4
A10
44
30
SEE NOTE 3A
3 PLACES
A13
9
A1
REF
31
SEE NOTE 3A
3 PLACES
A8
14
T1
7
A2
REF
SEE NOTE 3A
9 PLACES
28
SEE NOTE 3A
12 PLACES
R10
16
SEE NOTE 7
R9
16
A16
46
27
17
A15
45
R4
16
R5
16
A15
8
A5
6
61
35
SEE NOTE 3B
SEE NOTE 31
51
15
57
SEE NOTE 9 TYP
SEE NOTE 3D
36
R1
16
21
R2
62
R3
16
52
15
MP2
REF
SEE NOTE 13
MP3
REF
A10
3
4
3 PLACES
MP1
REF
SEE NOTE 13
28
SEE NOTE 3A
4 PLACES
J13
P13
MP2Y
MP3Z

1	–	–	10
3	–	–	20
A/R	A/R	A/R	MIL
6	6	–	100
A/R	A/R	–	MIL
1	1	1	30
1	1	1	2
1	1	–	10
–	–	1	6
1	1	–	20
1	1	–	20
1	1	–	20
1	1	–	20
1	1	–	20
1	1	–	20
1	1	–	20
1	1	–	20
1	1	–	20
9	9	9	10
A/R	A/R	A/R	MI
–	–	A/R	100
2	2	2	MS
6	6	6	MS
2	2	3	10
22	22	[illegible]	10
2	2	[illegible]	100
3	3	[illegible]	100
3	3	[illegible]	100
33	33	3	100
7	7	5	100
15	15	[illegible]	100
–	–	1	100
8	8	8	100
8	8	8	100
–	–	1	20
3	3	[illegible]	100
1	1	1	20
1	1	1	2018
7	8	5	10
2	2	2	100
2	2	2	2018
–	–	1	20
–	–	1	20
–	–	1	20
–	–	1	20
1	1	1	20
1	1	1	20
1	1	1	20
–	3	3	20
3	3	3	20
3	3	3	20
–	–	1	2018
QTY REQD	QTY REQD	QTY REQD	
031	021	01	

SEE NOTE 15
SEE NOTE 14

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

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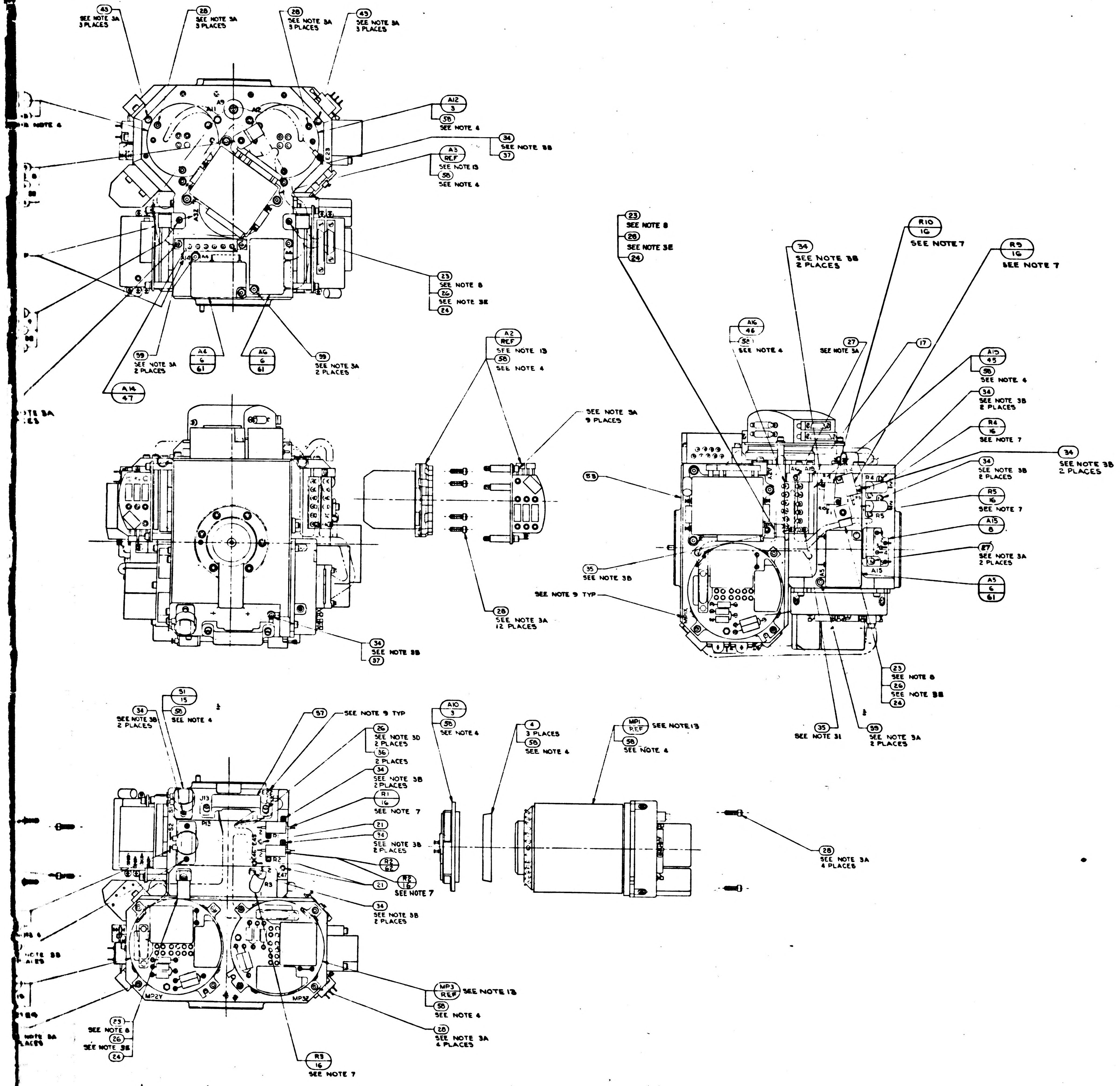
SYM	REVISIONS TDRR 17755 DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	EF
AY	REVISED PER TDRR 33712	1 AUG 67	



A9
A11
A12
A2
A3
A4
A6
A14
A16
A15
A10
A5
MP1
MP2Y
MP3
MP3Z
J13
P13
R1
R2
R3
R4
R5
R9
R10
(43) SEE NOTE 3A 3 PLACES
(28) SEE NOTE 3A 3 PLACES
(A12) (3) (58) SEE NOTE 4
(34) SEE NOTE 3B (37)
(A3) REF SEE NOTE 13 (58) SEE NOTE 4
(23) SEE NOTE 8 (26) SEE NOTE 3E (24)
(59) SEE NOTE 3A 2 PLACES
(A4) (6) (61)
(A6) (6) (61)
(A14) (47)
(A2) REF SEE NOTE 13 (58) SEE NOTE 4
SEE NOTE 3A 9 PLACES
(28) SEE NOTE 3A 12 PLACES
(34) SEE NOTE 3B (37)
(35) SEE NOTE 3B
SEE NOTE 9 TYP
(23) SEE NOTE 8 (26) SEE NOTE 3E (24)
(34) SEE NOTE 3B 2 PLACES
(R10) (16) SEE NOTE 7
(R9) (16) SEE NOTE 7
(A16) (46) (58) SEE NOTE 4
(27) SEE NOTE 3A
(17)
(A15) (45) (58) SEE NOTE 4
(34) SEE NOTE 3B 2 PLACES
(R4) (16) SEE NOTE 7
(34) SEE NOTE 3B 2 PLACES
(R5) (16) SEE NOTE 7
(A15) (8) (53)
(27) SEE NOTE 3A 2 PLACES
(A5) (6) (61)
(23) SEE NOTE 8 (26) SEE NOTE 3B (24)
(35) SEE NOTE 31
(59) SEE NOTE 3A 2 PLACES
(34) SEE NOTE 3B 2 PLACES
(51) (15) (58) SEE NOTE 4
(57) SEE NOTE 9 TYP
(26) SEE NOTE 3D 2 PLACES (36) 2 PLACES
(34) SEE NOTE 3B 2 PLACES
(R1) (16) SEE NOTE 7
(21)
(34) SEE NOTE 3B 2 PLACES
(R2) (62)
(R2) (16) SEE NOTE 7
(21)
(34) SEE NOTE 3B 2 PLACES
(A10) (3) (58) SEE NOTE 4
(4) 3 PLACES (58) SEE NOTE 4
(MP1) REF SEE NOTE 13 (58) SEE NOTE 4
(28) SEE NOTE 3A 4 PLACES
(MP3) REF SEE NOTE 13 (58) SEE NOTE 4
(28) SEE NOTE 3A 4 PLACES
(23) SEE NOTE 8 (26) SEE NOTE 3E (24)
(R3) (16) SEE NOTE 7

SEE NOTE 15
SEE NOTE 14

QTY REQ'D	QTY REQ'D	QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
1	–	–	1010928-184	RESISTOR, R2	62
3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
6	6	–	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO. 4	58
1	1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	1	2018837	BRACKET, CONN. 44 PIN	56
1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
–	–	1	1010928-295	RESISTOR FIXED	54
1	1	–	2018750-011	HOUSING STABLE MEMBER	53
1	1	–	2018830	SHIELD THERMOSTAT	52
1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	1	–	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC., SELF-LOCKING	43
A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	MS15795-705	WASHER, FLAT, METAL, ROUND	36
2	2	3	1011625-11	SCREW, HEX, SOC. HD., SELF-LOCKING	35
22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
15	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	8	1000223	WASHER, CABLE CLAMP	24
8	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	2018776	CLAMP, THERMOSTAT	17
7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
–	–	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
–	–	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
–	–	1	2018750	HOUSING STABLE MEMBER	1
031	021	011	LIST OF MATERIALS		

2018605 AY

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

CODE IDENT NO	SIZE	NASA DRAWING NO.
80230	J	2018605
SCALE 1/1	WT	SHEET 1 OF 2

3/2018605

2018605

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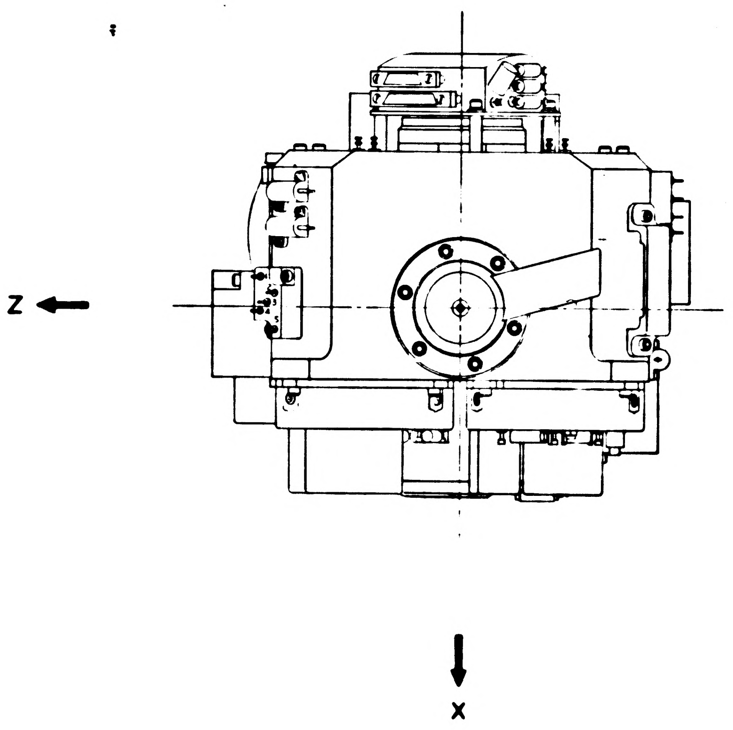
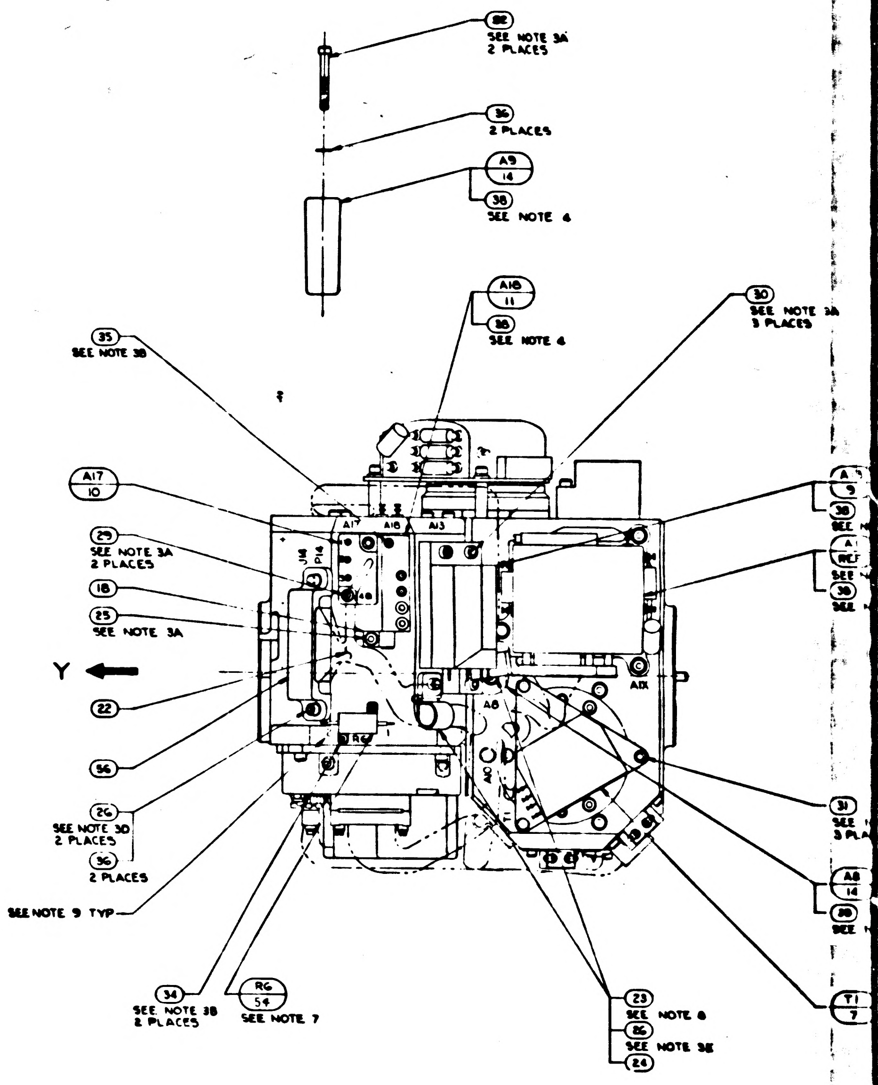
C




82
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
38
SEE NOTE 4
A18
11
38
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
35
SEE NOTE 3B
A17
10
A17
A18
A13
J14
P14
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
54
SEE NOTE 7
R6
A8
A10
A1X
23
SEE NOTE 8
86
SEE NOTE 3E
24
31
SEE
3 PLA
A8
14
38
SEE
T1
7
A
9
38
SEE
A
REF
SEE
38
SEE

B

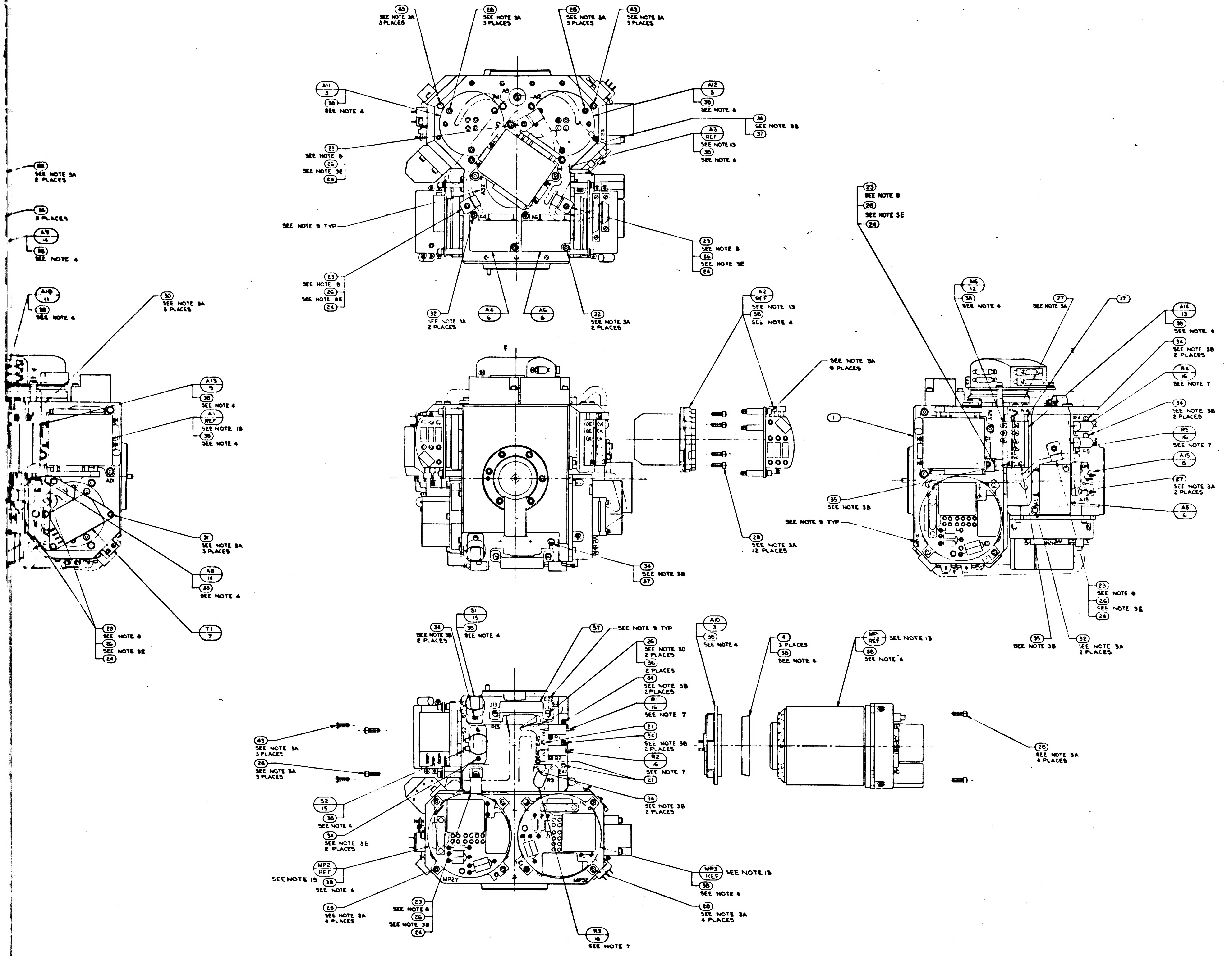
NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

A

2018605	REV AY	SHEET 2

1/2018605


43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
SEE NOTE 9 TYP
A9
A11
A12
E23
A32
A4
A6
23 SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
SEE NOTE 3A 2 PLACES
2 PLACES
A9 14
38 SEE NOTE 4
A10 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 REF SEE NOTE 13
38 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
23 SEE NOTE 8
26 SEE NOTE 3E
24
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
R4
R5
A15
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
S1 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57
SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
E22
R1
R2
R3
E47
MP2Y
MP3Z
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

-011 CONF

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	DL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

DRAWN R.G.
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

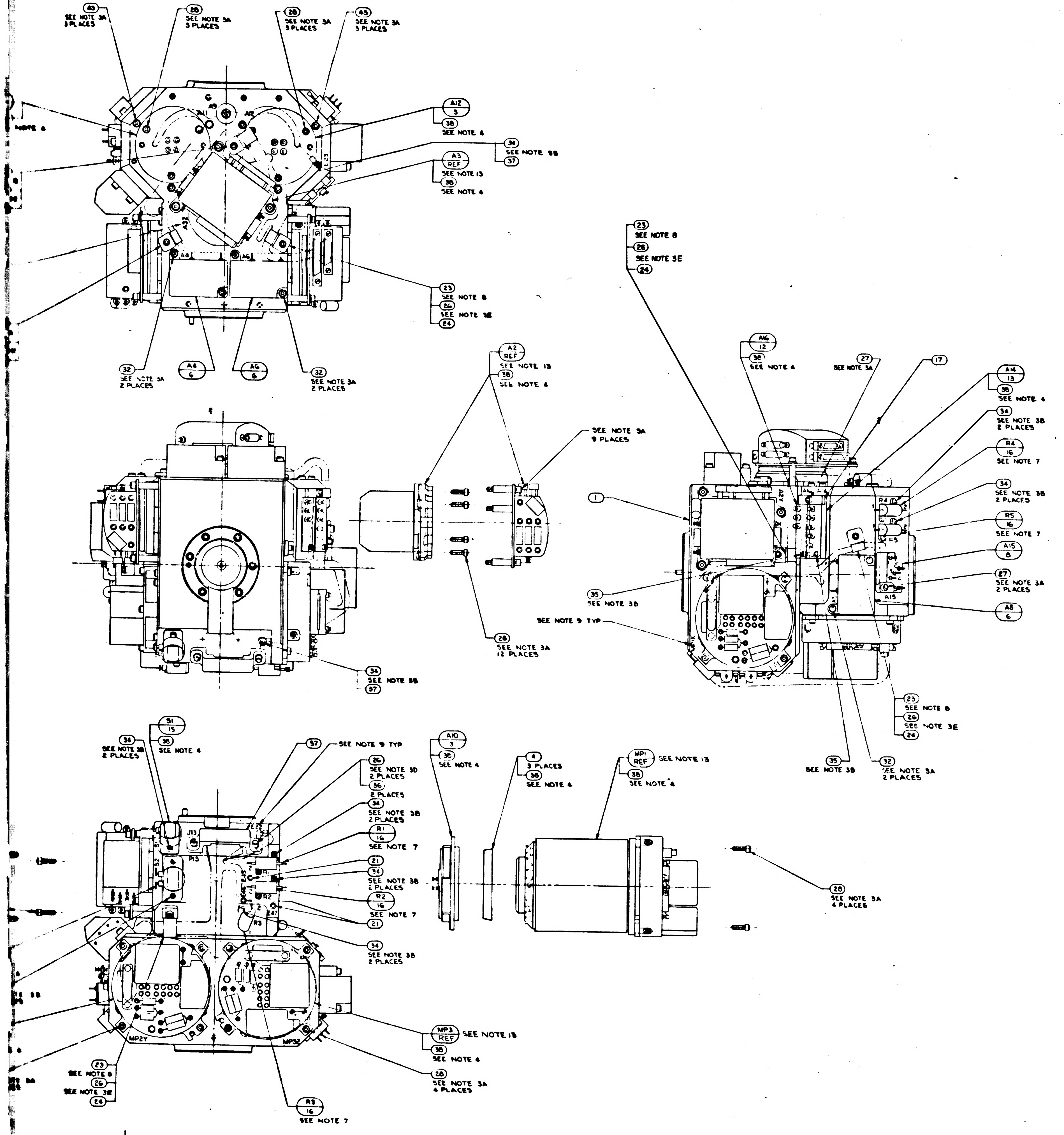
2018605	REV AY	SHEET 2

5 4 3 2

2/2018605

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	5 MAY 67	E.F.
	AY	REVISION STATUS CHANGED	1 AUG 67	4.N.



43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
NOTE 4
A9
A11
A12
E23
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
A32
A4
A6
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
R4
R5
A15
A2Y
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
S1 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
57
SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
S1
S2
E22
R1
R2
R3
E47
MP2Y
MP3Z
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7

-011 CONFIGURATION

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN R.G.S. DATE
CHECKED
APPROVAL 19 OCT 65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO	SIZE	NASA DRAWING NO
80230	J	2018605

SCALE 1/1 WT SHEET 2 OF 2

2018605 AY

8605 REV AY SHEET 2

3/2018605

WIRING LEGEND

COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2	↑	↑
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3	↓	↓
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

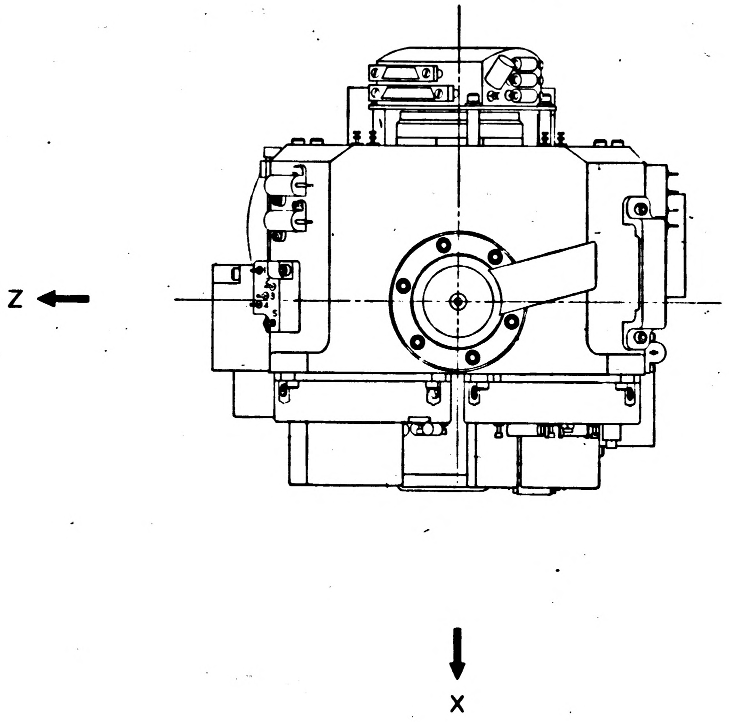
CABLE CLAMP (23)

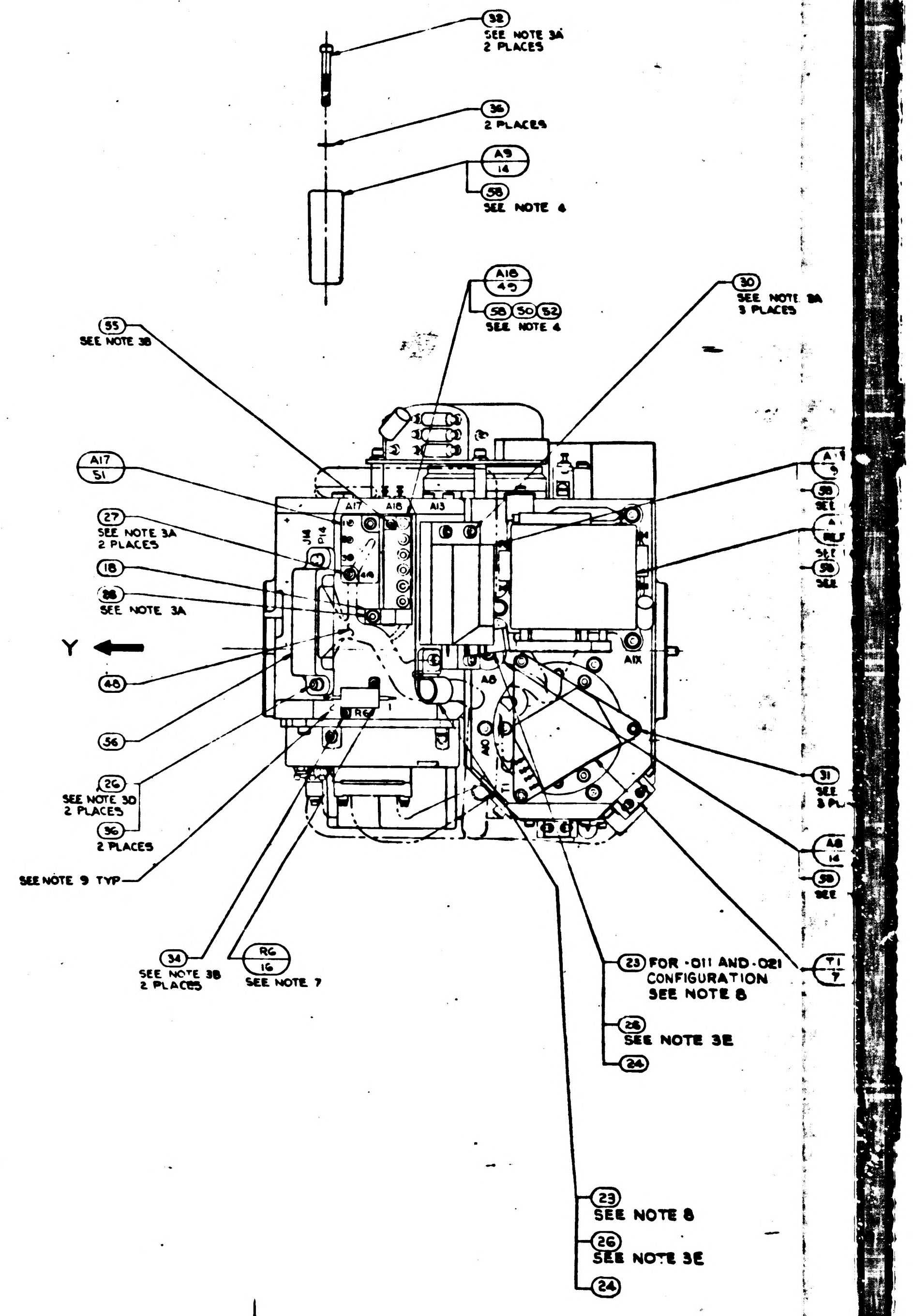
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9, & R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010528-097	1.0	1010528-254	43.2		
-114	1.5	-256	45.3	↑	
-126	2.0	-258	47.5		
-136	2.55	-260	49.9		
-143	3.01	-263	53.6		
-149	3.48	-265	56.2		
-155	4.02	-268	60.4		
-159	4.42	-271	64.9		
-164	4.99	-273	68.1		
-168	5.49	-274	69.8		
-172	6.04	-277	75.0		
-178	6.98	-280	80.6		
-184	8.06	-282	84.5		
-189	9.09	-285	90.9		
-193	10.0	-287	95.3		
-197	11.0	-289	100		
-201	12.1	-292	107		
-204	13.0	-295	115		
-207	14.0	-297	121		
-210	15.0	-300	130		
-213	16.2	-303	140		
-215	16.9	-309	162		
-218	18.2	-312	174	↓	
-220	19.1	-316	191		
-222	20.0	-320	210		
-226	22.1	-326	243		
-229	23.7	-332	280		
-231	24.9	-336	309		
-233	26.1	-340	340		
-236	28.0	-344	374		
-238	29.4	-349	422		
-240	30.9	-362	576		
-242	32.4	-369	681		
-244	34.0	-389	1020		
-248	37.4	1010528-400	1430		
1010528-251	40.2				



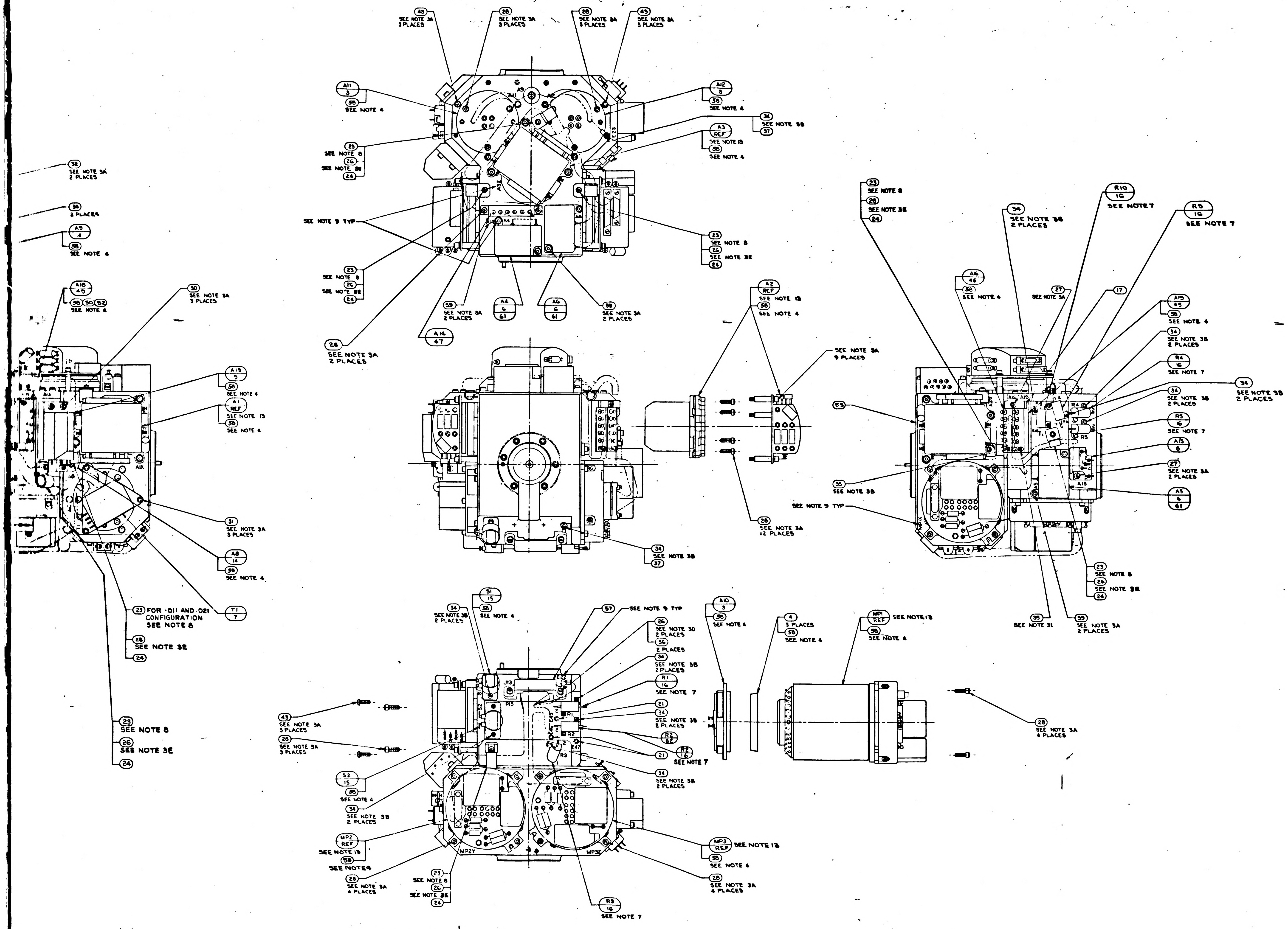

32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
58
SEE NOTE 4
A18
49
58 50 52
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
55
SEE NOTE 3B
A17
51
A17
A18
A13
27
SEE NOTE 3A
2 PLACES
18
38
SEE NOTE 3A
Y
48
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
R6
A8
A10
T1
A1X
A8
14
58
SEE
T1
7
31
SEE
3 PL
23 FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
28
SEE NOTE 3E
24
23
SEE NOTE 8
26
SEE NOTE 3E
24

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ② ③ ⑤ ⑨ ⑪ ⑫ ⑬ ⑭ ⑮ ㊺ ㊻ ㊼ AND ㊿, BETWEEN ITEM ② AND ITEM ③. BETWEEN ITEM ③ AND ITEM ④ AND BETWEEN ITEM ㊾ AND ITEM ㊿
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM ㉞ FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
15. PIP PREAMP P/N 2021269-011 MAY BE USED IN PLACE OF P/N 2007060-021.

5 4 3 2



43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
58 SEE NOTE 4
A12 3
58 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
38 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
58 SEE NOTE 4
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
A4 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
59 SEE NOTE 3A 2 PLACES
A14 47
28 SEE NOTE 3A 2 PLACES
A18 45
58 30 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
58 SEE NOTE 4
A1 REF SEE NOTE 13
58 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
58 SEE NOTE 4
T1 7
23 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
87
23 SEE NOTE 8
26 SEE NOTE 3E
24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 6
27 SEE NOTE 3A 2 PLACES
A5 6 61
58
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
31 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 62
R6 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
52 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
J13
MP2Y
MP3Z
A15
A1X

	1	-	-
SEE NOTE 16	3	–	–
SEE NOTE 14	A/R	A/R	A/R
	6	6	–
	A/R	A/R	–
	1	1	1
	1	1	1
	1	1	–
	–	–	1
	1	1	–
	1	1	–
	1	1	–
	1	1	–
	1	1	–
	1	1	–
	1	1	–
	1	1	–
	1	1	–
	9	9	9
	A/R	A/R	A/R
	–	–	A/R
	2	2	2
	6	6	6
	2	2	3
	22	[illegible]	18
	2	2	8
	3	3	3
	3	3	3
	33	33	33
	7	7	8
	14	15	12
	–	–	1
	7	8	8
	7	8	8
	–	–	1
	3	3	3
	1	1	1
	1	1	1
	7	8	5
	2	2	2
	2	2	2
	–	–	1
	–	–	1
	–	–	1
	–	–	1
	1	1	1
	1	1	1
	1	1	1
	–	3	3
	3	3	3
	3	3	3
	–	–	1
	QTY REQD	QTY RECD	QTY REQD
	031	02	011

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

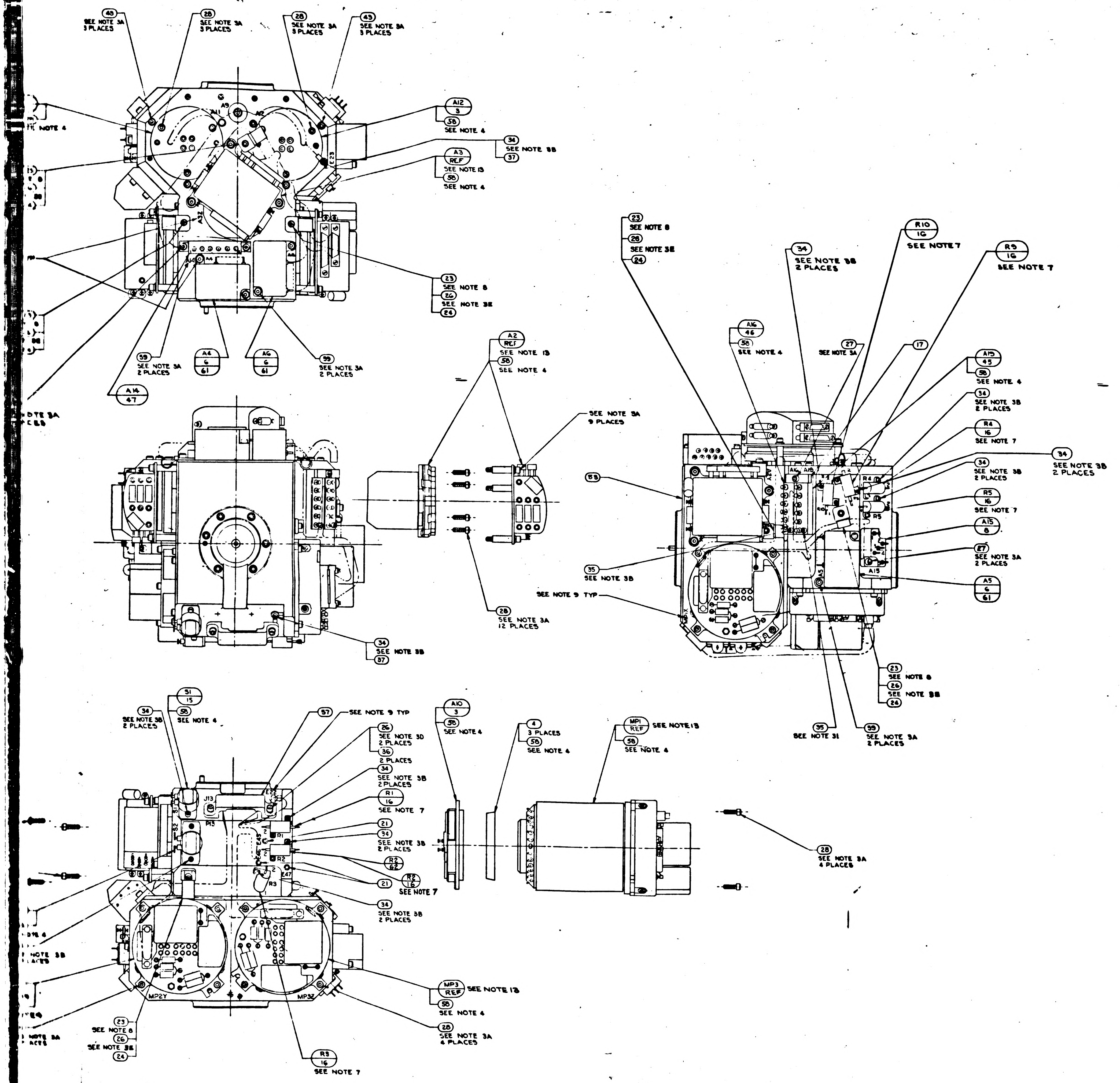
DRAWN
CHECKED
APPROVED
APPROVED
NASA A
MFT APP

2018605 REV AZ SHEET 1

5 4 3 2

2/2018605

REVISIONS TDRR 17755			
SYM	DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	EF
AY	REVISED PER TDRR 33712	1 AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JAC



45 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
45 SEE NOTE 3A 3 PLACES
A9
A11
A12
E23
A3Z
A14
A4
A12 / 3
58 SEE NOTE 4
34 SEE NOTE 3B
37
A3 / REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A4 / 6 / 61
A6 / 6 / 61
59 SEE NOTE 3A 2 PLACES
A14 / 47
A2 / REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
58
35 SEE NOTE 3B
SEE NOTE 9 TYP
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
28 SEE NOTE 3E
24
34 SEE NOTE 3B 2 PLACES
R10 / 16 SEE NOTE 7
R9 / 16 SEE NOTE 7
A16 / 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A19 / 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 / 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 / 16 SEE NOTE 7
A15 / 8
27 SEE NOTE 3A 2 PLACES
A5 / 6 / 61
A16
A19
R4
R5
R10
A15
A5
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
S1 / 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 / 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 / 62
R2 / 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
S1
S2
E22
E45
E46
E47
R1
R2
R3
MP2Y
MP3Z
A10 / 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 / REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 / REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 / 16 SEE NOTE 7

	QTY REQ'D	QTY REQ'D	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
	1	-	-	1010928-184	RESISTOR, R2	62
SEE NOTE 15	3	—	—	2007060-021	PIP PREAMP ASSEMBLY	61
SEE NOTE 14	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
	6	6	-	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
	A/R	A/R	—	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO 4	58
	1	1	1	2018838	BRACKET, CONN. 34 PIN	57
	1	1	1	2018837	BRACKET, CONN. 44 PIN	56
	1	1	—	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
	-	—	1	1010928-295	RESISTOR FIXED	54
	1	1	—	2018750-011	HOUSING STABLE MEMBER	53
	1	1	—	2018830	SHIELD THERMOSTAT	52
	1	1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
	1	1	—	2018829-2	SHIM BLOWER CONT THERMO	50
	1	1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
	1	1	—	2018828	WIRING HARNESS 'A' STABLE MEMBER	48
	1	1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
	1	1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
	1	1	-	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC, SELF-LOCKING	43
	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
	—	—	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
	2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
	-	-	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
	7	8	8	1000223	WASHER, CABLE CLAMP	24
	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
	—	—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
	3	3	3	1001600-1	TERMINAL, INSULATED	21
	1	1	1	2018778	CLAMP, THERMOSTAT	18
	1	1	1	2018776	CLAMP, THERMOSTAT	17
	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
	2	2	2	1001485	THERMOSTAT, SAFETY	15
	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
	—	—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
	—	—	1	2018636	THERMO. ASS'Y, TEMP. ALARM	12
	—	—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
	—	—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
	—	3	3	2007060-011	PIP PREAMP ASS'Y.	6
	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
	—	—	1	2018750	HOUSING STABLE MEMBER	1
	031	021	011	LIST OF MATERIALS		

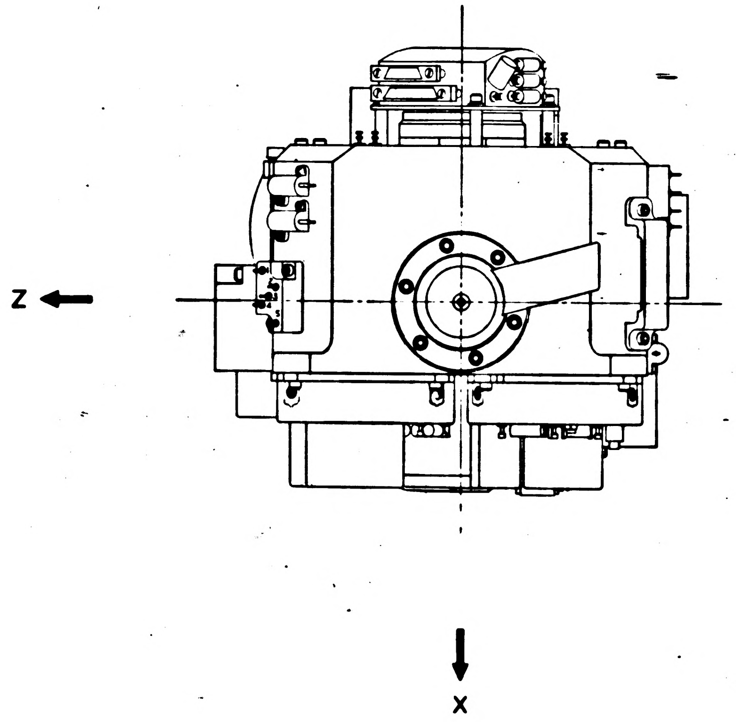
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DWG NO CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL 23 Mar 65 APPROVAL	STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL 3-23-65	CODE IDENT NO. 80230 · SIZE J · NASA DRAWING NO. 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL 23 Mar 65	SCALE 1/1 · WT · SHEET 1 OF 2
APPLICATION				

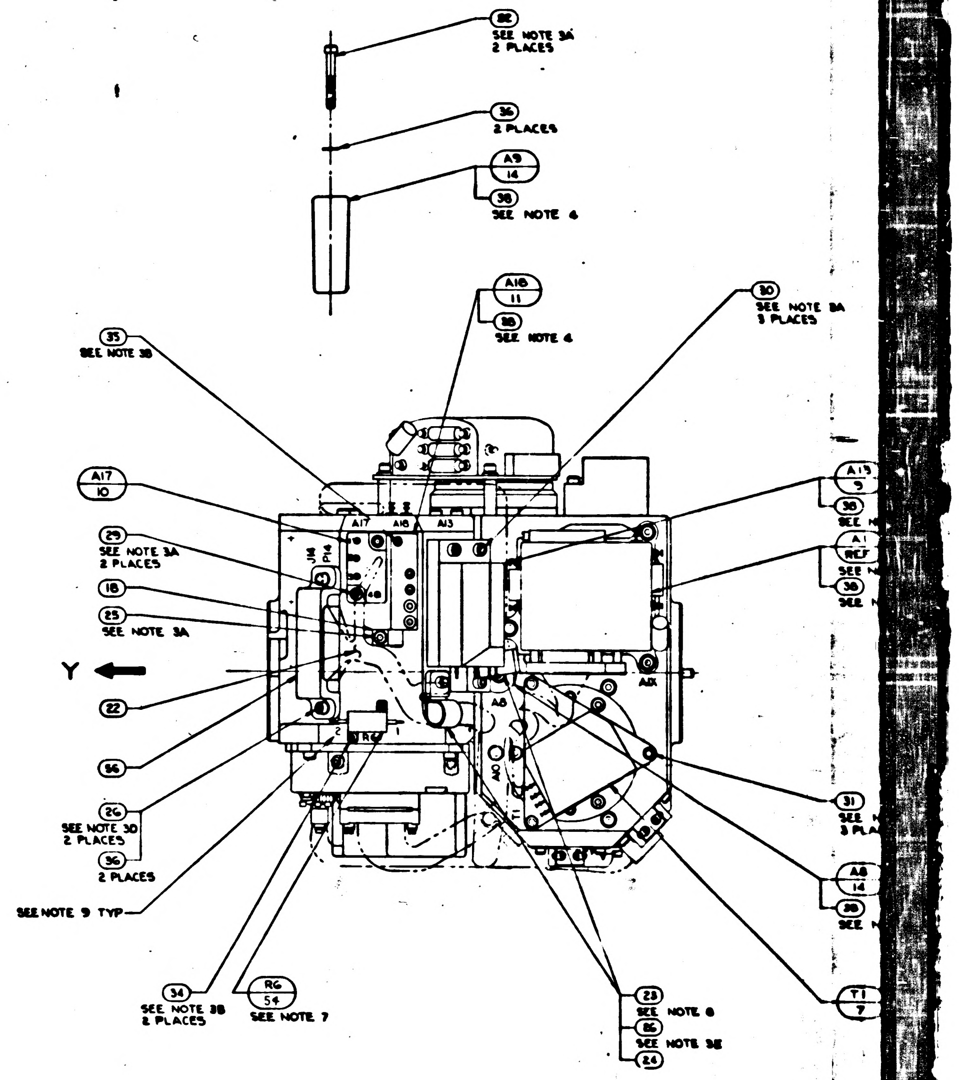
2018605 REV AZ SHEET 1

2018605 AZ

2018605

3-2018605

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14
38
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A16
11
38
SEE NOTE 4
30
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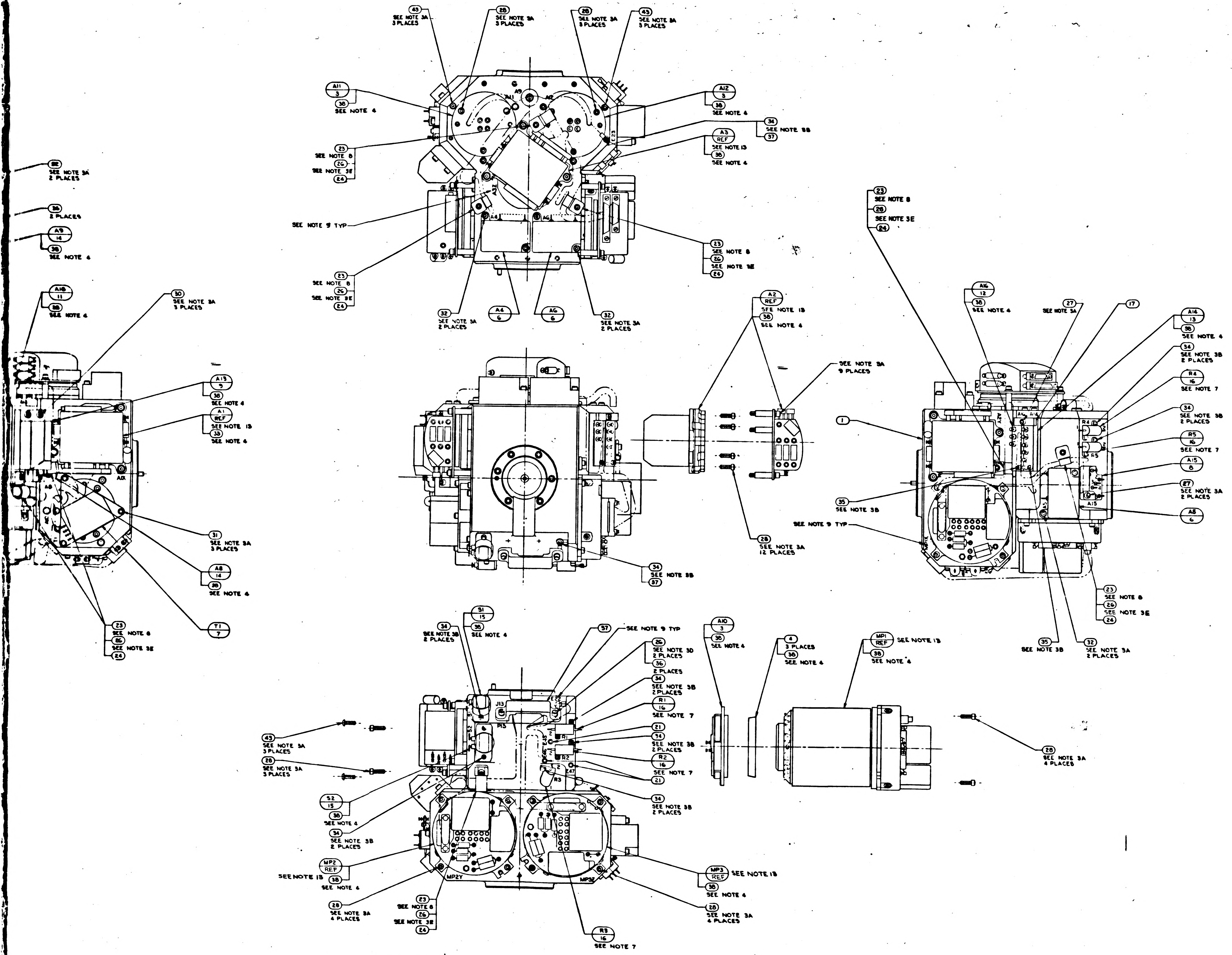
3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
RG
54
SEE NOTE 7
23
SEE NOTE 8
86
SEE NOTE 3E
24
A17
A16
A13
J14
P14
A8
A10
A1X
T1
A15
9
38
A1
REF
38
31
3 PLA
A8
14
38
T1
7

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H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43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3E 24
SEE NOTE 9 TYP
A9
A11
A12
E23
A3Z
A4
A6
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
82 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
38 SEE NOTE 4
A18 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 REF SEE NOTE 13
33 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
23 SEE NOTE 8 26 SEE NOTE 3E 24
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3E 24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
A16
A14
R4
R5
A15
A5
MP1X
23 SEE NOTE 8 26 SEE NOTE 3E 24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
E22
E47
R1
R2
R3
S1
S2
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP2Y
MP3Z
23 SEE NOTE 8 26 SEE NOTE 3E 24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

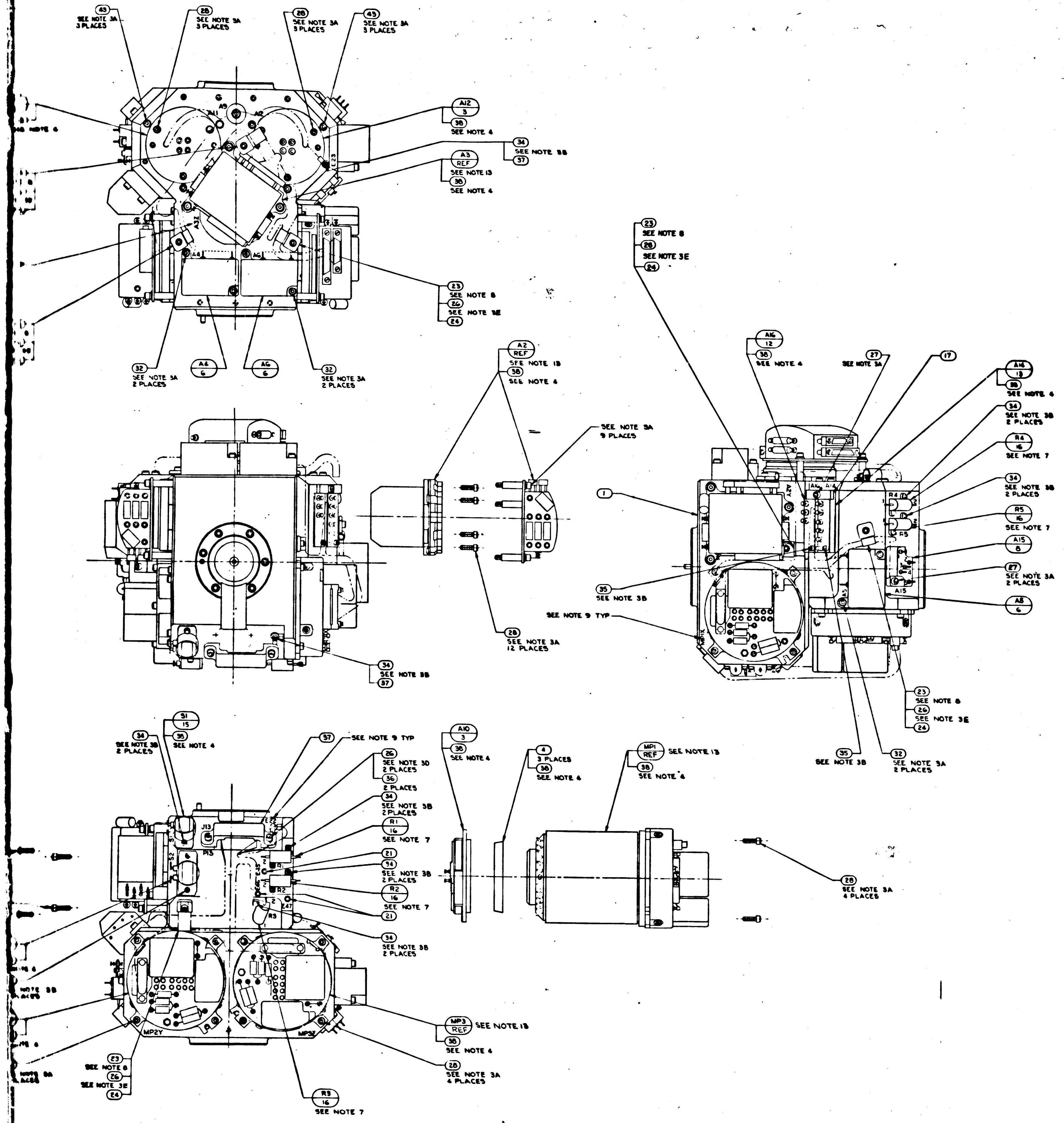
-011 CONF

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	
		MATERIAL	DRAWN B.G.S CHECKED APPROVAL APPROVAL
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL
APPLICATION			

2018605 REV AZ SHEET 2

2/2018605

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	J J J EH
	AY	REVISION STATUS CHANGED	1 AUG 67	4.N.
	AZ	REVISION STATUS CHANGED	8 AUG 67	J J J JAC



43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A6 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
1
23 SEE NOTE 8
26 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A16 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A8 6
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
31 15
34 SEE NOTE 3B 2 PLACES
35 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7
23 SEE NOTE 8
26 SEE NOTE 3E
24
MP2Y
MP3Z
J13
P13
R1
R2
R3
A15
R4
R5

-011 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB Cambridge Mass DRAWN R.G.S. DATE CHECKED APPROVAL 11-03-65 APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL		STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230 · SIZE J · NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	SCALE 1/1 · WT · SHEET 2 OF 2
APPLICATION				

2018605 AZ

2018605 REV AZ SHEET 2

3/2018605

WIRING LEGEND

COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

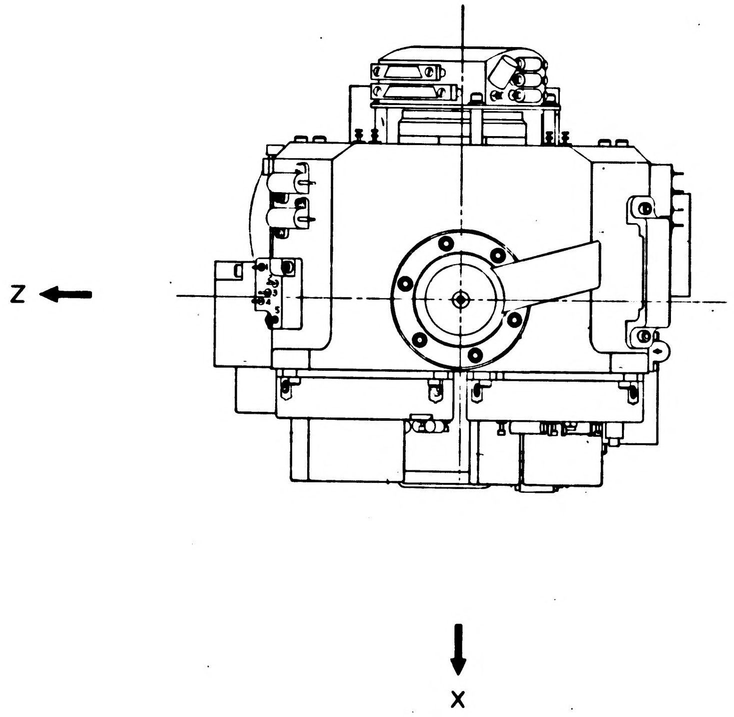
CABLE CLAMP ㉓

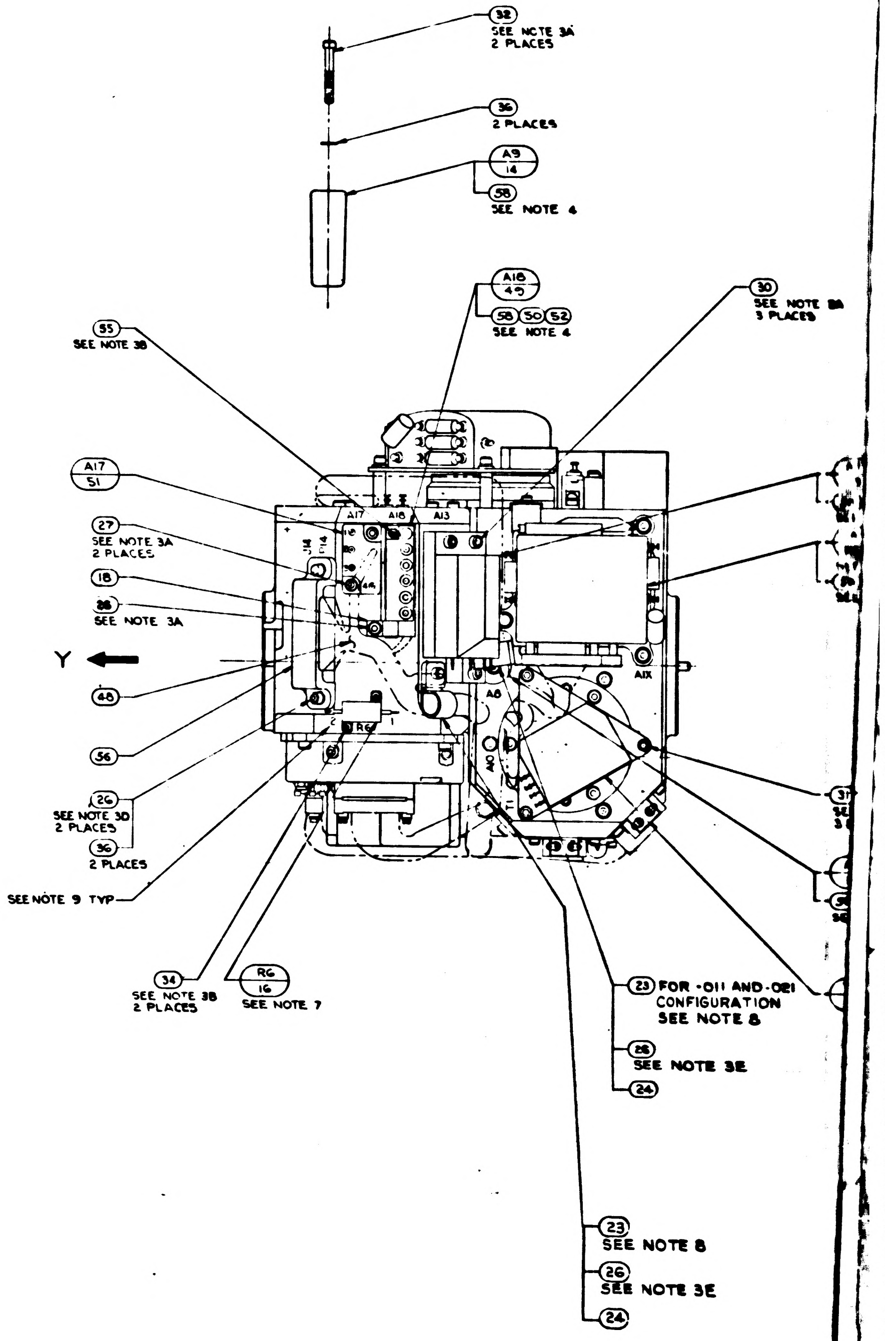
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2	1010928-264	54.9
-114	1.5	-256	45.3	-239	30.1
-126	2.0	-258	47.5	-230	24.3
-136	2.55	-260	49.9	-195	10.5
-143	3.01	-263	53.6	-171	5.9
-149	3.48	-265	56.2	-333	287
-155	4.02	-268	60.4	-321	215
-159	4.42	-271	64.9	-305	147
-164	4.99	-273	68.1	-299	127
-168	5.49	-274	69.8	-272	66.5
-172	6.04	-277	75.0	-253	42.2
-178	6.98	-280	80.6	-249	38.3
-184	8.06	-282	84.5	-228	23.2
-189	9.09	-285	90.9	-216	17.4
-193	10.0	-287	95.3	-192	9.76
-197	11.0	-289	100	-182	7.68
-201	12.1	-292	107	-170	5.76
-204	13.0	-295	115	-153	3.83
-207	14.0	-297	121	-317	196
-210	15.0	-300	130	-302	137
-213	16.2	-303	140	-288	97.6
-215	16.9	-309	162	-194	10.2
-218	18.2	-312	174	-121	1.78
-220	19.1	-316	191	1010928-281	82.5
-222	20.0	-320	210		
-226	22.1	-326	243		
-229	23.7	-332	280		
-231	24.9	-336	309		
-233	26.1	-340	340		
-236	28.0	-344	374		
-238	29.4	-349	422		
-240	30.9	-362	576		
-242	32.4	-369	681		
-244	34.0	-389	1020		
-248	37.4	1010928-400	1430		
1010928-251	40.2				

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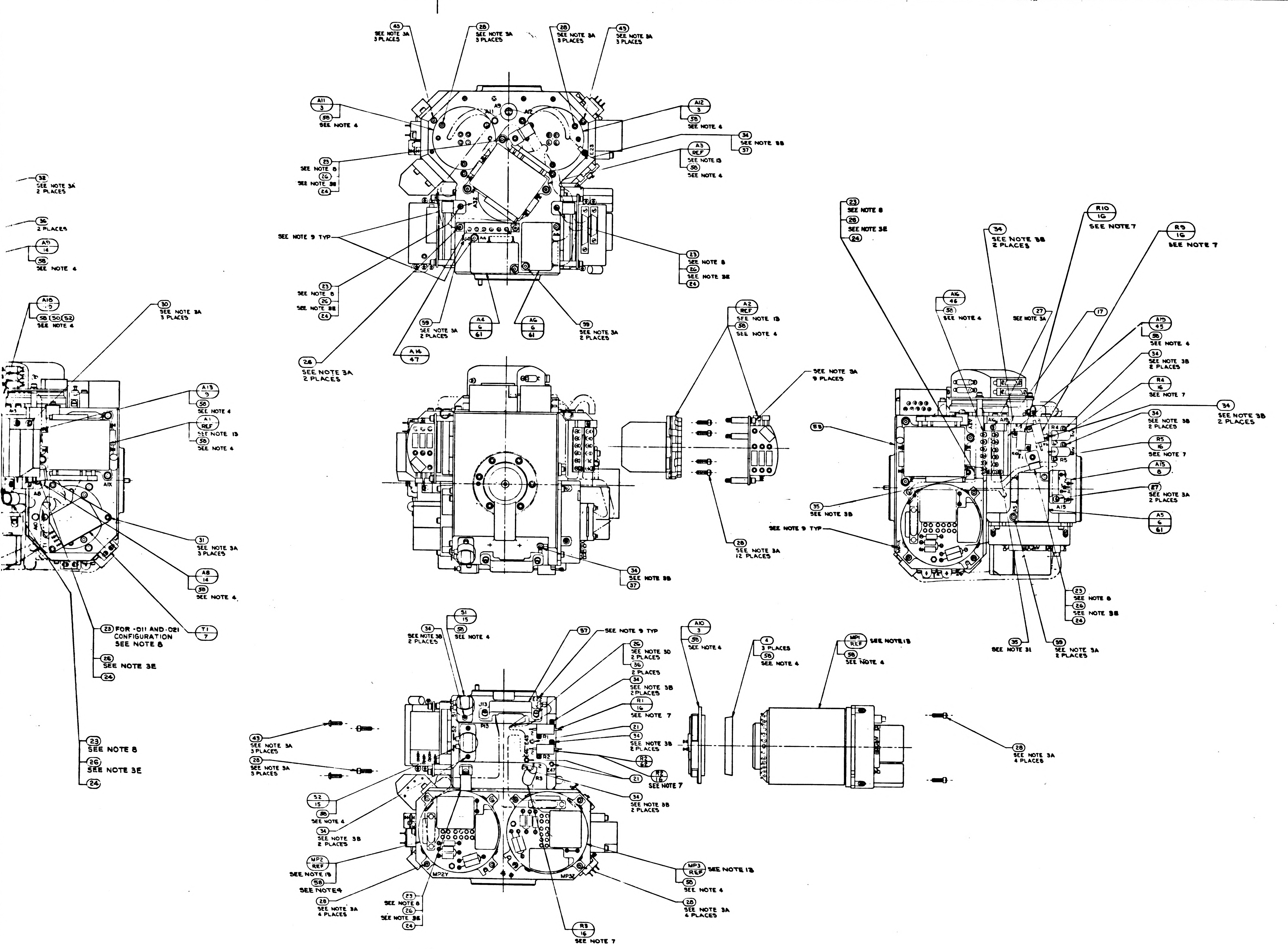
36
2 PLACES
A9
14
58
SEE NOTE 4
A18
49
58 50 52
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
55
SEE NOTE 3B
A17
51
27
SEE NOTE 3A
2 PLACES
18
38
SEE NOTE 3A
Y
48
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
A17
A18
A13
A8
A10
A1X
R6
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
23 FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
26
SEE NOTE 3E
24
23
SEE NOTE 8
26
SEE NOTE 3E
24

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM ㊳ OR (58) TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ②,③,⑤,⑨,⑪,⑫,⑬,⑭,⑮,㊺,㊻,㊼ AND ㊿, BETWEEN ITEM ② AND ITEM ③. BETWEEN ITEM ③ AND ITEM ④ AND BETWEEN ITEM ㊾ AND ITEM ㊿
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $^{.10}_{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM ㉔ FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
15. PIP PREAMP P/N 2021269-011 MAY BE USED IN PLACE OF P/N 2007060-021.

2018605 REV BA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A11 3 58 SEE NOTE 4
A12 3 58 SEE NOTE 4
A9
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13 58 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3E 24
32 SEE NOTE 3A 2 PLACES
36 2 PLACES
A7 14 58 SEE NOTE 4
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3E 24
23 SEE NOTE 8 26 SEE NOTE 3E 24
A18 9 58 50 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
26 SEE NOTE 3A 2 PLACES
A13 9 58 SEE NOTE 4
A1 REF SEE NOTE 13 58 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14 58 SEE NOTE 4
T1 7
23 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
26 SEE NOTE 3E 24
23 SEE NOTE 8
26 SEE NOTE 3E
24
A2 REF SEE NOTE 13 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3E 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
33
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3E 24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15 58 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 62
21
R2 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
J13
P13
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
MP2Y
MP3Y
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

SEE NOTE 15
SEE NOTE 14

1	–	-	101
3	–	-	200
A/R	A/R	A/R	MIL
6	6	–	1004
A/R	A/R	--	MIL
1	1	1	201
1	1	1	201
1	1	--	101
–	–	1	101
1	1	--	20
1	1	--	20
1	1	--	200
1	1	--	201
1	1	--	201
1	1	--	201
1	1	--	201
1	1	--	201
1	1	--	201
9	9	9	1010
A/R	A/R	A/R	MIL
–	–	A/R	1006
2	2	2	MS1
6	6	6	MS1
2	2	2	1011
22	22	18	1011
2	2	2	100
3	3	3	100
3	3	3	100
33	33	33	100
7	7	6	100
14	15	12	100
–	–		100
7	8	8	1000
7	8	8	1000
–	–	1	2018
3	3	3	100
1	1	1	2018
1	1	1	2018
7	8	5	1010
2	2	2	1001
2	2	2	2018
–	–	1	2018
–	–	1	2018
–	–	1	2018
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1	1	1	2007
1	1	1	2007
1	1	1	2007
–	3	3	2007
3	3	3	2018
3	3	3	2018
–	–	1	2018
QTY REQ'D	QTY REQ'D	QTY REQ'D	
031	021	011	

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

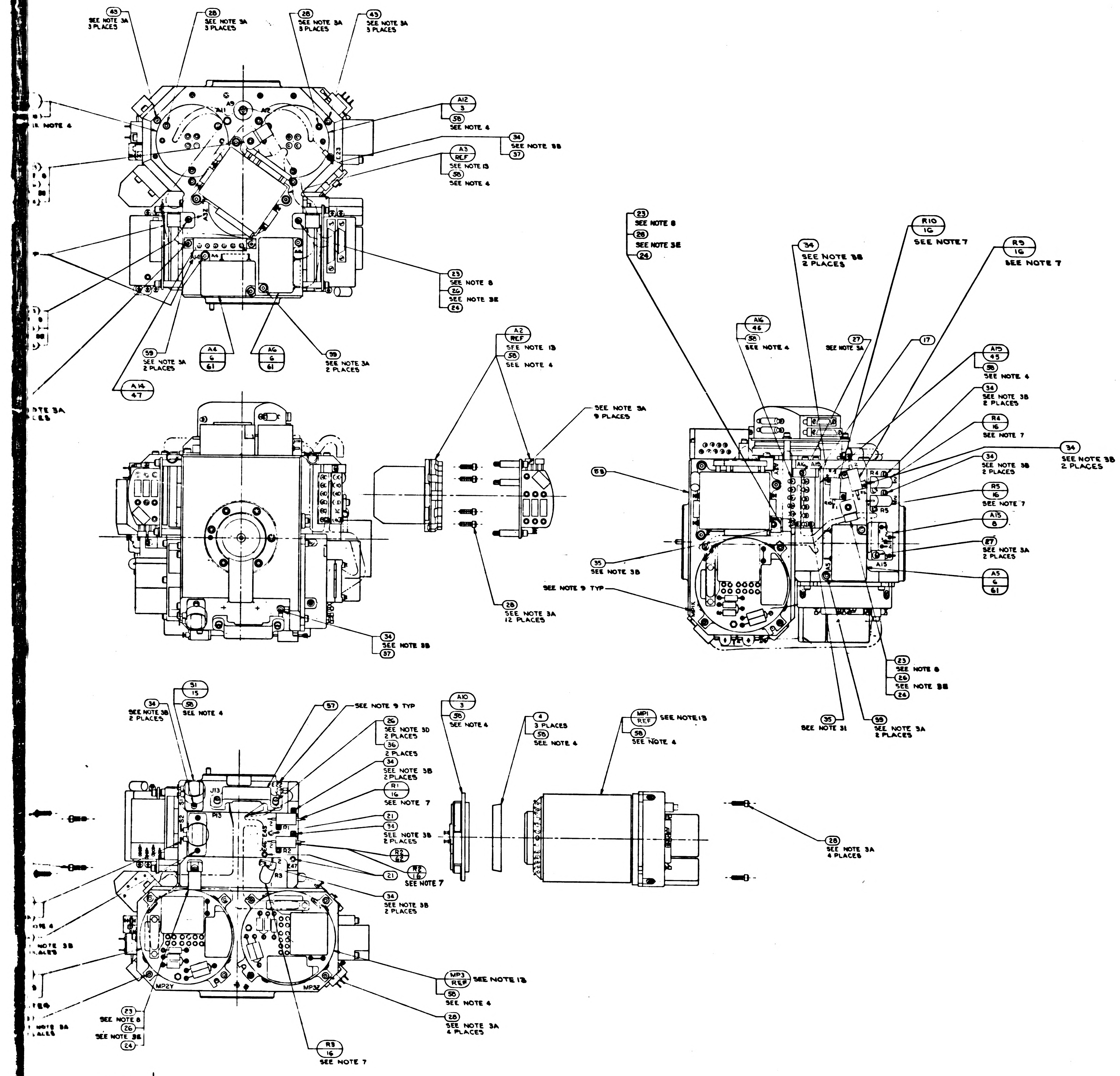
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

DR ENGR R.G
CH ECKED
APPROVAL
APPROVAL

2018605	REV BA	SHEET 1

2/2018605

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 17755		
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	EF
AY	REVISED PER TDRR 33712	1 AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ JAC
BA	REVISED PER TDRR 34021	9 AUG 67	JJJ



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43 SEE NOTE 3A 3 PLACES
A9
A11
A12
E23
A3Z
A14
A4
A12 3
58 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
28 SEE NOTE 3E
24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
53
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
A16
A5
MP1X
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
S1 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
R2 62
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
S1
S2
E22
E45
E46
E47
R1
R2
R3
MP2Y
MP3Z
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7

	QTY REQD	QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
	1	–	–	1010928-184	RESISTOR, R2	62
SEE NOTE 15	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
SEE NOTE 14	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
	6	6	–	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
	1	1	1	2018838	BRACKET, CONN. 34 PIN	57
	1	1	1	2018837	BRACKET, CONN. 44 PIN	56
	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
	–	–	1	1010928-295	RESISTOR FIXED	54
	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
	1	1	–	2018830	SHIELD THERMOSTAT	52
	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
	1	1	–	2018828	WIRING HARNESS 'A' STABLE MEMBER	48
	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC, SELF-LOCKING	43
	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
	2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
	7	8	8	1000223	WASHER, CABLE CLAMP	24
	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
	–	—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
	3	3	3	1001600-1	TERMINAL, INSULATED	21
	1	1	1	2018778	CLAMP, THERMOSTAT	18
	1	1	1	2018776	CLAMP, THERMOSTAT	17
	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
	2	2	2	1001485	THERMOSTAT, SAFETY	15
	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
	–	—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
	–	—	1	2018636	THERMO. ASS'Y, TEMP. ALARM	12
	–	—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
	–	—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
	–	—	1	2018750	HOUSING STABLE MEMBER	1
	031	021	011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018604	DL 2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 BA

2018605 REV BA SHEET 1

3-2018605

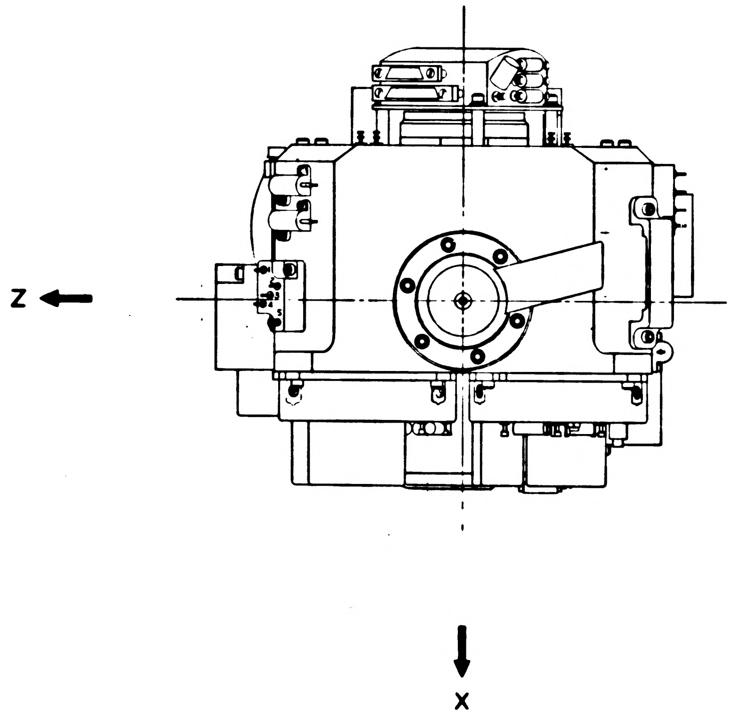
2018605

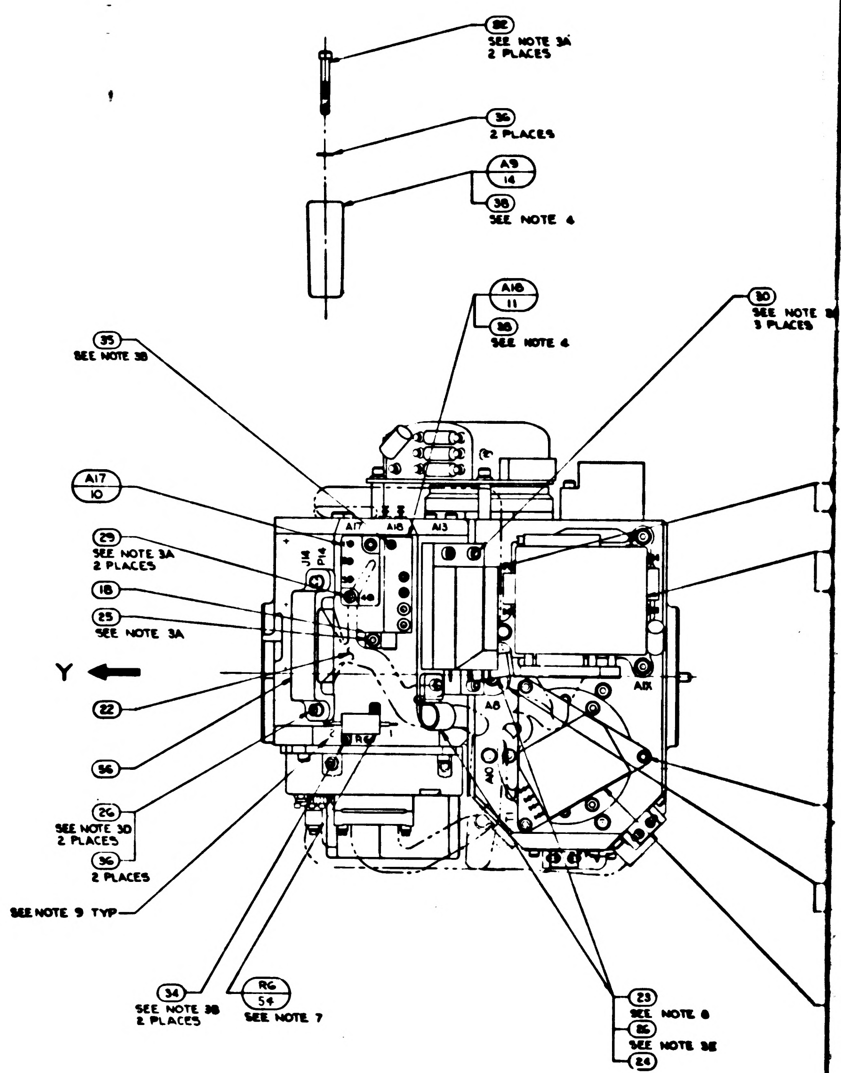
D

C

B

A

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SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
38
SEE NOTE 4
A16
11
38
SEE NOTE 4
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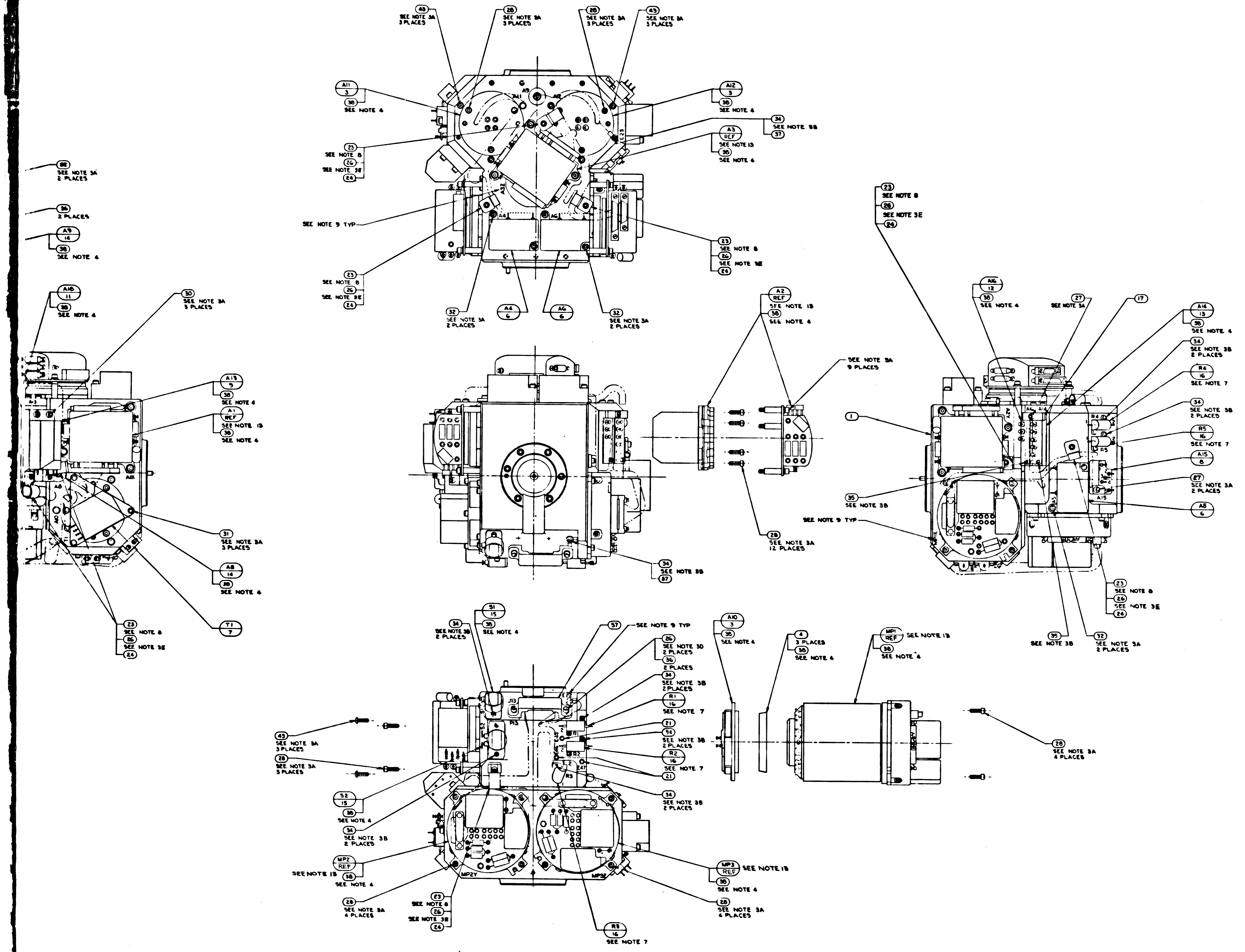
3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
54
SEE NOTE 7
23
SEE NOTE 8
86
SEE NOTE 3E
24
A17
A18
A13
J14
P14
A8
AIX
R6

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

2018605	REV BA	SHEET 2

1/2018605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28 SEE NOTE 3A 3 PLACES
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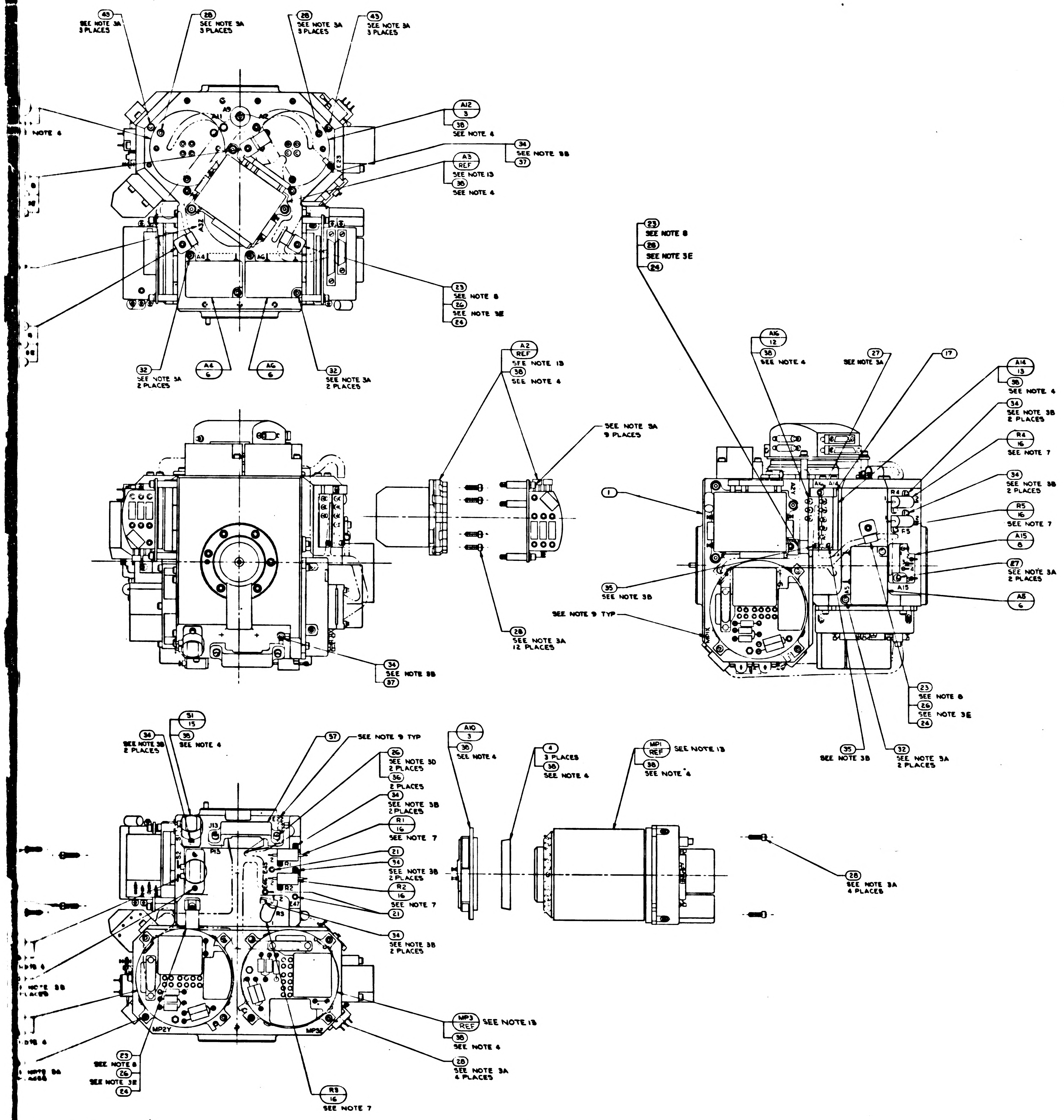
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
28 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
38 SEE NOTE 4
A16 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 REF SEE NOTE 13
38 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
23 SEE NOTE 8
26
SEE NOTE 3E
24
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26
SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
38 SEE NOTE 4
37 SEE NOTE 9 TYP
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 4 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A9
A10
A12
A4
A6
A15
J13
P15
R1
R2
R3
R4
R5
MP2Y
MP3Z

-011 CON

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	DL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	
APPLICATION		FINAL FINISH

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	5 MAY 67	
	AY	REVISION STATUS CHANGED	AUG 6-	AN
	AZ	REVISION STATUS CHANGED	8 AUG 6-	JAC
	BA	REVISION STATUS CHANGED	9 AUG 68	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NOTE 4
A9
A11
A12
E23
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
A32
A4
A6
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
28 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
A16
A14
R4
F5
A15
A5
MP1X
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
S1 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
S1
S2
E22
E45
E46
E47
R1
R2
R3
MP2Y
MP3Z
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7

-011 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB Cambridge Mass	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL 11/23/65 APPROVAL	STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230 | SIZE J | NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL 24 Nov 65	SCALE 1/1 | WT | SHEET 2 OF 2
APPLICATION				

2018605 REV BA SHEET 2

3/2018605

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

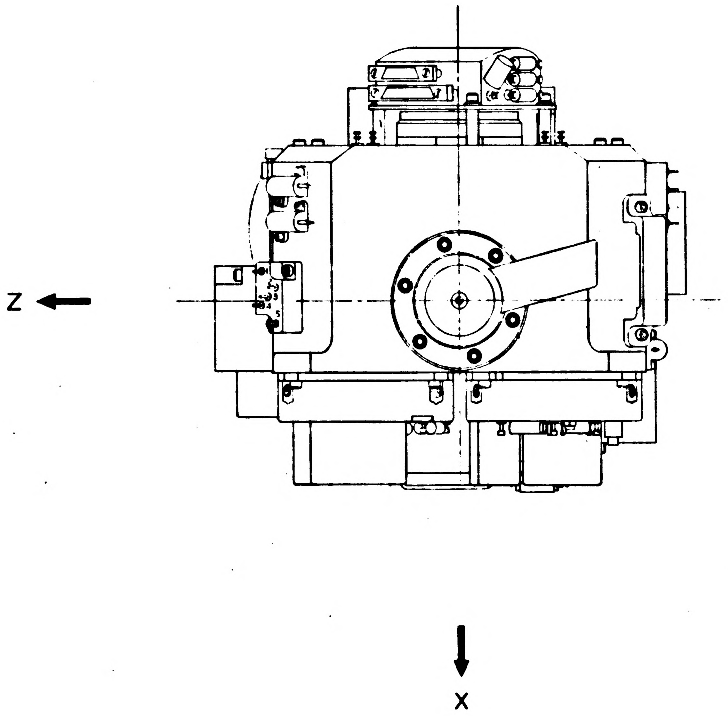
CABLE CLAMP (23)

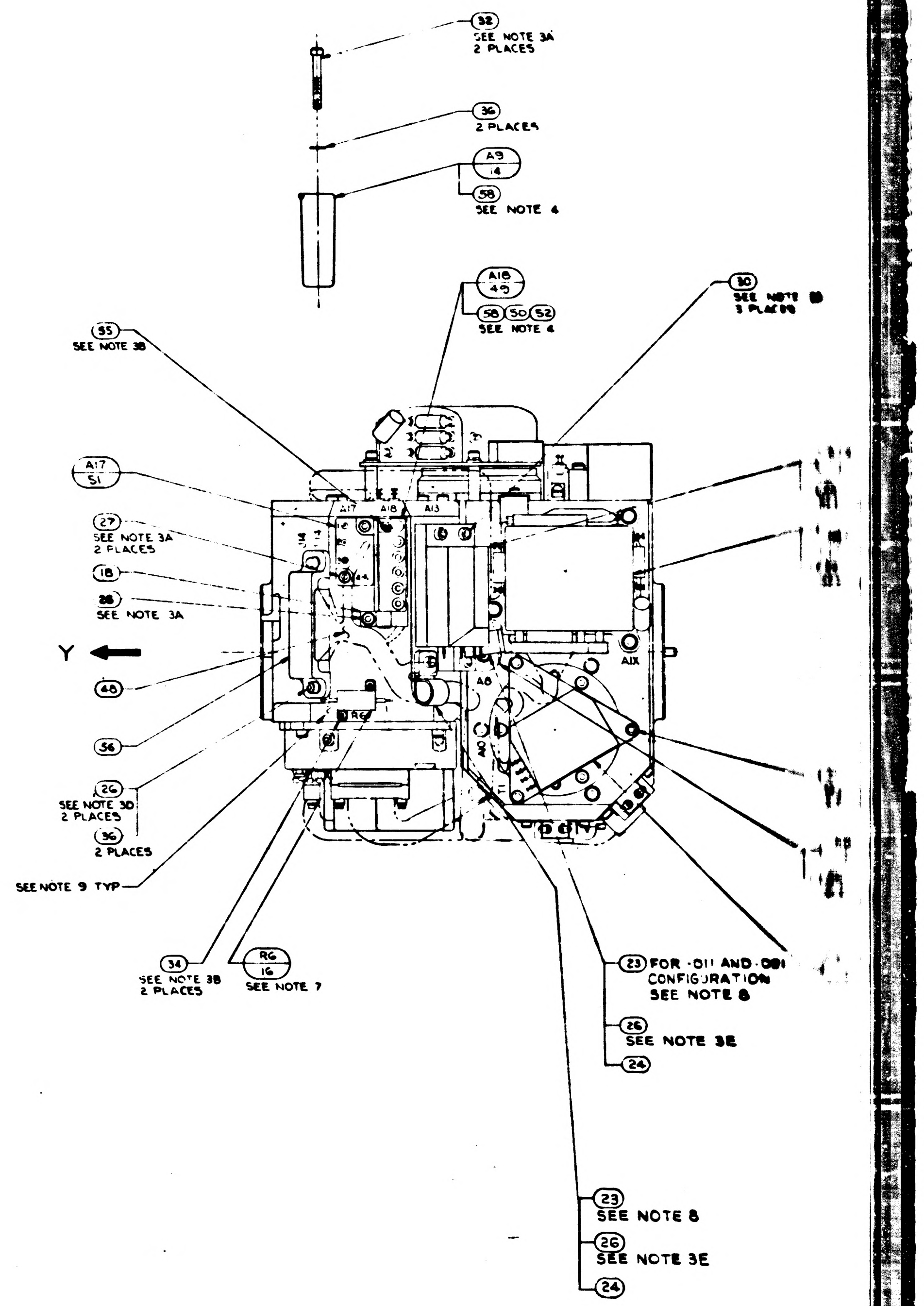
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2	1010928-264	54.9
-114	1.5	-256	45.3	-239	30.1
-126	2.0	-258	47.5	-230	24.3
-136	2.55	-260	49.9	-195	10.5
-143	3.01	-263	53.6	-171	5.9
-149	3.48	-265	56.2	-333	287
-155	4.02	-268	60.4	-321	215
-159	4.42	-271	64.9	-305	147
-164	4.99	-273	68.1	-299	127
-168	5.49	-274	69.8	-272	66.5
-172	6.04	-277	75.0	-253	42.2
-178	6.98	-280	80.6	-249	38.3
-184	8.06	-282	84.5	-228	23.2
-189	9.09	-285	90.9	-216	17.4
-193	10.0	-287	95.3	-192	9.76
-197	11.0	-289	100	-182	7.68
-201	12.1	-292	107	-170	5.76
-204	13.0	-295	115	-153	3.83
-207	14.0	-297	121	-317	196
-210	15.0	-300	130	-302	137
-213	16.2	-303	140	-288	97.6
-215	16.9	-309	162	-194	10.2
-218	18.2	-312	174	-121	1.78
-220	19.1	-316	191	1010928-281	82.5
-222	20.0	-320	210		
-226	22.1	-326	243		
-229	23.7	-332	280		
-231	24.9	-336	309		
-233	26.1	-340	340		
-236	28.0	-344	374		
-238	29.4	-349	422		
-240	30.9	-362	576		
-242	32.4	-369	681		
-244	34.0	-389	1020		
-248	37.4	1010928-400	1430		
1010928-251	40.2				

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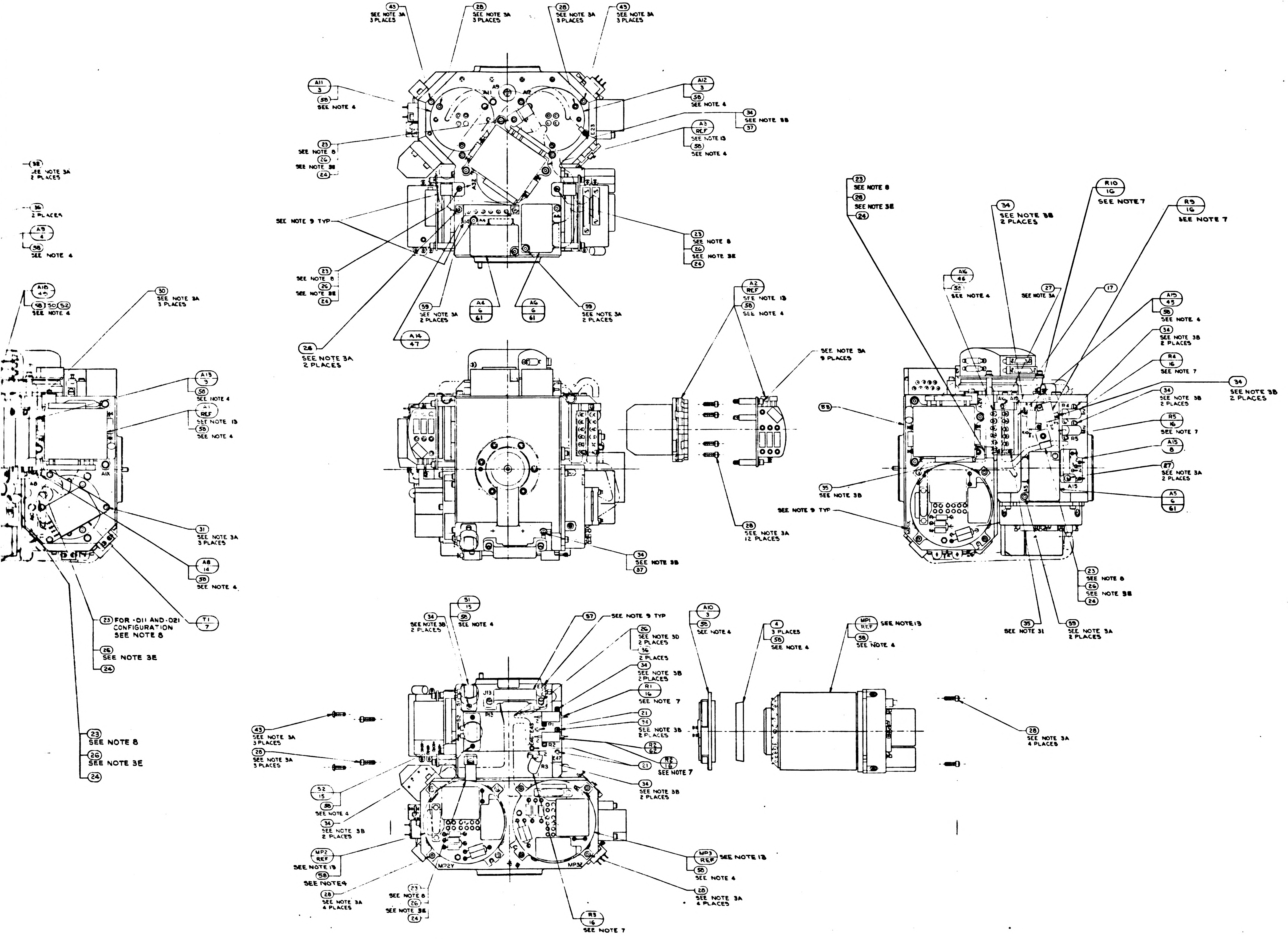
(36) 2 PLACES
A9 / 14
(58) SEE NOTE 4
A18 / 49
(58) (50) (52) SEE NOTE 4
(30) SEE NOTE 3B 3 PLACES
(35) SEE NOTE 3B
A17 / 51
(27) SEE NOTE 3A 2 PLACES
(18)
(28) SEE NOTE 3A
Y
(48)
(56)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
(34) SEE NOTE 3B 2 PLACES
R6 / 16 SEE NOTE 7
(23) FOR -011 AND -081 CONFIGURATION SEE NOTE 8
(26) SEE NOTE 3E
(24)
(23) SEE NOTE 8
(26) SEE NOTE 3E
(24)
A17
A18
A13
A8
A1X
R6

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM (38) OR (59) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2), (3), (5), (9), (11), (12), (13), (14), (15), (45), (46), (47) AND (50), BETWEEN ITEM (2) AND ITEM (3). BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (39) AND ITEM (50)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM (34) FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

15. FOR -031 ASSY, PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021.
    FOR -041 ASSY, PIP PREAMP PN 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021.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28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
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A12 3 58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13 58 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3E 24
38 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 4 58 SEE NOTE 4
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3E 24
23 SEE NOTE 8 26 SEE NOTE 3E 24
A16 45 48 50 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
26 SEE NOTE 3A 2 PLACES
A2 REF SEE NOTE 13 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
A13 3 58 SEE NOTE 4
A1 REF SEE NOTE 13 58 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14 58 SEE NOTE 4
T1 7
23 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
34 SEE NOTE 3B 37
28 SEE NOTE 3A 12 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
58
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3B 24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
51 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 62
21
R2 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
52 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13 P13 P1 R2 R3 S2 MP2Y MP3Z A9 A11 A12

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A/R	A/R	A/R	A/R	MIL I
6	6	6	-	1004
A/R	A/R	A/R	--	MIL 1
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1	1	1	1	2018
1	1	1	--	1014
—	—	—	1	101
1	1	1	--	20
1	1	1	--	201
1	1	1	--	20C
1	1	1	--	201
1	1	1	--	20
1	1	1	--	2018
1	1	1	--	201
1	1	1	--	201
1	1	1	--	2018
9	9	9	9	1010
A/R	A/R	A/R	A/R	MIL-T
—	—	—	A/R	100
2	2	2	2	MS
6	6	6	6	MS
2	2	2	1	1011
22	22	22	18	1011
2	2	2	3	1001
3	3	3	3	100
3	3	3	3	100
33	33	33	33	100
7	7	7	5	100
14	14	15	12	100
—	—	—	1	100
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—	—	—	1	201
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2	2	2	2	100
2	2	2	2	201
—	—	—	1	201
—	—	—	1	201
—	—	—	1	20
—	—	—	1	200
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1	1	1	1	200
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—	—	3	3	200
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3	3	3	3	2018
—	—	—	1	2018
QTY REQD	QTY REQD	QTY REQD	QTY REQD	
041	031	021	C11	

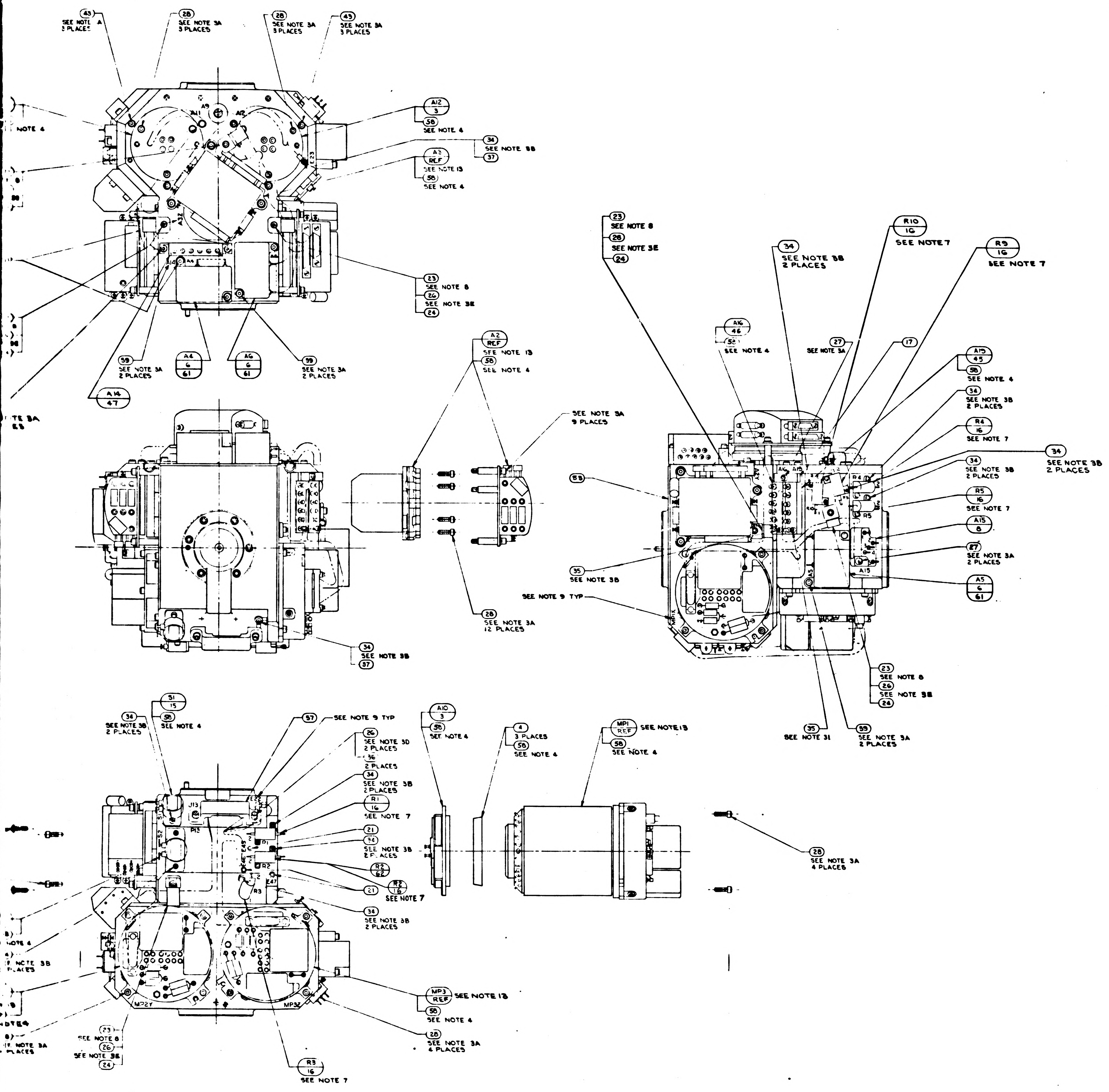
2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

DRAWN
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL

	REV	SHEET
2018605	BB	1

2/2018605


4
3
2
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D
C
B
A
43 SEE NOTE 4 2 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A12 3
58 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
53
35 SEE NOTE 3B
SEE NOTE 9 TYP
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3E
24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A13 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 3
27 SEE NOTE 3A 2 PLACES
A5 6 61
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
51 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 62
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7
23 SEE NOTE 8
26
SEE NOTE 3E
24
MP2Y
MP3Y
J13
NOTE 4
NOTE 3B PLACES
NOTE 3A PLACES

REV	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 17755		
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	EF
AY	REVISED PER TDRR 33712	AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ TAC
BA	REVISED PER TDRR 34021	5 AUG 67	JJJ
BB	REVISED PER TDRR 34724	2 OCT 67	RWH

QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1	–	–	1010928-184	RESISTOR, R2	62
3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
6	6	6	–	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
A/R	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	1	1	2018837	BRACKET, CONN. 44 PIN	56
1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
–	–	–	1	1010928-295	RESISTOR FIXED	54
1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
1	1	1	–	2018830	SHIELD THERMOSTAT	52
1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	1	1	–	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
–	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
7	7	8	8	1000223	WASHER, CABLE CLAMP	24
7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	2018776	CLAMP, THERMOSTAT	17
7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
–	–	–	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
–	–	–	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
–	–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
–	–	–	1	2018750	HOUSING STABLE MEMBER	1

LIST OF MATERIALS

NEXT ASSY	USED ON
2018604	DL 2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

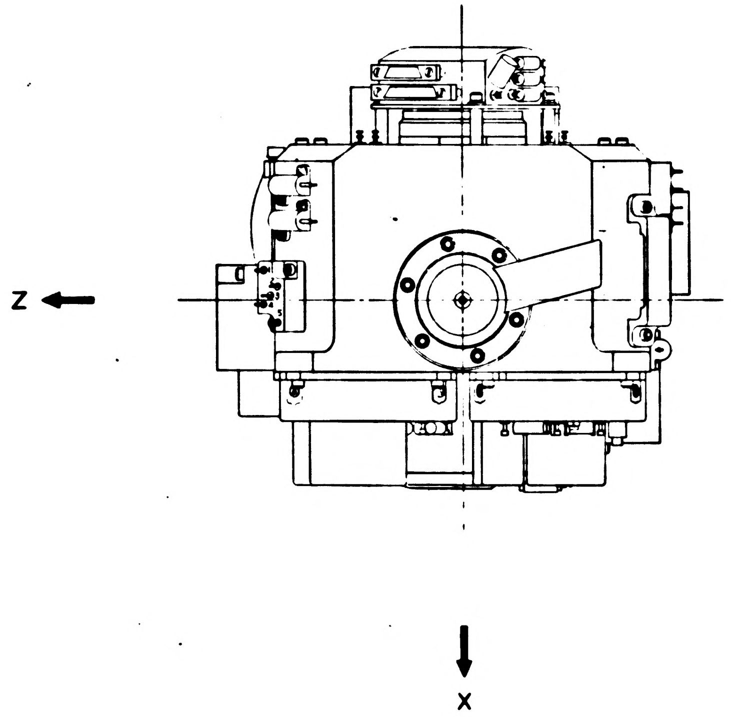
CODE IDENT NO 80230
SIZE J_3
NASA DRAWING NO 2018605
SCALE 1/1
WT
SHEET 1 OF 2

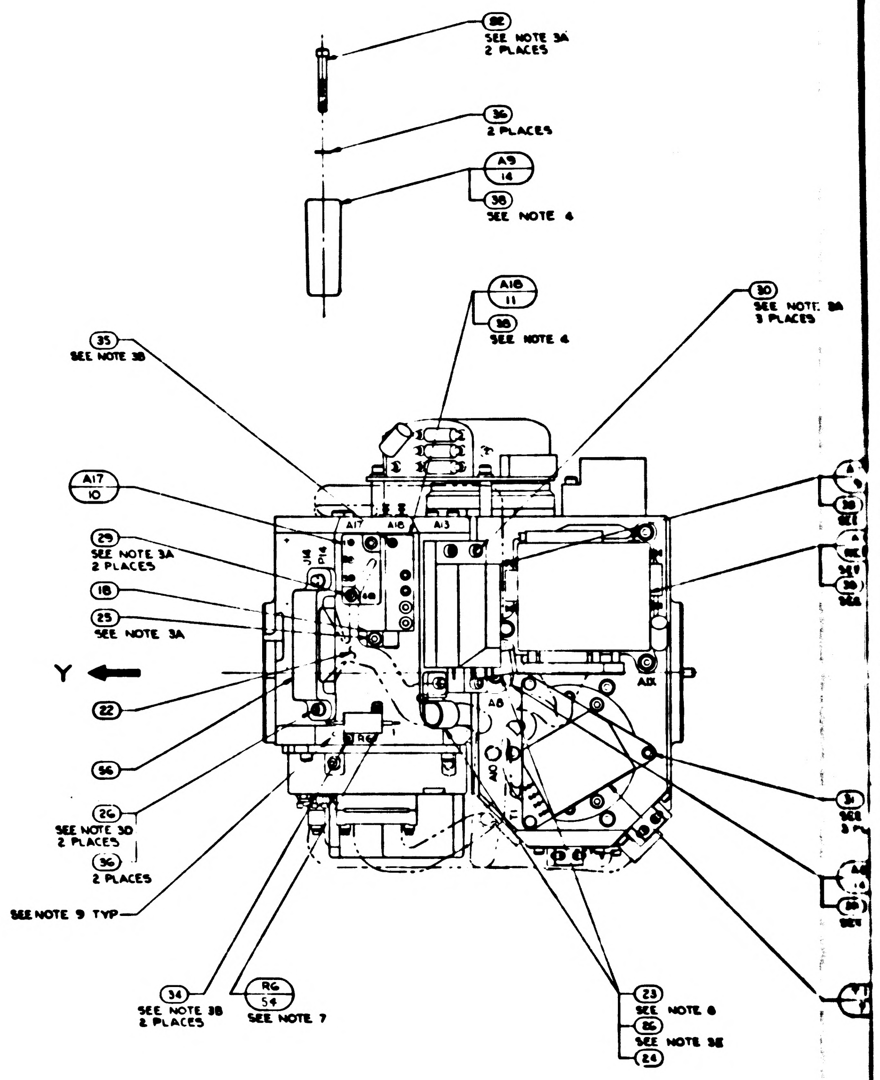
2018605 BB

2018605 REL BB SHEET 1

3/2018605

SO18e02

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SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
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SEE NOTE 4
A18
11
38
SEE NOTE 4
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SEE NOTE 3A
3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
RG
54
SEE NOTE 7
23
SEE NOTE 8
86
SEE NOTE 3E
24
31
A17
A18
A13
J14
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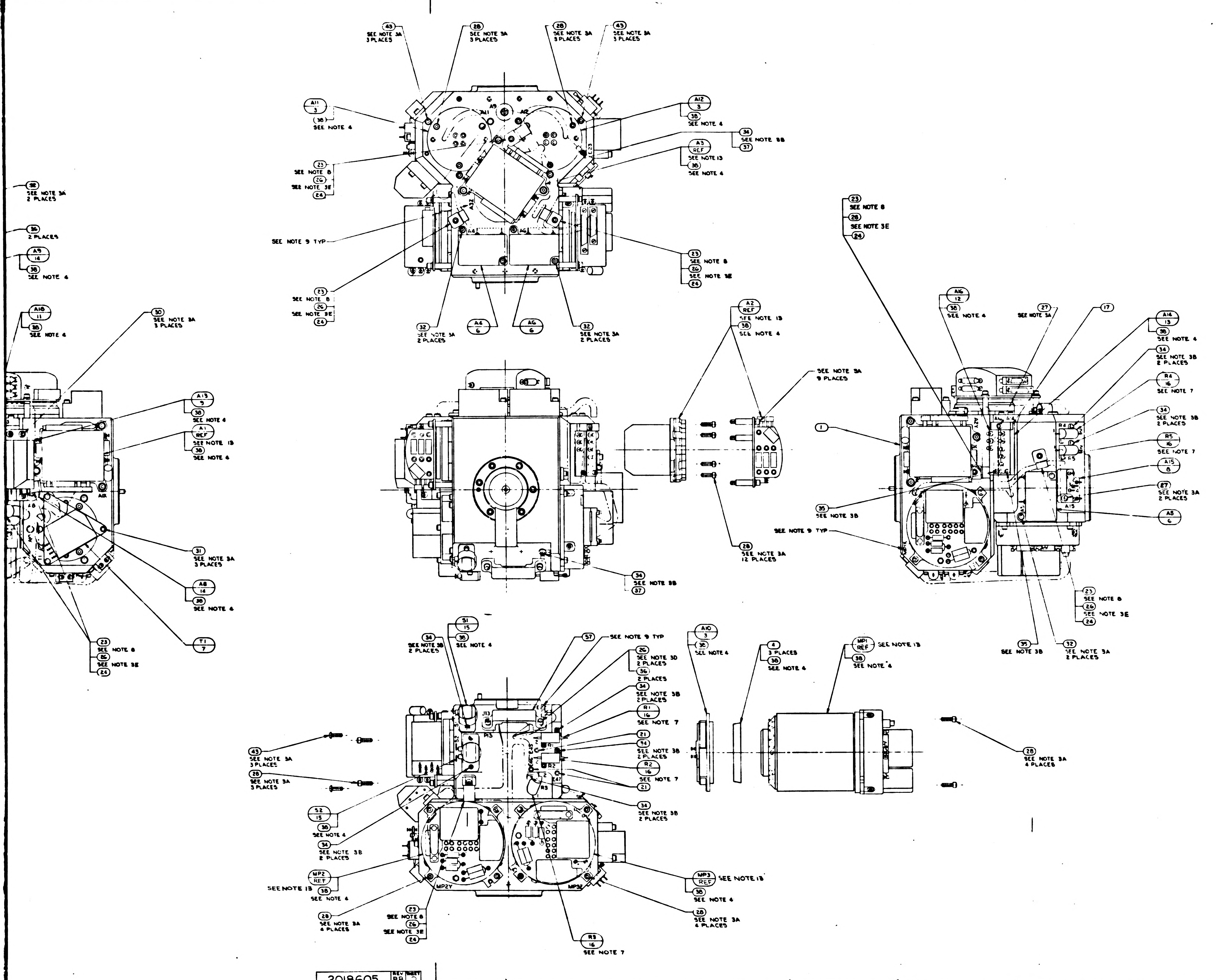
AIX
A8
A10

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H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A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
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A3 REF SEE NOTE 13
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23 SEE NOTE 8
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SEE NOTE 9 TYP
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23 SEE NOTE 8
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32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
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36 2 PLACES
A9 14
38 SEE NOTE 4
A18 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 REF
SEE NOTE 13
38 SEE NOTE 4
A18
A8
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
23 SEE NOTE 8
26 SEE NOTE 3E
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A2 REF
SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
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A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
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A14 13
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34 SEE NOTE 3B 2 PLACES
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SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16
SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
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35 SEE NOTE 3B
SEE NOTE 9 TYP
A15
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
51 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
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34 SEE NOTE 3B 2 PLACES
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R2 16
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34 SEE NOTE 3B 2 PLACES
J13
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43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF
SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP2Y
MP3Z
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16
SEE NOTE 7
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
36 SEE NOTE 4
4 3 PLACES
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MP1 REF SEE NOTE 13
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28 SEE NOTE 3A 4 PLACES
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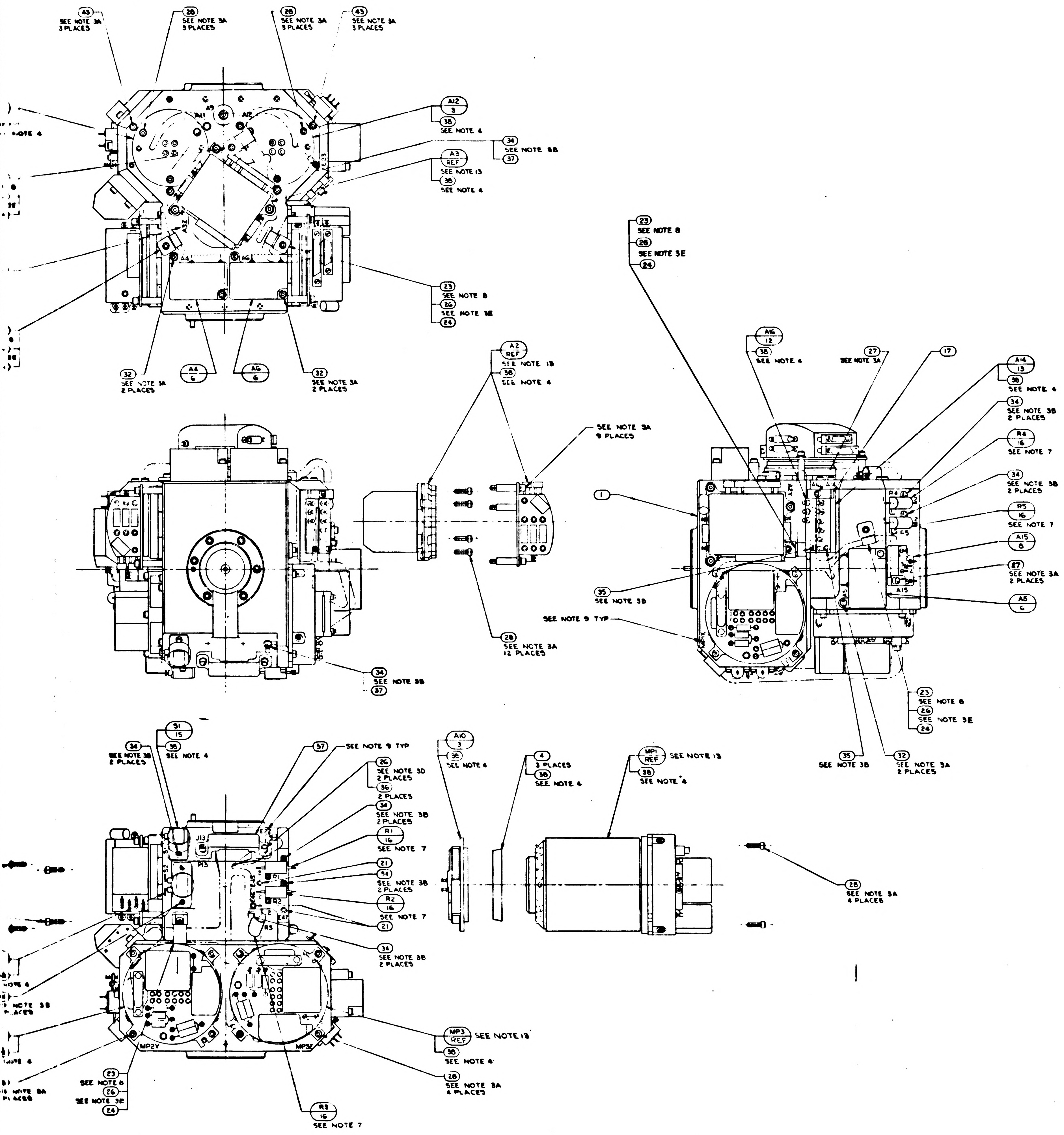
-Ͻ11 CON

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± DO NOT SCALE THIS DRAWING	
			DRAWN
			CHECKED
		MATERIAL	APPROVAL
			APPROVAL
2018604	DL2018601	HEAT TREATMENT	NASA APPROVAL
NEXT ASSY	USED ON		
APPLICATION		FINAL FINISH	MIT APPROVAL

2018605	REV BB	SHEET 2

272018605

ZONE	LTR	DESCRIPTION	DATE	APPROVED
REVISIONS				
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	5 MAY 67	EF
	AY	REVISION STATUS CHANGED	AUG 67	4N.
	AZ	REVISION STATUS CHANGED	8 AUG 67	JJJ JAC
	BA	REVISION STATUS CHANGED	9 AUG 67	JJJ
	BB	REVISION STATUS CHANGED	2 OCT 67	GD RWH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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
A12
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SEE NOTE 4
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SEE NOTE 3B
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A3
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SEE NOTE 13
38
SEE NOTE 4
23
SEE NOTE 8
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SEE NOTE 3E
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SEE NOTE 3A
2 PLACES
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A6
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32
SEE NOTE 3A
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A2
REF
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SEE NOTE 4
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SEE NOTE 3A
12 PLACES
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SEE NOTE 3B
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A16
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SEE NOTE 4
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SEE NOTE 3A
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A14
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
R4
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SEE NOTE 7
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SEE NOTE 3A
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SEE NOTE 3B
SEE NOTE 9 TYP
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SEE NOTE 8
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SEE NOTE 3A
2 PLACES
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SEE NOTE 3B
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SEE NOTE 4
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SEE NOTE 9 TYP
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SEE NOTE 3D
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SEE NOTE 3B
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SEE NOTE 3B
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SEE NOTE 4
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SEE NOTE 4
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SEE NOTE 13
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SEE NOTE 3A
4 PLACES
MP3
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SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
R3
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SEE NOTE 7
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SEE NOTE 8
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SEE NOTE 3E
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MP2Y
MP3Y
J13
P13
A9
A11
A12
A32
A4
A6
A15
R1
R2
R3
R4
R5
NOTE 4
NOTE 3B
NOTE 3A

-011 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	**MANNED SPACECRAFT CENTER** HOUSTON TEXAS	
		MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL 19 03 65 APPROVAL	STABLE MEMBER ASSEMBLY	
2018604	UL 2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230	SIZE J3 · NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	SCALE 1/1	WT · SHEET 2 OF 2
APPLICATION					

2018605 REV BB SHEET 2

2018605 BB

3/2018605

2018605

WIRING LEGEND

COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

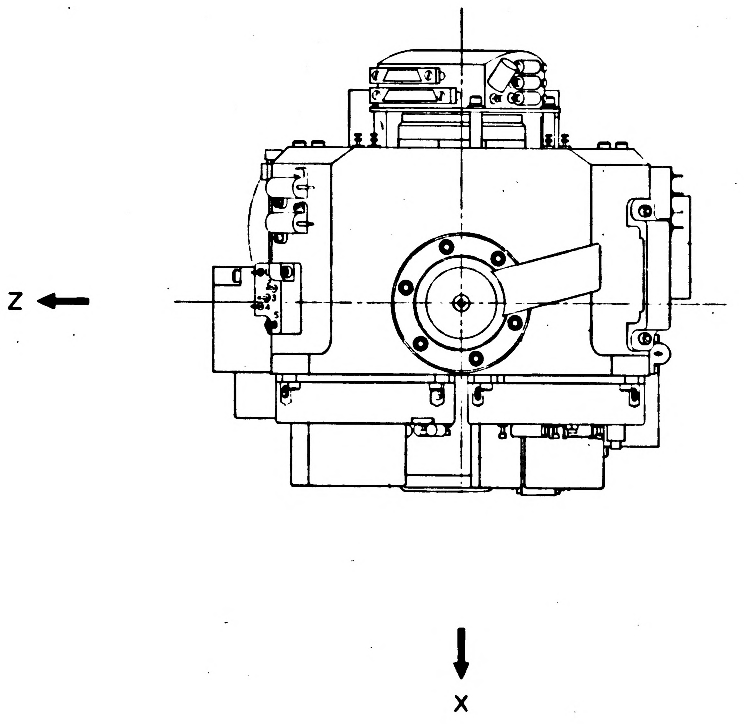
CABLE CLAMP ㉓

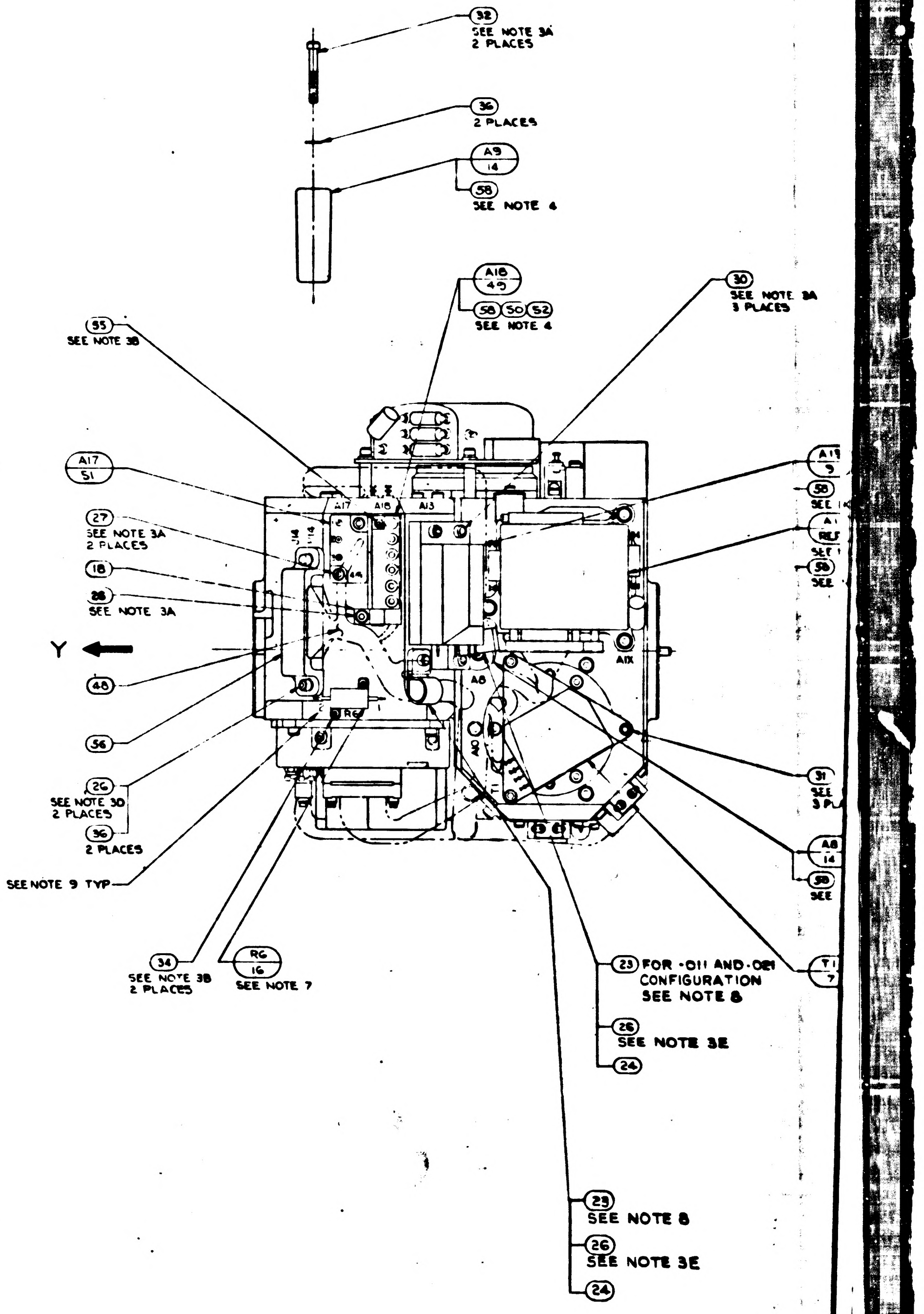
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2	1010928-264	54.9
-114	1.5	-256	45.3	-239	30.1
-126	2.0	-258	47.5	-230	24.3
-136	2.55	-260	49.9	-195	10.5
-143	3.01	-263	53.6	-171	5.9
-149	3.48	-265	56.2	-333	287
-155	4.02	-268	60.4	-321	215
-159	4.42	-271	64.9	-305	147
-164	4.99	-273	68.1	-299	127
-168	5.49	-274	69.8	-272	66.5
-172	6.04	-277	75.0	-253	42.2
-178	6.98	-280	80.6	-249	38.3
-184	8.06	-282	84.5	-228	23.2
-189	9.09	-285	90.9	-216	17.4
-193	10.0	-287	95.3	-192	9.76
-197	11.0	-289	100	-182	7.68
-201	12.1	-292	107	-170	5.76
-204	13.0	-295	115	-153	3.83
-207	14.0	-297	121	-317	196
-210	15.0	-300	130	-302	137
-213	16.2	-303	140	-288	97.6
-215	16.9	-309	162	-194	10.2
-218	18.2	-312	174	-121	1.78
-220	19.1	-316	191	1010928-281	82.5
-222	20.0	-320	210		
-226	22.1	-326	243		
-229	23.7	-332	280		
-231	24.9	-336	309		
-233	26.1	-340	340		
-236	28.0	-344	374		
-238	29.4	-349	422		
-240	30.9	-362	576		
-242	32.4	-369	681		
-244	34.0	-389	1020		
-248	37.4	1010928-400	1430		
1010928-251	40.2				

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SEE NOTE 4
A18
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58 50 52
SEE NOTE 4
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SEE NOTE 3A
3 PLACES
55
SEE NOTE 3B
A17
51
A17
A18
A13
27
SEE NOTE 3A
2 PLACES
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28
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26
SEE NOTE 30
2 PLACES
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R6
A8
A1X
A10
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
A19
9
58
A1
REF
58
31
3 PL
A8
14
58
T1
7
23 FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
26
SEE NOTE 3E
24
23
SEE NOTE 8
26
SEE NOTE 3E
24

NOTES:

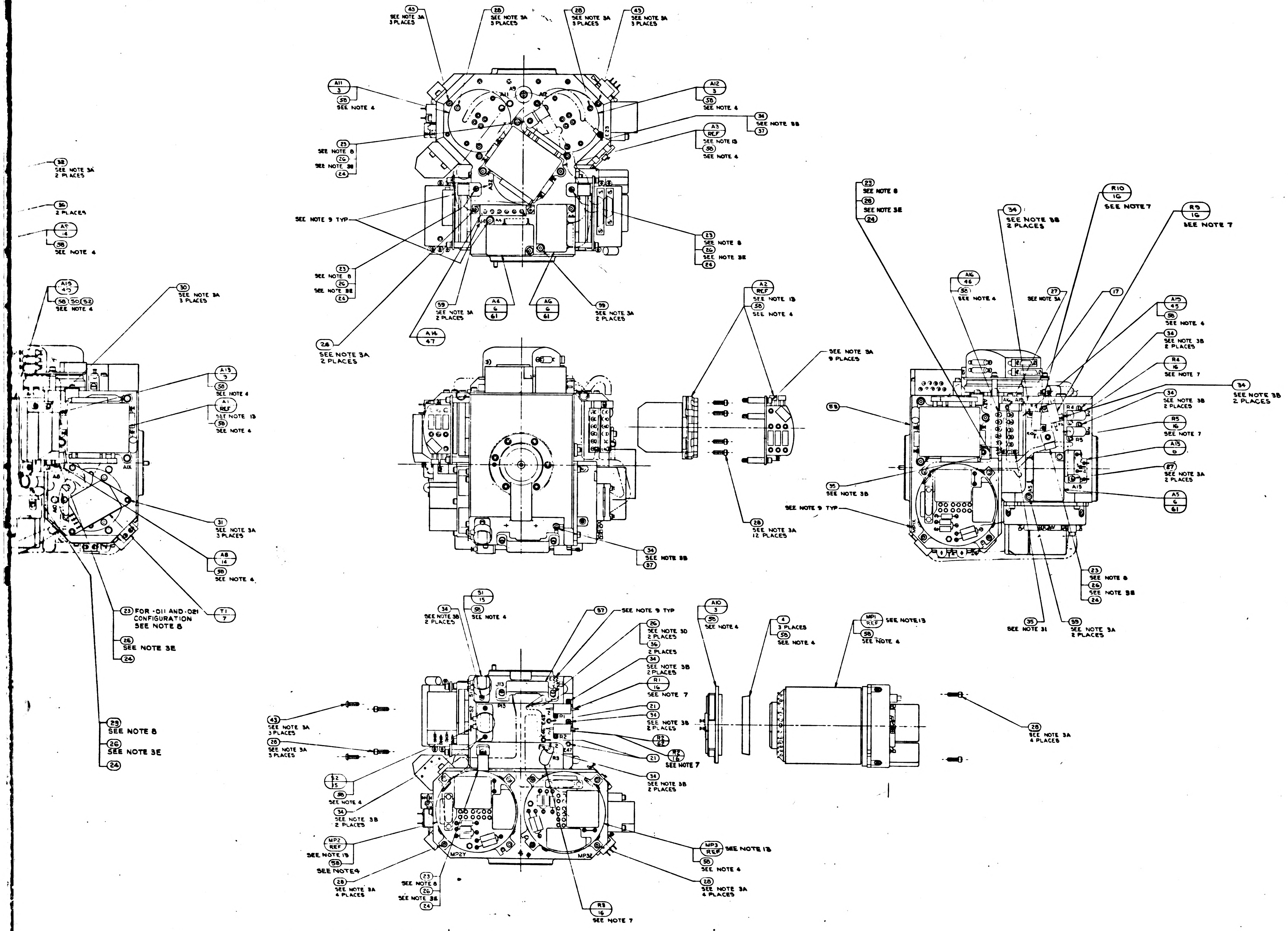
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TQROUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM ㊳ OR (53) TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ②,③,⑤,⑨,⑪,⑫,⑬,⑭,⑮,㊺,㊻,㊼ AND ㊿, BETWEEN ITEM ② AND ITEM ③. BETWEEN ITEM ③ AND ITEM ④ AND BETWEEN ITEM ㊾ AND ITEM ㊿
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM ㉔ FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

15. FOR -031 ASSY, PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021.
FOR -041 ASSY, PIP PREAMP PN 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021.

2018605	REV BC	SHEET 1

1/2018605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SEE NOTE 3A
3 PLACES
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A11
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58
SEE NOTE 4
A12
3
58
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
58
SEE NOTE 4
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SEE NOTE 8
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J12
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A2
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SEE NOTE 3A
2 PLACES
A4
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A6
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SEE NOTE 3A
2 PLACES
A14
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SEE NOTE 3A
2 PLACES
32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
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A13
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SEE NOTE 3A
3 PLACES
A13
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A1
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SEE NOTE 13
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A1X
A8
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SEE NOTE 3A
3 PLACES
A8
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T1
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FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
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SEE NOTE 3E
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A2
REF
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SEE NOTE 4
SEE NOTE 3A
9 PLACES
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SEE NOTE 3B
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SEE NOTE 3A
12 PLACES
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SEE NOTE 8
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SEE NOTE 3E
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SEE NOTE 3B
2 PLACES
R10
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SEE NOTE 7
R9
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SEE NOTE 7
A16
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SEE NOTE 3A
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A15
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
R4
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2 PLACES
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2 PLACES
R5
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SEE NOTE 3B
2 PLACES
R2
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R3
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
J13
P13
S2
R1
R2
R3
E47
43
SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
S2
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
MP2
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SEE NOTE 13
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SEE NOTE 3A
4 PLACES
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SEE NOTE 8
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MP2Y
MP3Y
R8
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SEE NOTE 7
MP3
REF
SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
A10
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SEE NOTE 4
4
3 PLACES
58
SEE NOTE 4
MP1
REF
SEE NOTE 13
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SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

1	1	-	-	101
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A/R	A/R	A/R	A/R	MIL-I
6	6	6	-	100
A/R	A/R	A/R	—	MIL-
1	1	1	1	2018
1	1	1	1	201
1	1	1	--	101
—	—	—	1	101
1	1	1	-	20
1	1	1	-	20
1	1	1	--	200
1	1	1	--	201
1	1	1	--	20
1	1	1	--	201
1	1	1	--	201
1	1	1	--	201
1	1	1	--	20
9	9	9	9	1010
A/R	A/R	A/R	A/R	MIL-
—	—	—	A/R	1006
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6	6	6	6	MS
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22	22	22	19	101
2	2	2	8	1001
3	3	3	3	100
3	3	3	3	100
33	33	33	33	1001
7	7	7	5	100
14	14	15	12	100
—	—	—	1	100
7	7	8	8	100
7	7	8	8	100
—	—	—		20
3	3	3	3	100
1	1	1	1	2018
1	1	1	1	2018
7	7	8	5	1010
2	2	2	2	100
2	2	2	2	2018
—	—	—		2018
—	—	—		2018
—	—	—		2018
—	—	—		2007
1	1	1	1	200
1	1	1	1	200
1	1	1	1	2007
—	—	3	3	200
3	3	3	3	2018
3	3	3	3	2018
—	—	—		2018
QTY REQD	QTY REQD	QTY REQD	QTY REQD	
041	031	021	01	

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
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MATERIAL

HEAT TREATMENT

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DRAWN B.
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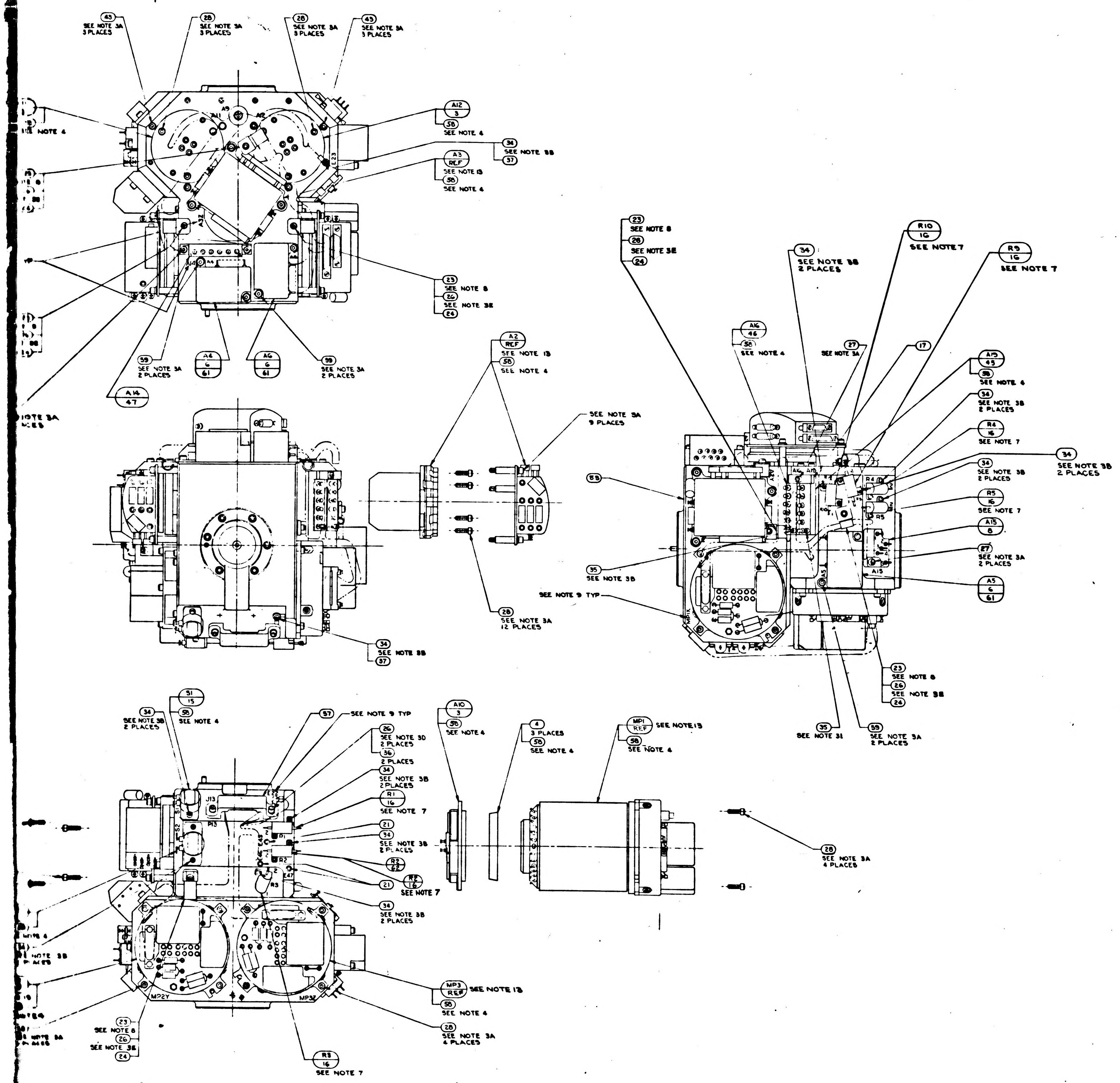
APPROVAL
NASA APPROVAL
MIT APPROVAL

2018605 REV BC SHEET 1

2/2018605

REVISIONS TDRR 17755			
SYM	DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	EF
AY	REVISED PER TDRR 33712	1 AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ JAC
BA	REVISED PER TDRR 34021	9 AUG 67	JJJ
BB	REVISED PER TDRR 34724	2 OCT 67	GD RWH
BC	REVISED PER TDRR 34725	17 OCT 67	RWH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SEE NOTE 3A 3 PLACES
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SEE NOTE 3A 3 PLACES
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SEE NOTE 3A 3 PLACES
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SEE NOTE 3A 3 PLACES
A12
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SEE NOTE 4
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SEE NOTE 3B
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A3
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SEE NOTE 4
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SEE NOTE 8
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SEE NOTE 3A 2 PLACES
A4
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A6
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SEE NOTE 3A 2 PLACES
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A2
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SEE NOTE 13
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SEE NOTE 4
SEE NOTE 3A 9 PLACES
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35
SEE NOTE 3B
SEE NOTE 9 TYP
28
SEE NOTE 3A 12 PLACES
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SEE NOTE 3B
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SEE NOTE 8
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SEE NOTE 3B 2 PLACES
R10
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SEE NOTE 7
A16
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SEE NOTE 4
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A13
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SEE NOTE 4
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R4
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SEE NOTE 7
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SEE NOTE 3B 2 PLACES
34
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R5
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R2
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R2
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SEE NOTE 4
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3 PLACES
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MP1
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SEE NOTE 3A 4 PLACES
MP3
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SEE NOTE 4
28
SEE NOTE 3A 4 PLACES
R3
16
SEE NOTE 7
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SEE NOTE 8
26
SEE NOTE 3E
J13
MP2Y
MP3Z

1	1	–	–	1010928-184	RESISTOR, R2	62
3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
6	6	6	–	1001488-9	SCREW, HEX, SOC. HD SELF-LOCKING	59
A/R	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	1	1	2018837	BRACKET, CONN. 44 PIN	56
1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
–	–	–	1	1010928-295	RESISTOR FIXED	54
1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
1	1	1	–	2018830	SHIELD THERMOSTAT	52
1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	1	1	–	2018828	WIRING HARNESS 'A' STABLE MEMBER	48
1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC., SELF-LOCKING	43
A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
–	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
7	7	8	8	1000223	WASHER, CABLE CLAMP	24
7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	2018776	CLAMP, THERMOSTAT	17
7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
–	–	–	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
–	–	–	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
–	–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
–	–	–	1	2018750	HOUSING STABLE MEMBER	1
QTY REQ'D	QTY REQ'D	QTY REQ'D	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
041	031	021	011	LIST OF MATERIALS		

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

CODE IDENT NO 80230
SIZE J_3
NASA DRAWING NO 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 BC

2018605 REV BC SHEET 1

3/2018605

D

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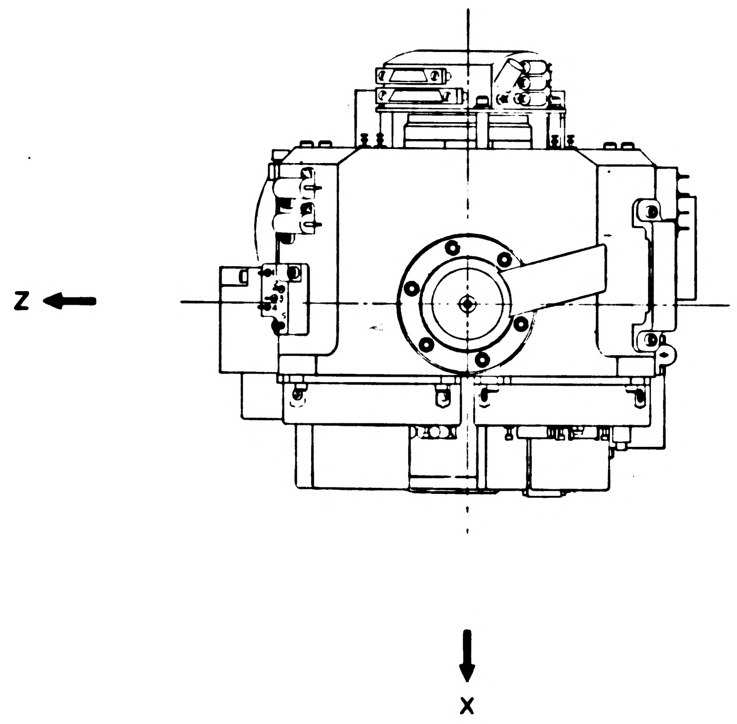

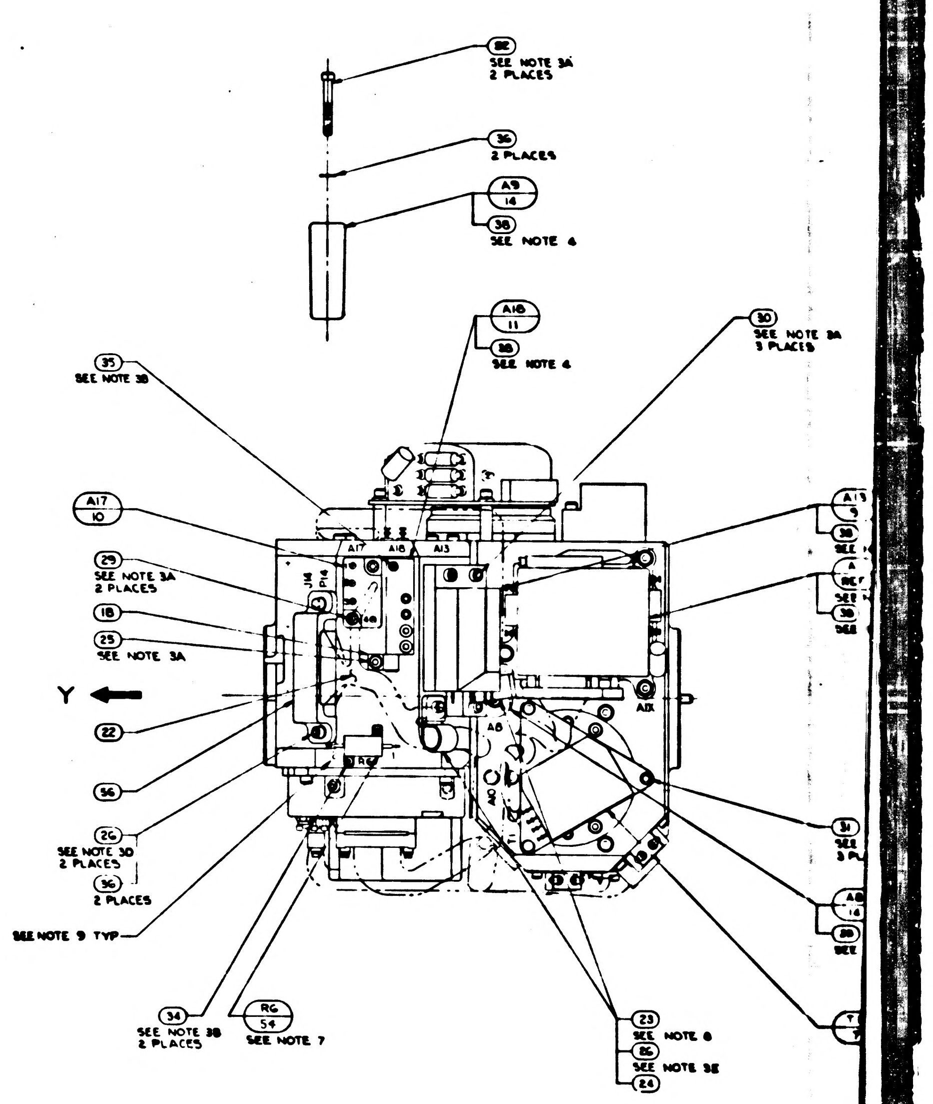
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A18
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SEE NOTE 3A
3 PLACES
35
SEE NOTE 3B
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29
SEE NOTE 3A
2 PLACES
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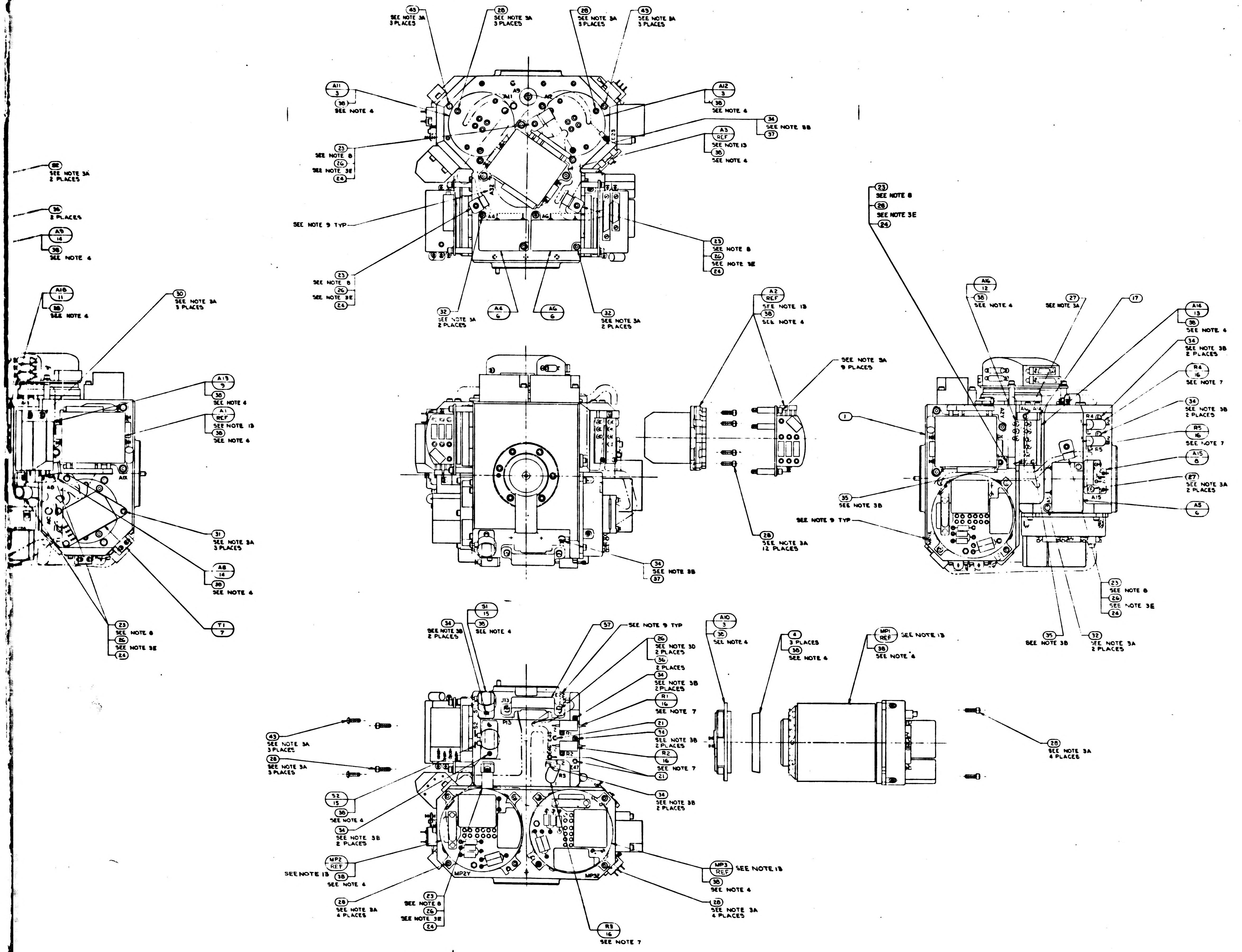
B

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

A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3 PLACES
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SEE NOTE 7
MP3
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
J13
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MP2Y
MP3Z
A10
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES

-011 CON

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	UL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

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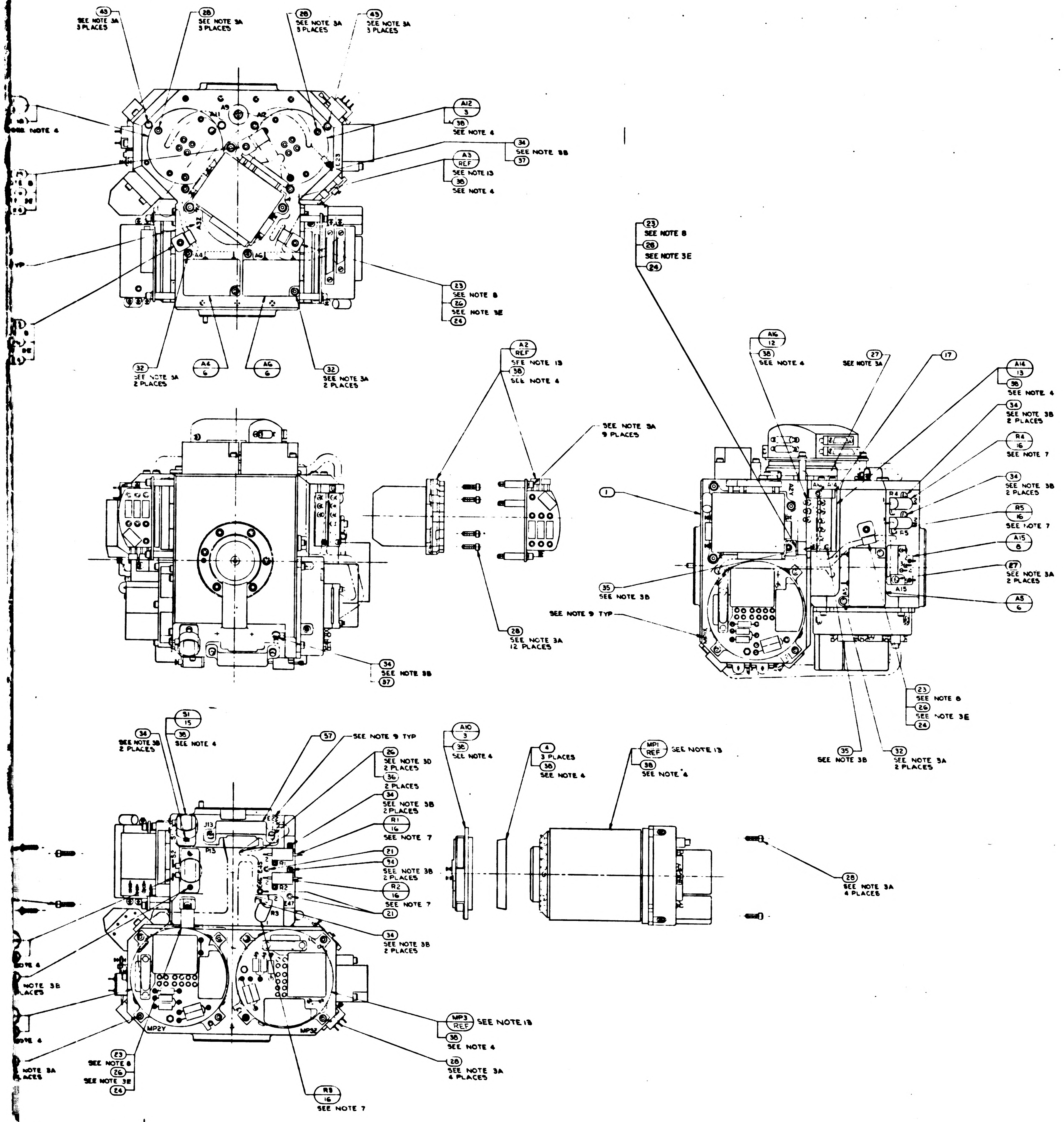
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

2018605	REV BC	SHEET 2

2✓2018605

ZONE	LTR	DESCRIPTION	DATE	APPROVED
REVISIONS				
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	5 MAY 67	JJJ EH
	AY	REVISION STATUS CHANGED	1 AUG 67	4N
	AZ	REVISION STATUS CHANGED	8 AUG 67	JJJ JAC
	BA	REVISION STATUS CHANGED	9 AUG 67	JJJ
	BB	REVISION STATUS CHANGED	12 OCT 67	GD RWH
.	BC	REVISED PER TDRR 34725	17 OCT 67	JSM RWH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A12 3
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A3 REF SEE NOTE 13
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A11
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23 SEE NOTE 8
26 SEE NOTE 3E
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A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
NOTE 4
A2 REF SEE NOTE 13
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SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
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A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
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A14 13
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34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
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35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
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35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
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38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
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A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
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R3
MP2Y
MP3Z
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
NOTE 3B PLACES
NOTE 3A PLACES

-311 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON TEXAS	
		MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL 19 2 65 APPROVAL	STABLE MEMBER ASSEMBLY	
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230	SIZE J3
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	NASA DRAWING NO 2018605	
APPLICATION				SCALE 1/1	WT · SHEET 2 OF 2

C18605 REV BC SHEET 2

2018605 BC

3/2018605

WIRING LEGEND

COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

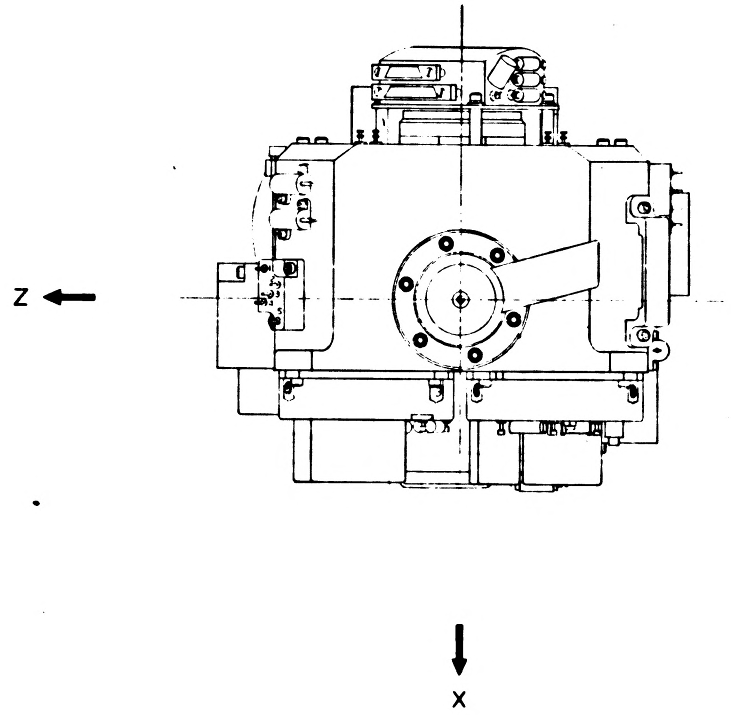
CABLE CLAMP ㉓

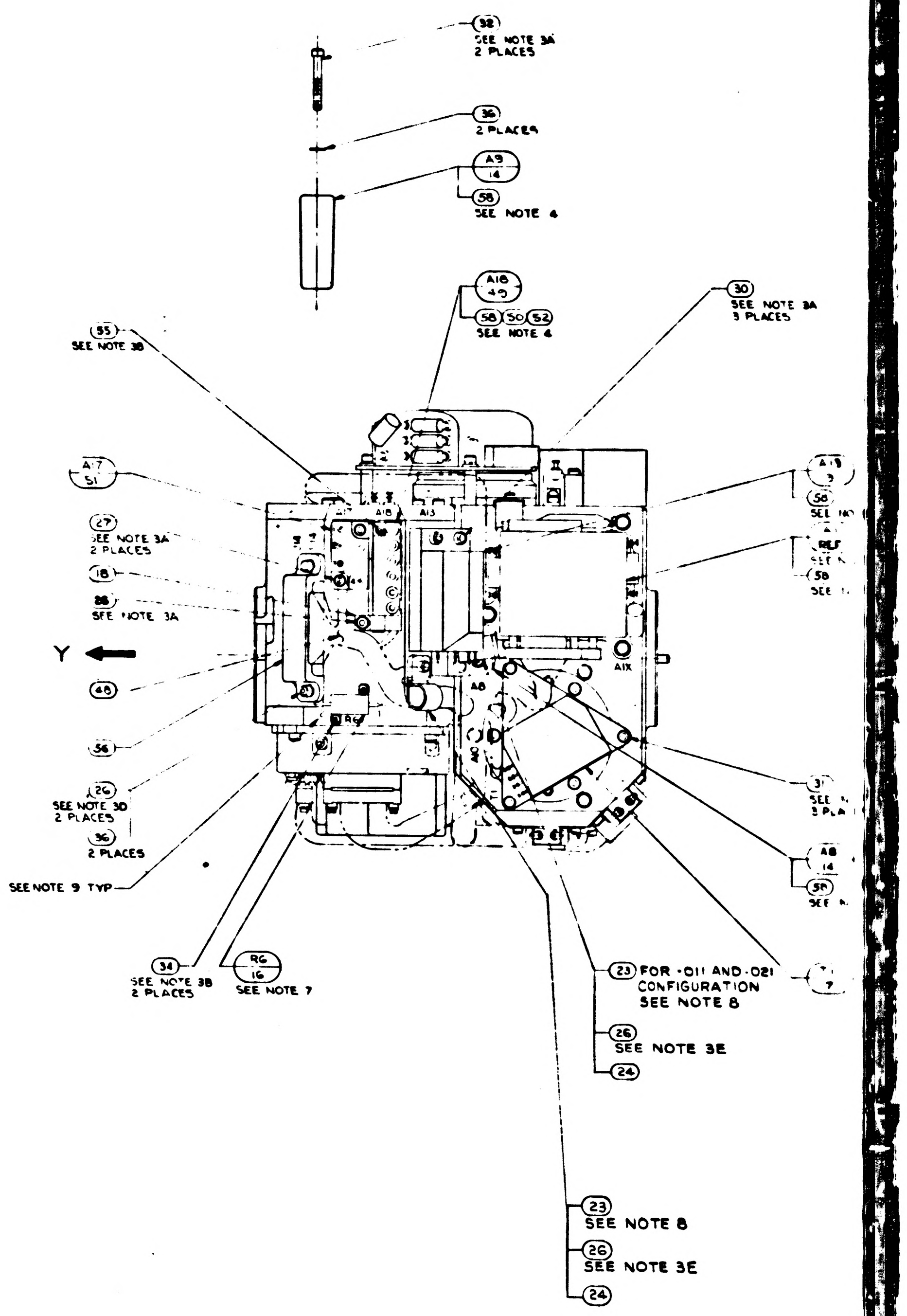
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2	1010928-264	54.9
-114	1.5	-256	45.3	-239	30.1
-126	2.0	-258	47.5	-230	24.3
-136	2.55	-260	49.9	-195	10.5
-143	3.01	-263	53.6	-171	5.9
-149	3.48	-265	56.2	-333	287
-155	4.02	-268	60.4	-321	215
-159	4.42	-271	64.9	-305	147
-164	4.99	-273	68.1	-299	127
-168	5.49	-274	69.8	-272	66.5
-172	6.04	-277	75.0	-253	42.2
-178	6.98	-280	80.6	-249	38.3
-184	8.06	-282	84.5	-228	23.2
-189	9.09	-285	90.9	-216	17.4
-193	10.0	-287	95.3	-192	9.76
-197	11.0	-289	100	-182	7.68
-201	12.1	-292	107	-170	5.76
-204	13.0	-295	115	-153	3.83
-207	14.0	-297	121	-317	196
-210	15.0	-300	130	-302	137
-213	16.2	-303	140	-288	97.6
-215	16.9	-309	162	-194	10.2
-218	18.2	-312	174	-121	1.78
-220	19.1	-316	191	1010928-281	82.5
-222	20.0	-320	210		
-226	22.1	-326	243		
-229	23.7	-332	280		
-231	24.9	-336	309		
-233	26.1	-340	340		
-236	28.0	-344	374		
-238	29.4	-349	422		
-240	30.9	-362	576		
-242	32.4	-369	681		
-244	34.0	-389	1020		
-248	37.4	1010928-400	1430		
1010928-251	40.2				




32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
58
SEE NOTE 4
A18
49
58 50 52
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
35
SEE NOTE 3B
A17
51
27
SEE NOTE 3A
2 PLACES
18
28
SEE NOTE 3A
Y
48
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
A17
A18
A13
A1X
A8
R6
A19
9
58
REF
58
31
3 PLA
A8
14
58
7
23 FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
26
SEE NOTE 3E
24
23
SEE NOTE 8
26
SEE NOTE 3E
24

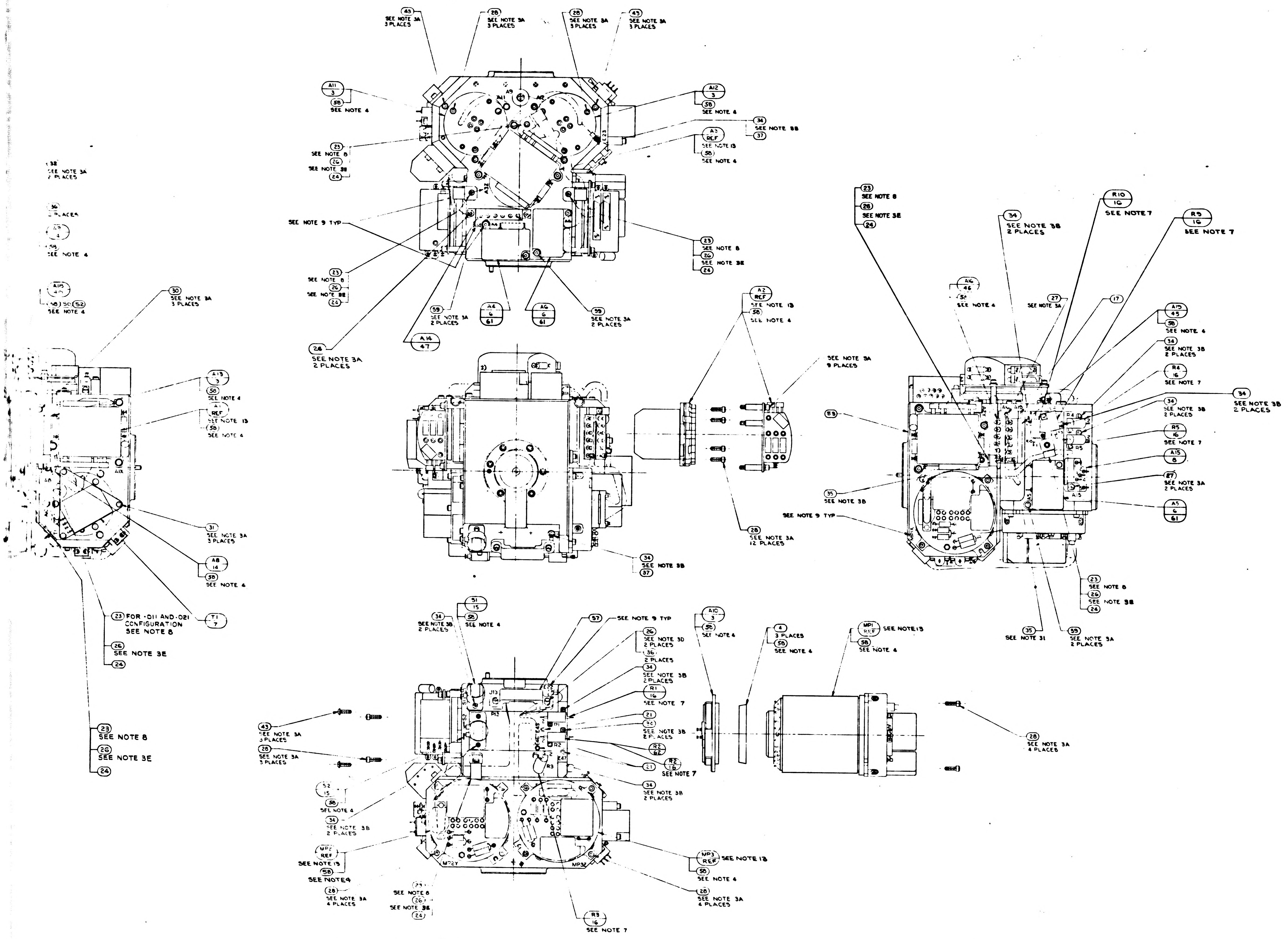
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TQROUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM ㊳ OR (59) TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ②,③,⑤,⑨,⑪,⑫,⑬,⑭,⑮,㊺,㊻,㊼ AND ㊿, BETWEEN ITEM ② AND ITEM ③ BETWEEN ITEM ③ AND ITEM ④ AND BETWEEN ITEM ㊾ AND ITEM ㊿
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II PER APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $^{.10}_{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM ㉔ FOR-011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
15. FOR-031 ASSY. PIP PREAMP PN 2021267-011 MAY BE USED IN PLACE OF PN 2007060-021. FOR-041 ASSY. PIP PREAMP PN 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021 *IN THE A4 OR A5 POSITION ONLY. PIP PREAMP P/N 2021269-031 MAY BE USED IN PLACE OF P/N 2007060-021 IN THE A6 POSITION ONLY.*

2018605 BD

1/2018605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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
58 SEE NOTE 4
A12 3
58 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A6 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
28 SEE NOTE 3A 2 PLACES
A9
A11
A12
32 SEE NOTE 3A 2 PLACES
36 3 PLACES
A7 4
59 SEE NOTE 4
A15 45
48 50 52
SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 3
58 SEE NOTE 4
A1 REF SEE NOTE 13
58 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
58 SEE NOTE 4
23 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
26 SEE NOTE 3E
24
T1 7
23 SEE NOTE 8
26 SEE NOTE 3E
24
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
34 SEE NOTE 3B
37
28 SEE NOTE 3A 12 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
53
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
51 15
58 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
30 SEE NOTE 3B 2 PLACES
R2 82
R2 16 SEE NOTE 7
C1
34 SEE NOTE 3B 2 PLACES
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
52 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
E45
E47
R2
R3
MP2Y
MP3Z

QTY REQD -041	QTY REQD -031	QTY REQD -021	QTY REQD -011	
1	1	–	–	101
	3	–	–	20070
A/R	A/R	A/R	A/R	MIL I
6	6	6	–	10014B
A/R	A/R	A/R	–	MIL
1	1	1	1	20188
1	1	1	1	2018
1	1	1	–	1016
–	–	–	1	1010
1	1	1	–	20
1	1	1	–	201
1	1	1	–	200
1	1	1	–	2018
1	1	1	–	20
1	1	1	–	2018
1	1	1	–	201
1	1	1	–	2018
1	1	1		2018
9	9	9	9	10108
A/R	A/R	A/R	A/R	MIL-T
–	–	–	A/R	1006
2	2	2	2	MS15
6	6	6	6	MS
2	2	2	3	10116
22	22	22	18	10116
2	2	2	2	10014
3	3	3	3	10014
3	3	3	3	10014
33	33	33	33	10014
7	7	7	5	10014
14	14	15	[illegible]	10014
–	–	–	1	10014
7	7	8	8	1000
7	7	8	8	1000
–	–	–	1	20
3	3	3	3	10016
1	1	1	1	20187
1	1	1	1	20187
7	7	8	5	1010
2	2	2	2	10014
2	2	2	2	20186
–	–	–	1	20186
–	–	–	1	20186
–	–	–	1	20186
–	–	–	1	20071
1	1	1	1	20070
1	1	1	1	2007
1	1	1	1	20070
–	–	3	3	2007
3	3	3	3	20188
3	3	3	3	201874
–	–	–	1	20187

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

INSTRUMEN

DRAWN

CHECKED

APPROVAL

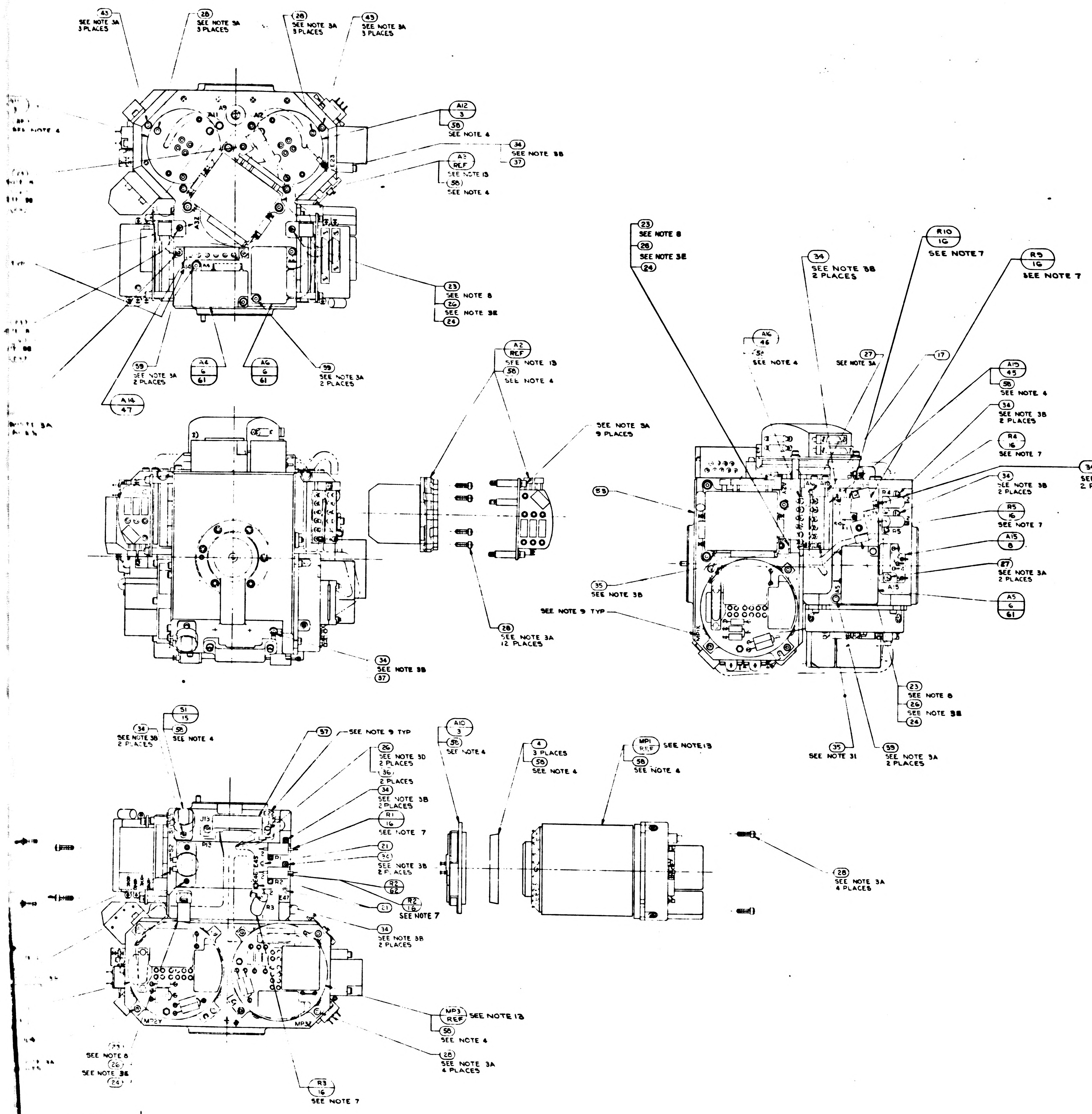
APPROVAL

NASA APPROVAL

MIT APPROVAL

2018605 REV 80 SHEET 1

2/2018605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A12 3
58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
53
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
51 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
46
SEE NOTE 3B 2 PLACES
R2 62
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
23 SEE NOTE 8
26 SEE NOTE 3E
24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A13 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A
A5 6 61
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
MP2Y
MP3Y
4
3
2

SYM	DESCRIPTION	DATE	APPROVAL
W	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	6 MAY 67	EF
AY	REVISED PER TDRR 33712	AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ TMC
BA	REVISED PER TDRR 34021	9 AUG 67	JJJ
BB	REVISED PER TDRR 34724		RWH
BC	REVISED PER TDRR 34725	17 OCT 67	RWH
BD	REVISED PER TDRR 34726	26 OCT 67	JRK

REVISIONS TDRR 17755

QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1	-	-	1010928-184	RESISTOR, R2	62
3	3	-	-	2007060-021	PIP PREAMP ASSEMBLY	61
A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
6	6	6	-	1001488-9	SCREW, HEX, SOC. HD SELF-LOCKING	59
A/R	A/R	A/R	-	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO 4	58
1	1	1	1	2018838	BRACKET, CONN 34 PIN	57
1	1	1	1	2018837	BRACKET, CONN 44 PIN	56
1	1	1	-	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
-	-	-	1	1010928-295	RESISTOR FIXED	54
1	1	1	-	2018750-011	HOUSING STABLE MEMBER	53
1	1	1	-	2018830	SHIELD THERMOSTAT	52
1	1	1	-	2007172-011	BLOWER CONTROL MOD ASSY	51
1	1	1	-	2018829-2	SHIM BLOWER CONT THERMO	50
1	1	1	-	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	1	1	-	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	1	1	-	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	1	1	-	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	1	1	-	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC, SELF-LOCKING	43
A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
-	-	-	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
-	-	-	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
7	7	8	8	1000223	WASHER, CABLE CLAMP	24
7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
-	-	-	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	2018776	CLAMP, THERMOSTAT	17
7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
-	-	-	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
-	-	-	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
-	-	-	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
-	-	-	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
-	-	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
-	-	-	1	2018750	HOUSING STABLE MEMBER	1

LIST OF MATERIALS

2018605 BD

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
CODE NO CONTRACT
DRAWN R.S.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

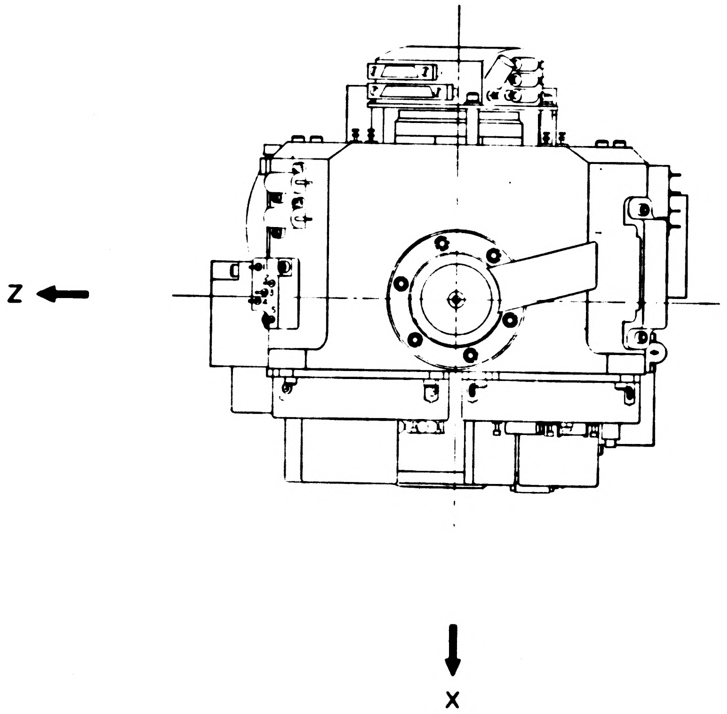
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

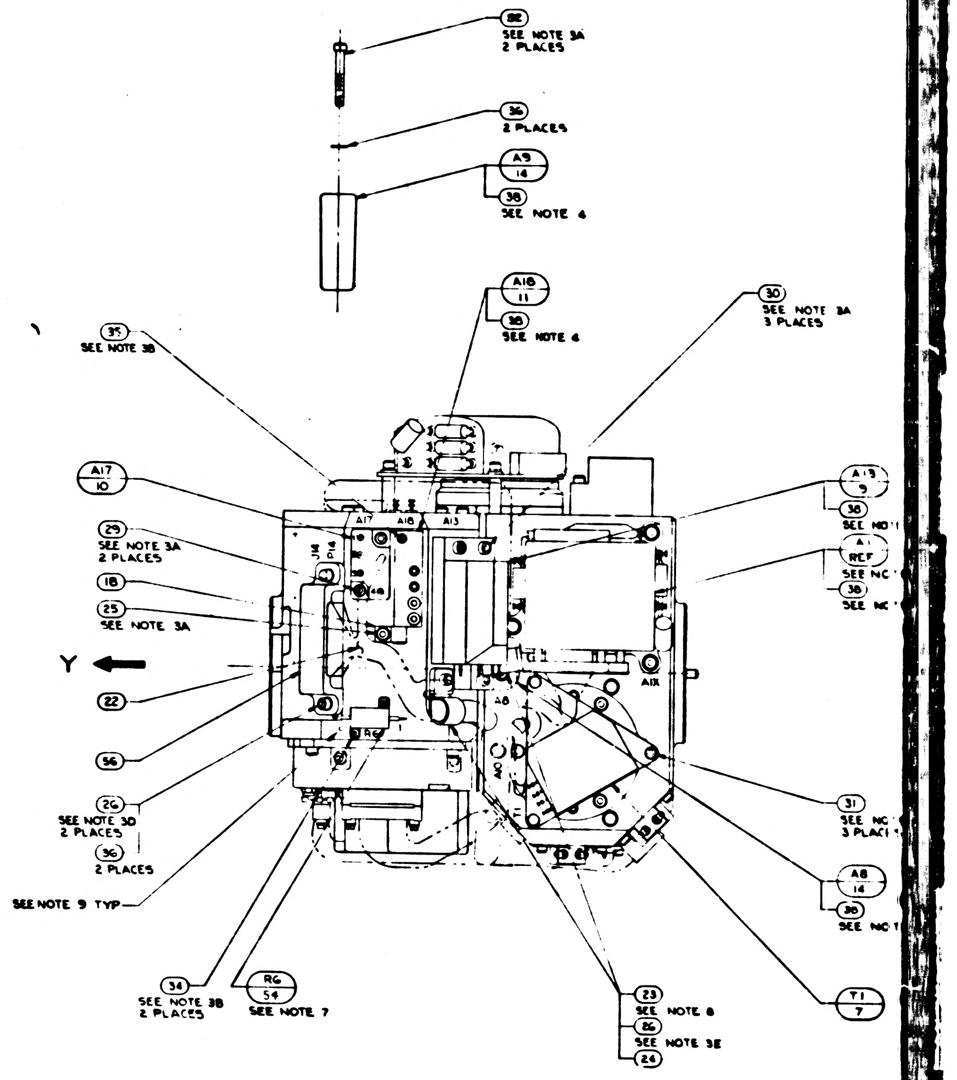
STABLE MEMBER ASSEMBLY

CODE IDENT NO 80230
SIZE J_3
NASA DRAWING NO 2018605
SCALE 1/1
WT
SHEET 1 OF 2

18605 REV BD SHEET 1

3/2018605

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SEE NOTE 3A
2 PLACES
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2 PLACES
A9
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A18
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SEE NOTE 4
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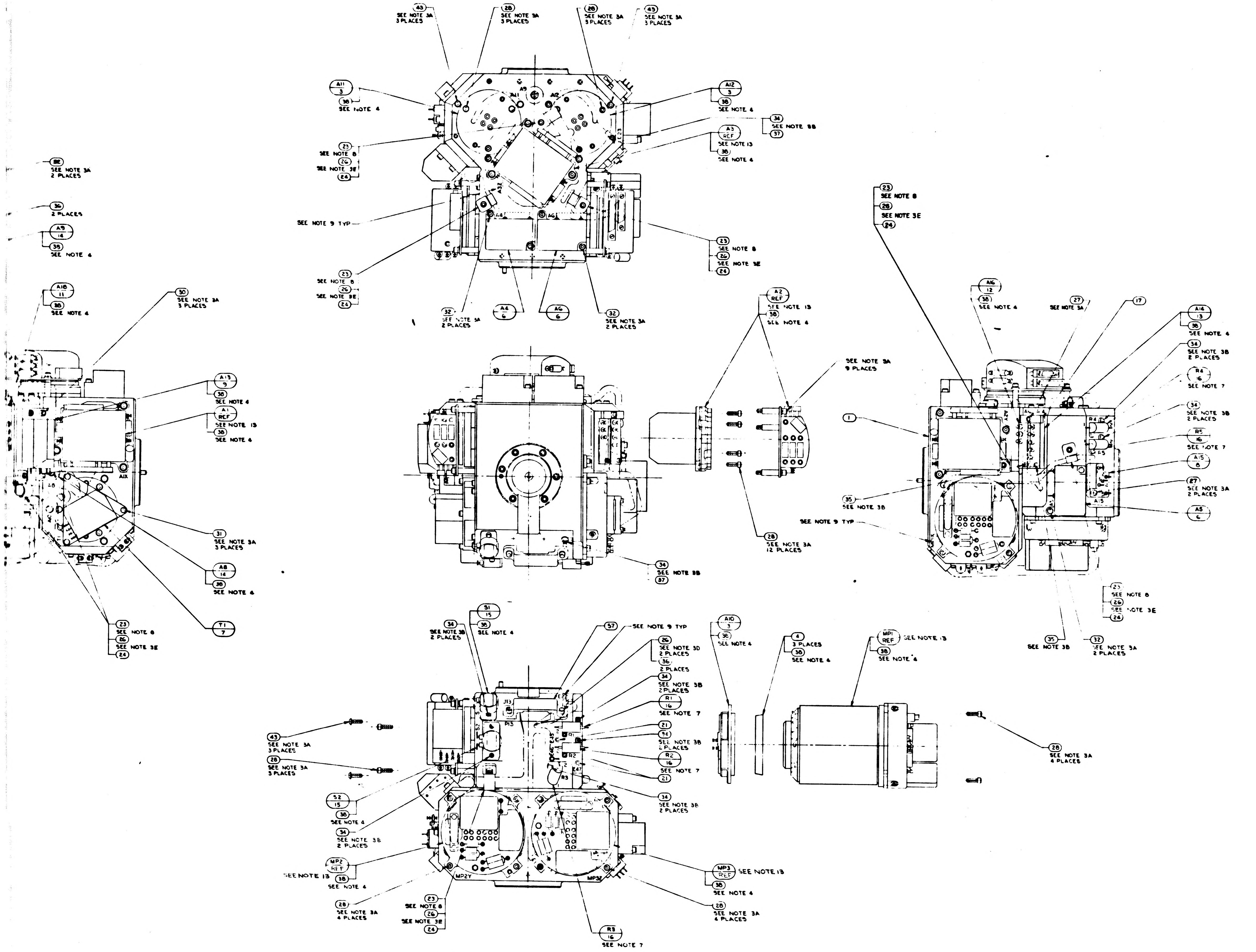
3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
54
SEE NOTE 7
23
SEE NOTE 8
86
SEE NOTE 3E
24
A13
9
38
SEE NO
A1
REF
SEE NC
38
SEE NC
31
SEE NC
3 PLACI
A8
14
38
SEE NO
T1
7
A17
A18
A13
J14
P14
A8
A1X
R6

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

2018605	REV BD	SHEET 2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28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A9
A11
A12
A4
A6
28 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
38 SEE NOTE 4
A18 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 REF SEE NOTE 13
38 SEE NOTE 4
A1X
A8
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
T1 7
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16
SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16
SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
A17
R4
R5
F5
A15
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
51 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16
SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16
SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
52 15
38 SEE NOTE 4
34 SEE NOTE 3E 2 PLACES
MP2 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16
SEE NOTE 7
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
S2
R1
R2
R3
MP2Y
MP3Z

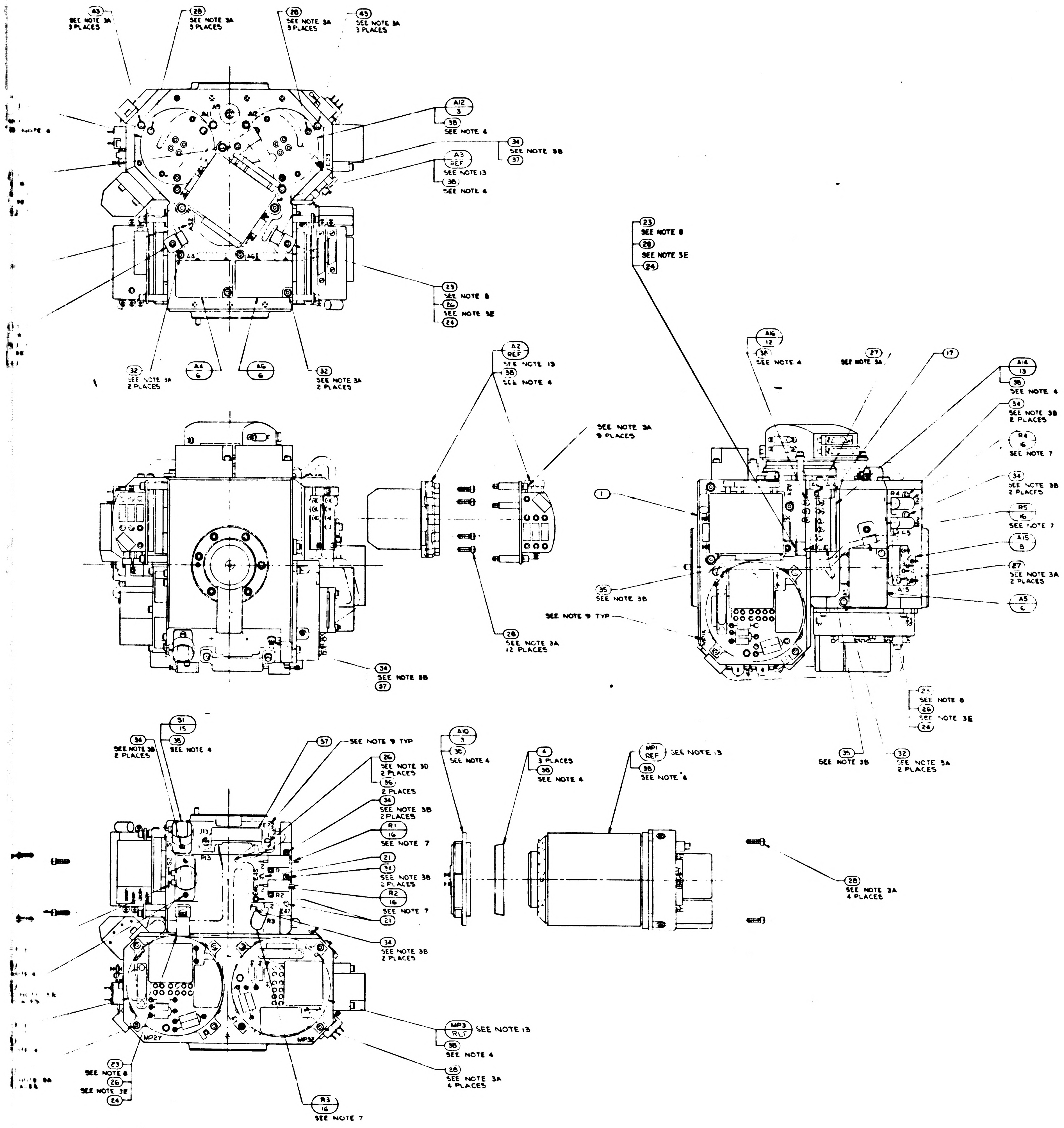
-D11 CONF

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	INSTRUME
		MATERIAL	DRAWN CHECKED APPROVAL APPROVAL
2018604	UL2018601	HEAT TREATMENT	NASA APPROVAL
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL
APPLICATION			

2018605	REV BD	SHEET 2

2/2018605

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	5 MAY 67	EF
	AY	REVISION STATUS CHANGED	AUG 67	4N
	AZ	REVISION STATUS CHANGED	8 AUG 67	JJJ JAC
	BA	PEVISION STATUS CHANGED	9 AUG 67	JJJ
	BB	REVISION STATUS CHANGED		RWH
	BC	REVISED PER TDRR 34725	17 OCT 67	JSM RWH
	BD	REVISION STATUS CHANGED	26 OCT 67	JRK



43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
A9
A11
A12
A12
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38
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
38
SEE NOTE 4
A4
A6
23
SEE NOTE 8
26
SEE NOTE 3E
24
32
SEE NOTE 3A
2 PLACES
A4
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A6
6
A2
REF
SEE NOTE 13
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
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SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
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A16
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38
SEE NOTE 4
27
SEE NOTE 3A
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A16
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38
SEE NOTE 4
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SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
R5
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SEE NOTE 7
A15
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SEE NOTE 3A
2 PLACES
A5
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SEE NOTE 3B
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SEE NOTE 3A
2 PLACES
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
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SEE NOTE 3B
2 PLACES
R1
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
R2
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SEE NOTE 7
21
J13
P13
R3
34
SEE NOTE 3B
2 PLACES
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
MP3
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
MP2Y
MP3Z
23
SEE NOTE 8
26
SEE NOTE 3E
24
R3
16
SEE NOTE 7

-D11 CONFIGURATION

2018604	UL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN R.G.S. DATE
CHECKED
APPROVAL 19 OCT 65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO 80230
SIZE J3
NASA DRAWING NO 2018605
SCALE 1/1
WT
SHEET 2 OF 2

2018605 BD

2018605 REV-SHEET BD 2

3/2018605

WIRING LEGEND				
COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

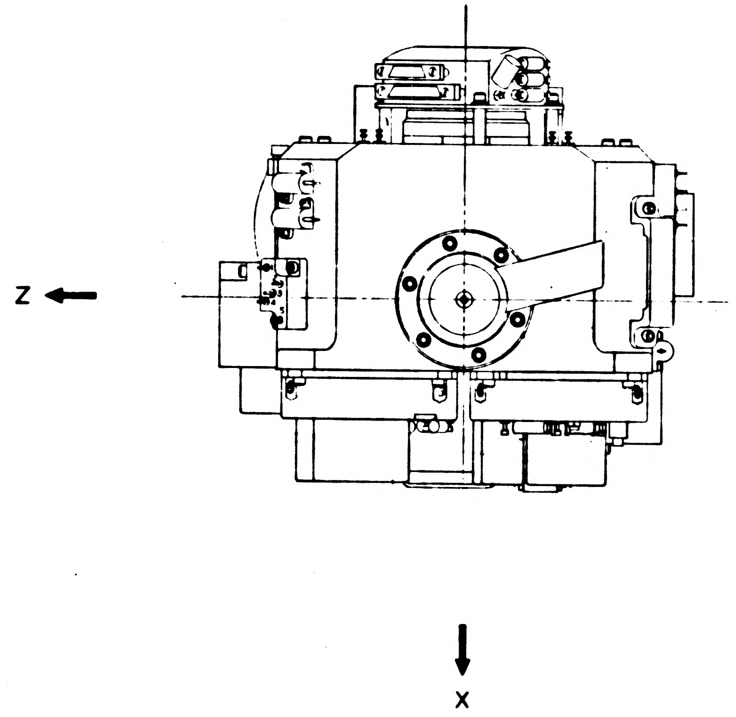
TABLE I

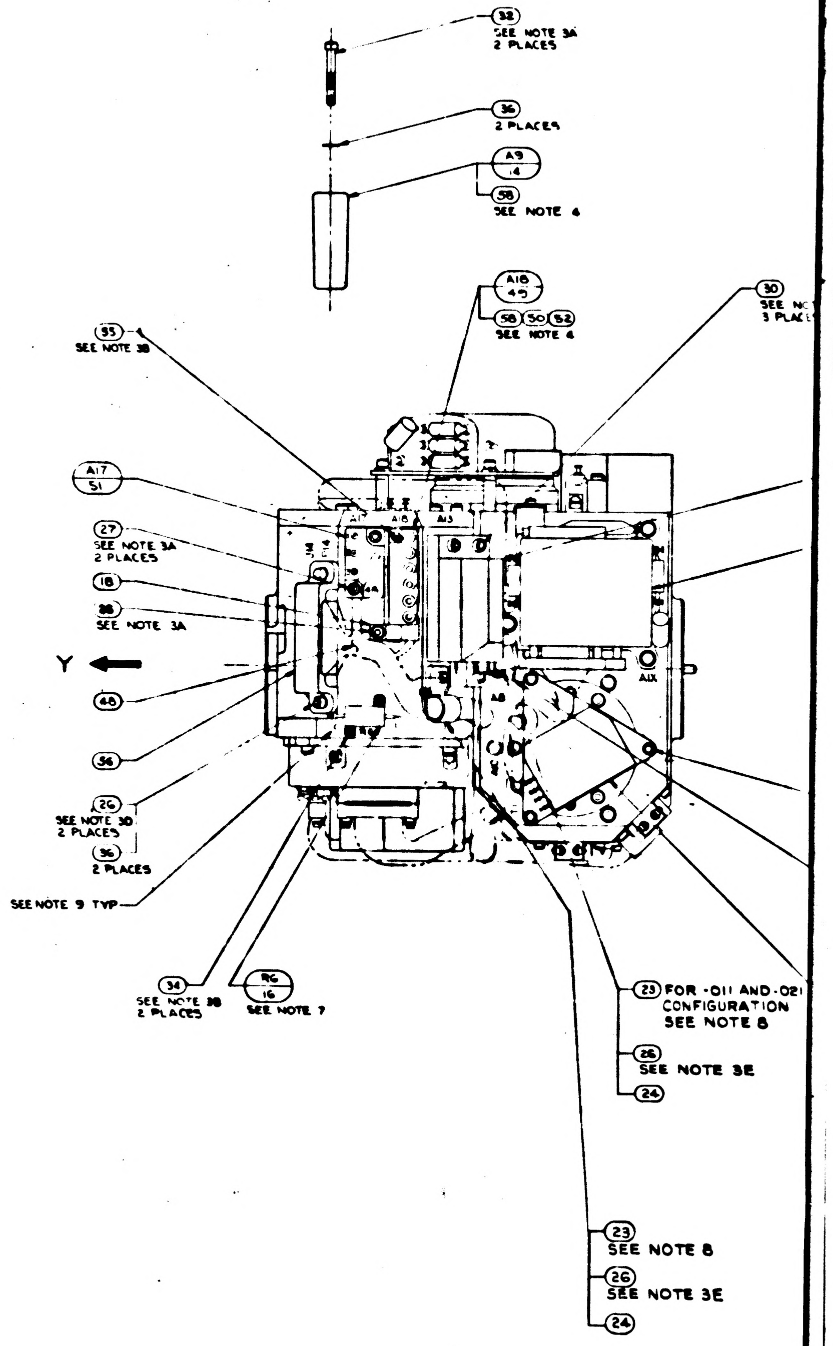
CABLE CLAMP (23)	
PART NO.	DIA REF
10C 220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10

PART NO	VALUE Ω	PART NO	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-386	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		

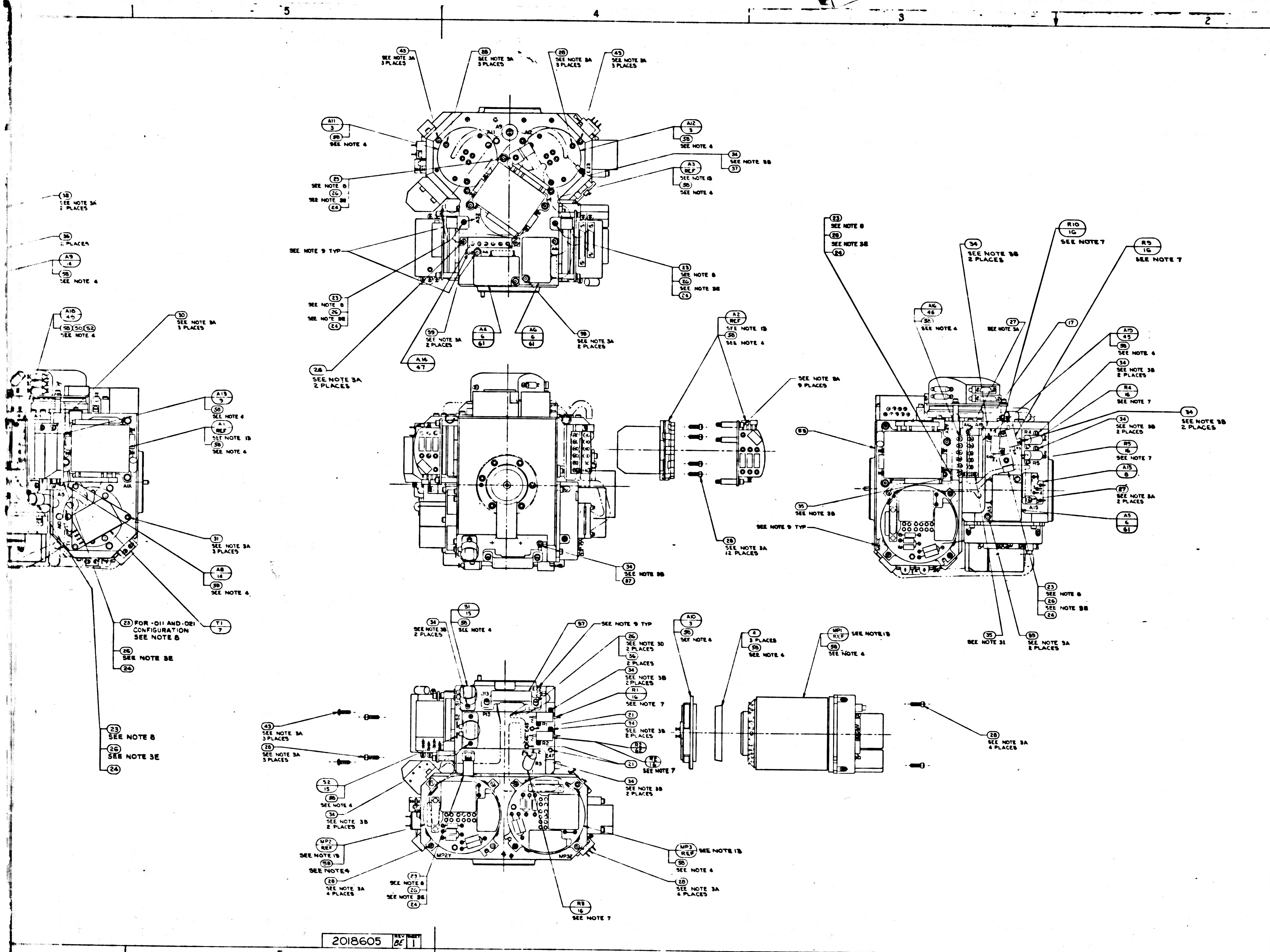



(32) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9 14
(58) SEE NOTE 4
A18 49
(58)(50)(52) SEE NOTE 4
(30) SEE NO 3 PLACES
(33) SEE NOTE 3B
A17 51
(27) SEE NOTE 3A 2 PLACES
(18)
(38) SEE NOTE 3A
Y
(48)
(56)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
(34) SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
(23) FOR -011 AND -021 CONFIGURATION SEE NOTE 8
(26) SEE NOTE 3E
(24)
(23) SEE NOTE 8
(26) SEE NOTE 3E
(24)
A17
A18
A13
A8
A1X

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 5.0 IN-LB
   B. 3.5 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   D. INSTALL FINGER TIGHT
   E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM (38) OR (59) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14),(15),(45),(46),(47) AND (50), BETWEEN ITEM (2) AND ITEM (3), BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (49) AND ITEM (50)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM (24) FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

15. FOR -031 ASSY, PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021. FOR -041 ASSY, PIP PREAMP PN 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021 *IN THE A4 OR A5 POSITION ONLY. PIP PREAMP P/N 2021269-031 MAY BE USED IN PLACE OF P/N 2007060-021 IN THE A6 POSITION ONLY.*



5
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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
A11
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58
SEE NOTE 4
A12
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58
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
58
SEE NOTE 4
25
SEE NOTE 8
26
SEE NOTE 3E
24
SEE NOTE 9 TYP
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SEE NOTE 8
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SEE NOTE 3E
24
23
SEE NOTE 8
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SEE NOTE 3E
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59
SEE NOTE 3A
2 PLACES
A4
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A6
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SEE NOTE 3A
2 PLACES
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SEE NOTE 3A
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SEE NOTE 3A
2 PLACES
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SEE NOTE 4
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58 50 52
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SEE NOTE 3A
3 PLACES
A13
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SEE NOTE 4
A1
REF
SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 3A
3 PLACES
A8
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SEE NOTE 4
T1
7
23 FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
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SEE NOTE 3E
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23
SEE NOTE 8
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SEE NOTE 3E
24
A2
REF
SEE NOTE 13
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SEE NOTE 4
SEE NOTE 3A
9 PLACES
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SEE NOTE 3A
12 PLACES
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SEE NOTE 3B
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SEE NOTE 8
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R10
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SEE NOTE 7
R9
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SEE NOTE 7
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SEE NOTE 4
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SEE NOTE 3A
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
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R5
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SEE NOTE 3A
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SEE NOTE 3B
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SEE NOTE 3A
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3 PLACES
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SEE NOTE 4
MP1
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4 PLACES
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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
MP2
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SEE NOTE 13
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SEE NOTE 3A
4 PLACES
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SEE NOTE 7
MP3
REF
SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
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P13
MP2Y
MP3Z
A5
A15
AIX

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1	1	1	–	[illegible]
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1	1	1	–	[illegible]
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7	7	8	8	[illegible]
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–	–	3	3	[illegible]
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–	–	–	1	[illegible]
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041	031	02	011	

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±

DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

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CHECKED

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APPROVED

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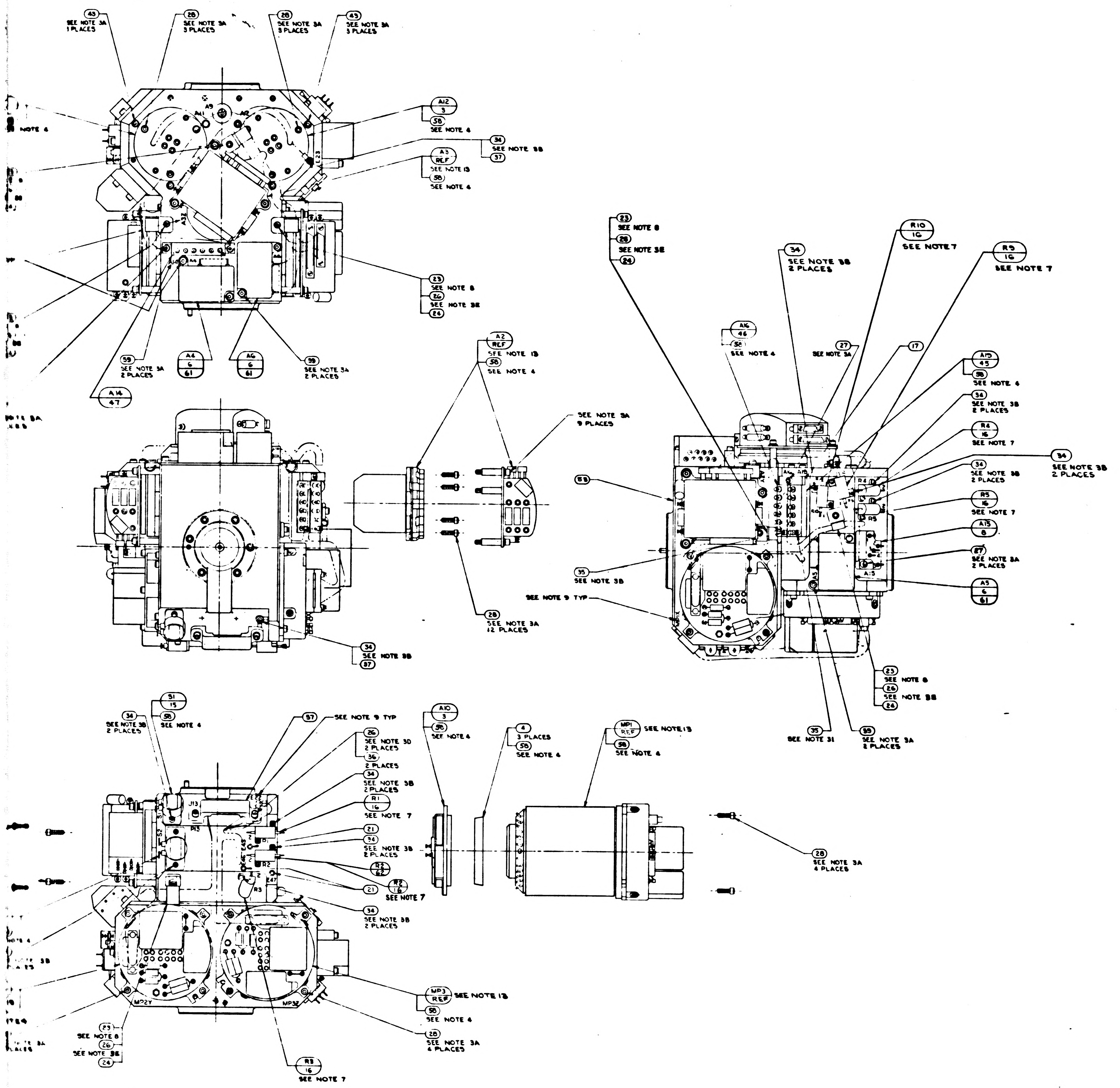
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SEE NOTE 3A
1 PLACES
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NOTE 4
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SEE NOTE 7
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SEE NOTE 4
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3 PLACES
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SEE NOTE 4
MP1
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

REVISIONS TDRR 17755

SYM	DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	EF
AY	REVISED PER TDRR 33712	AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ JAC
BA	REVISED PER TDRR 34021	8 AUG 67	JJJ
BB	REVISED PER TDRR 34724	2 OCT 67	RWH
BC	REVISED PER TDRR 34725	27 OCT 67	RWH
BD	REVISED PER TDRR 34726	26 OCT 67	JRK
BE	REVISED PER TDRR 34727	13 NOV 67	JRK RWH

LIST OF MATERIALS

QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1	–	–	1010928-184	RESISTOR, R2	62
3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
6	6	6	–	1001488-9	SCREW, HEX, SOC. HD SELF-LOCKING	59
A/R	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	2018838	BRACKET, CONN 34 PIN	57
1	1	1	1	2018837	BRACKET, CONN 44 PIN	56
1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
–	–	–	1	1010928-293	RESISTOR FIXED	54
1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
1	1	1	–	2018830	SHIELD THERMOSTAT	52
1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	1	1	–	2018828	WIRING HARNESS 'A' STABLE MEMBER	48
1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC, SELF-LOCKING	43
A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
–	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	2	2	3	1011625-11	SCREW, HEX., SOC HD., SELF-LOCKING	35
22	22	22	18	1011625-9	SCREW, HEX., SOC. HD, SELF-LOCKING	34
2	2	2	8	1001488-10	SCREW, HEX., SOC. HD, SELF-LOCKING	32
3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	1001488-6	SCREW, HEX., SOC. HD, SELF-LOCKING	30
33	33	33	33	1001488-4	SCREW, HEX., SOC. HD, SELF-LOCKING	28
7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
7	7	8	8	1000223	WASHER, CABLE CLAMP	24
7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	2018776	CLAMP, THERMOSTAT	17
7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2	2018641	HTR ASS'Y STABLE MEMBER	14
–	–	–	1	2018637	THERMO & HTR ASS'Y. TEMP CONTROL	13
–	–	–	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
–	–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
–	–	–	1	2018750	HOUSING STABLE MEMBER	1

2018604	DL 2018601
NEXT ASSY	USED ON
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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

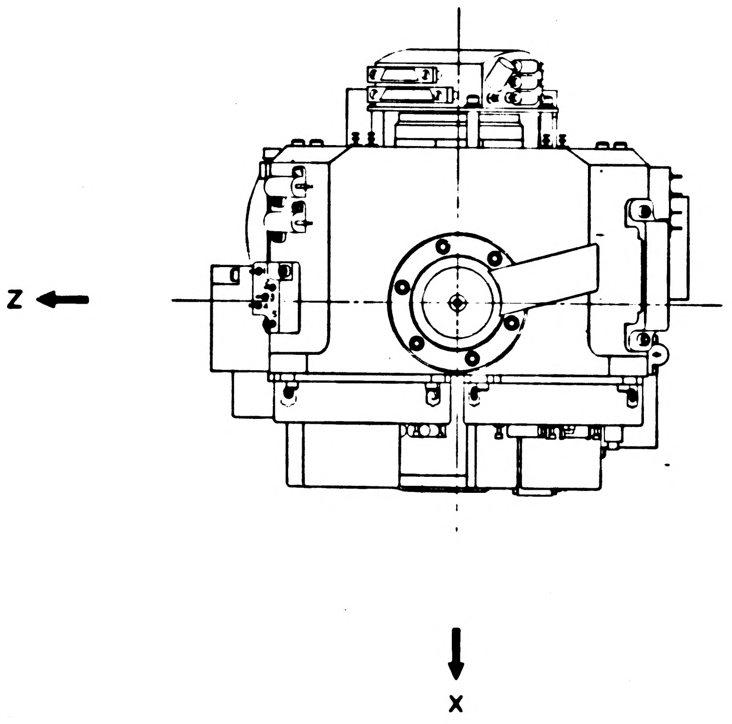
STABLE MEMBER
ASSEMBLY

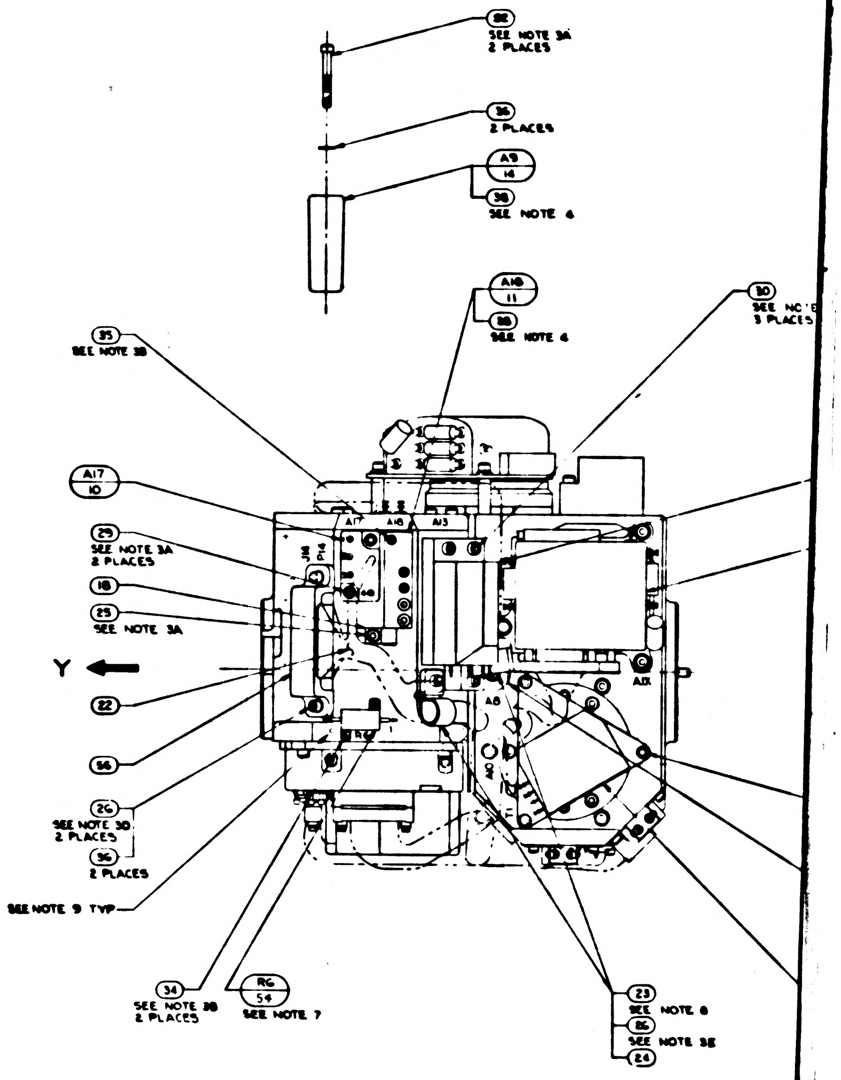
CODE IDENT NO 80230
SIZE J3
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 BE

2018605 REV BE SHEET 1

3/2018605

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SEE NOTE 3A
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A18
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SEE NOTE 4
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SEE NO'E
3 PLACES
35
SEE NOTE 3B
A17
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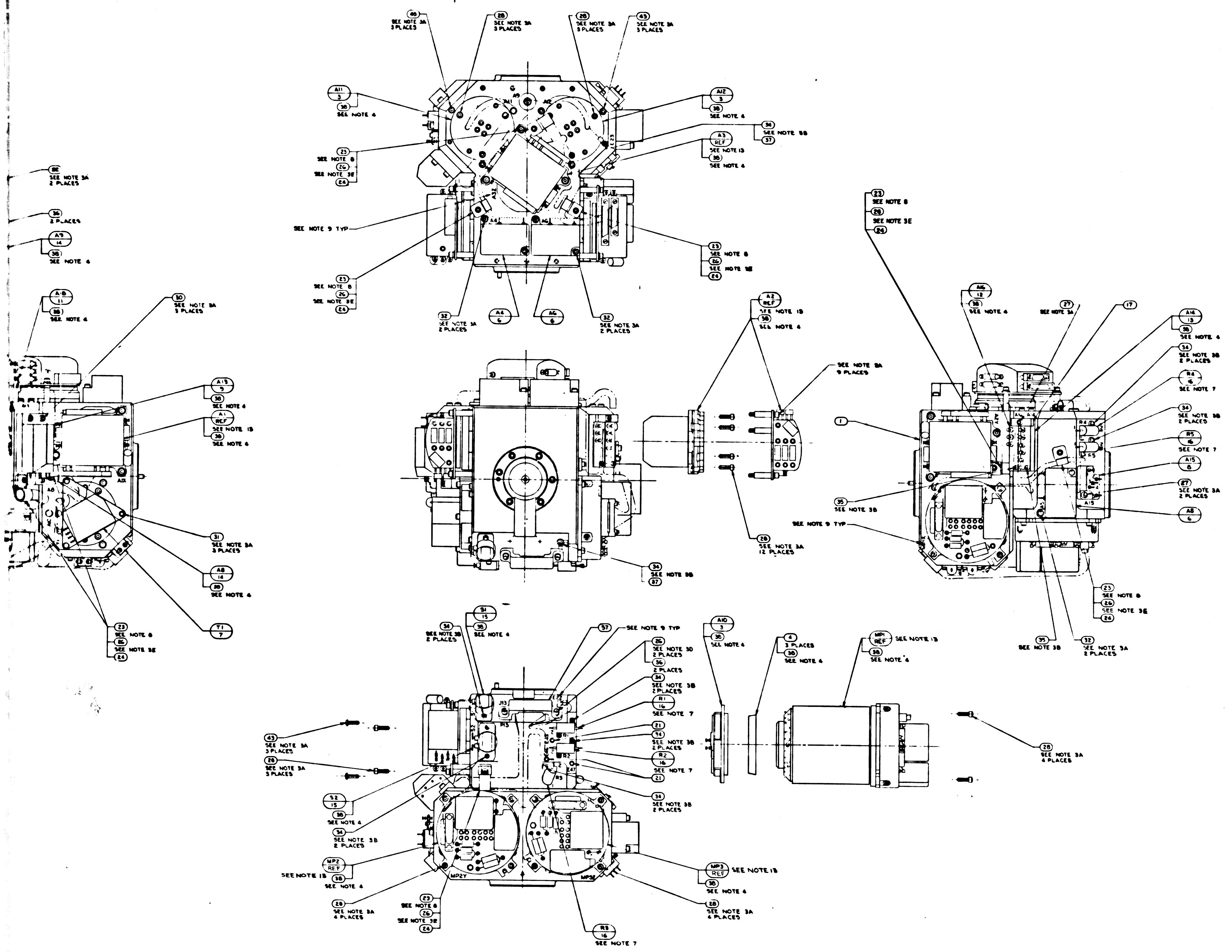
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
RG
54
SEE NOTE 7
23
SEE NOTE 8
86
SEE NOTE 3E
24
A17
A18
A13
J18
P14
A8
A1X

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

2018605	REV BE	SHEET 2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SEE NOTE 3A
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A3
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23
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24
32
SEE NOTE 3A
2 PLACES
A4
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A6
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32
SEE NOTE 3A
2 PLACES
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A6
8E
SEE NOTE 3A
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2 PLACES
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3 PLACES
A13
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A1
REF
SEE NOTE 13
38
SEE NOTE 4
A1X
A8
31
SEE NOTE 3A
3 PLACES
A8
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SEE NOTE 3E
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T1
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A2
REF
SEE NOTE 13
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SEE NOTE 4
SEE NOTE 3A
9 PLACES
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12 PLACES
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SEE NOTE 3B
2 PLACES
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SEE NOTE 3A
2 PLACES
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SEE NOTE 3B
SEE NOTE 9 TYP
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SEE NOTE 8
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SEE NOTE 3E
24
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SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
A2Y
R4
R5
A15
S1
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
57
SEE NOTE 9 TYP
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SEE NOTE 3D
2 PLACES
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SEE NOTE 3B
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R1
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SEE NOTE 3B
2 PLACES
R2
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SEE NOTE 3B
2 PLACES
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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
MP2
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
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SEE NOTE 8
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SEE NOTE 3E
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R3
16
SEE NOTE 7
MP3
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
J13
P13
E22
R1
R2
R3
E47
MP2Y
MP3Z
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
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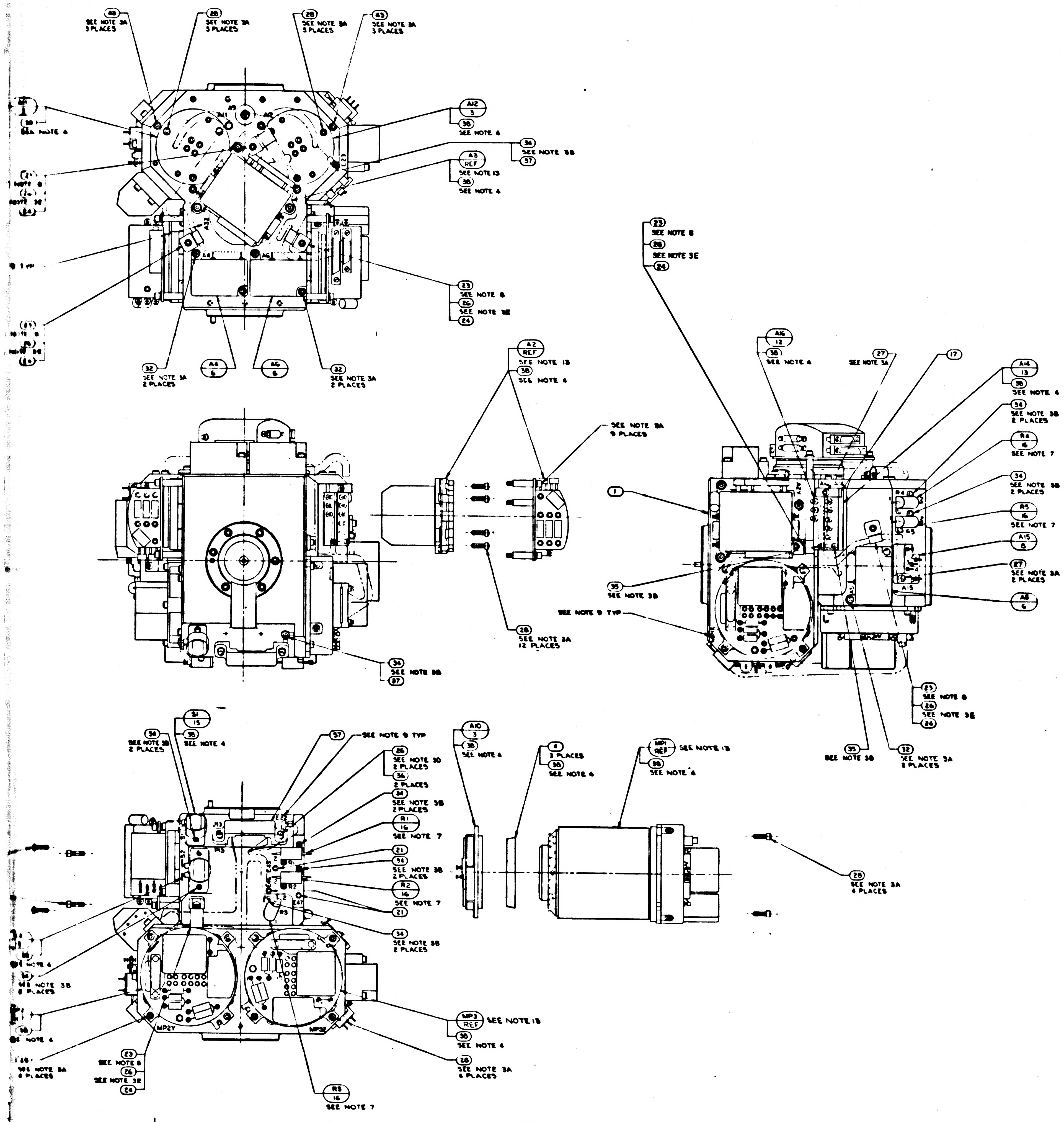
-011 CONF

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± DO NOT SCALE THIS DRAWING	DRAWN R.G. CHECKED APPROVAL APPROVAL
		MATERIAL	
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL
APPLICATION			

	REV	SHEET
2018605	BE	2

2/2018605

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	JJJ EF
	AY	REVISION STATUS CHANGED	1 AUG 67	AN
	AZ	REVISION STATUS CHANGED	8 AUG 67	JJJ JAC
	BA	REVISION STATUS CHANGED	9 AUG 67	JJJ
	BB	REVISION STATUS CHANGED	2 OCT 67	GD RWH
	BC	REVISED PER TDRR 34725	17 OCT 67	JSM RWH
	BD	REVISION STATUS CHANGED	26 OCT 67	JRK
	BE	REVISION STATUS CHANGED	13 NOV 67	JRK RWH



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49 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
49 SEE NOTE 3A 3 PLACES
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
A9
A11
A12
L23
A32
A4
A6
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
87
23 SEE NOTE 8
28 SEE NOTE 3E
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A8 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
R4
R5
A15
23 SEE NOTE 8
26 SEE NOTE 3E
26
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
S1 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
57 SEE NOTE 9 TYP
86 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
94 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
S1
S2
E22
E45
E47
R1
R2
R3
MP2Y
MP3Z
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
SEE NOTE 4
SEE NOTE 3B 8 PLACES
SEE NOTE 3A 4 PLACES

-011 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL 19 Jul 65 APPROVAL	STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230 · SIZE J3 · NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	SCALE 1/1 · WT · SHEET 2 OF 2
APPLICATION				

2018605 REV BE SHEET 2

3/2018605

WIRING LEGEND

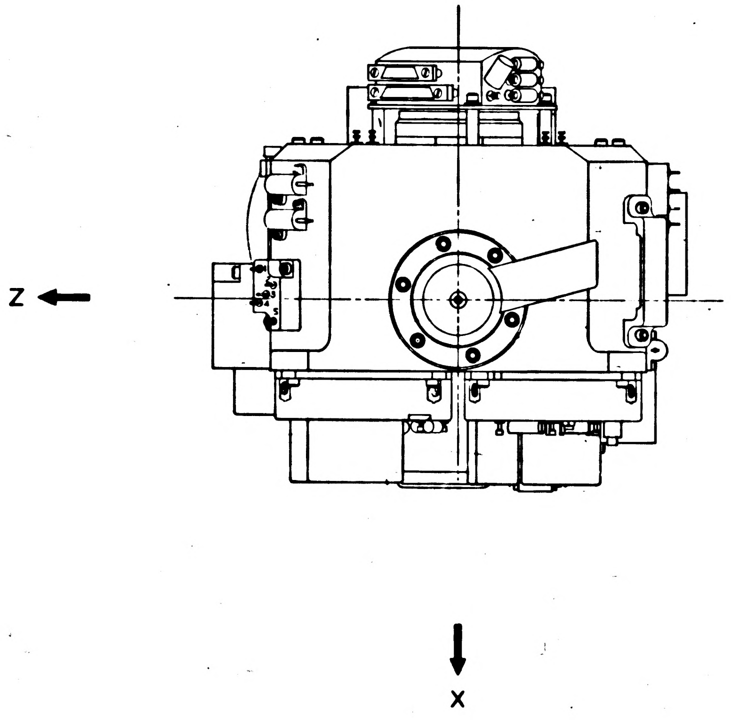
COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2	↑	↑
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3	↓	↓
4-2	A9-BLU	A11-4	.19 ± .02	YES

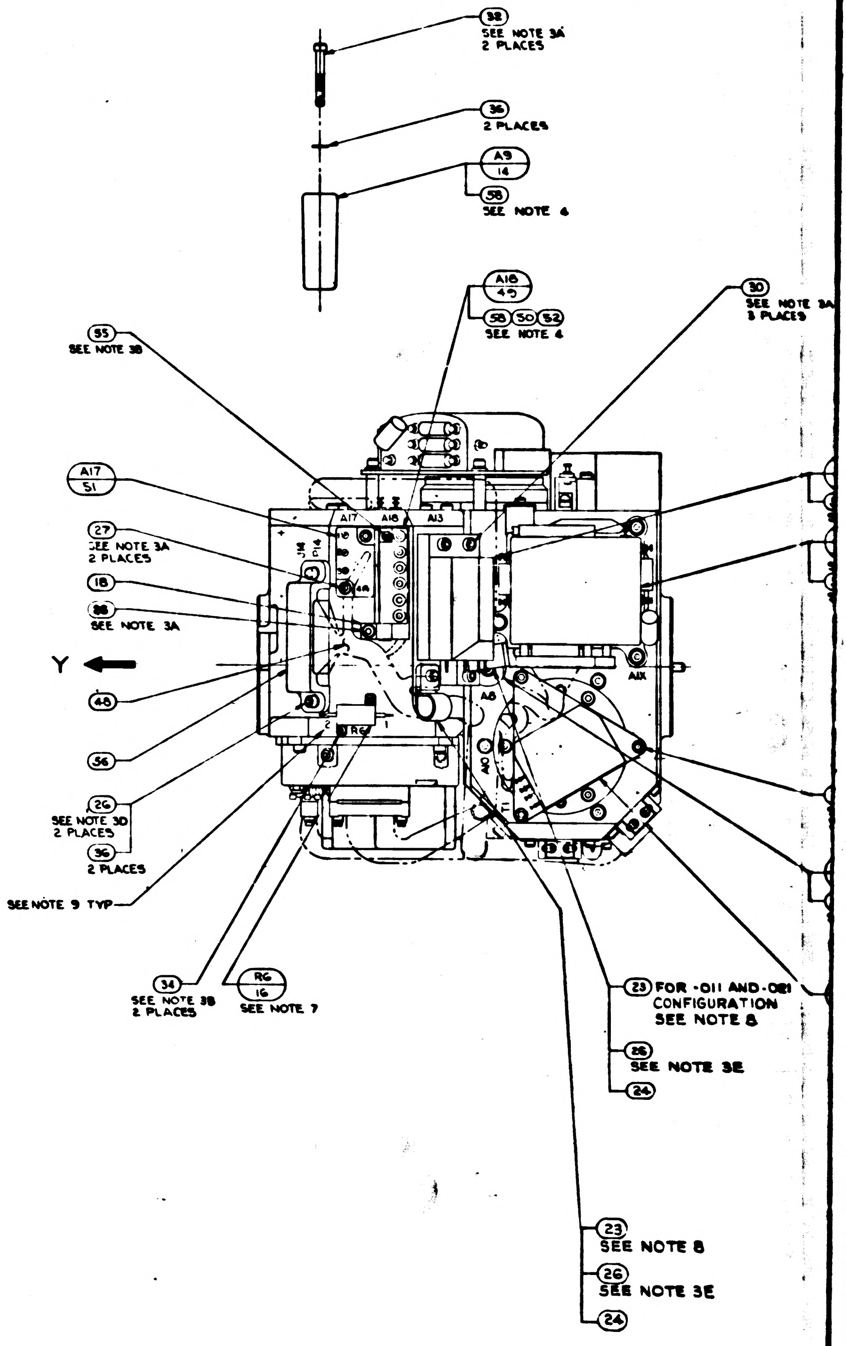
TABLE I

CABLE CLAMP (23)	
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9, & R10			
PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-386	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		





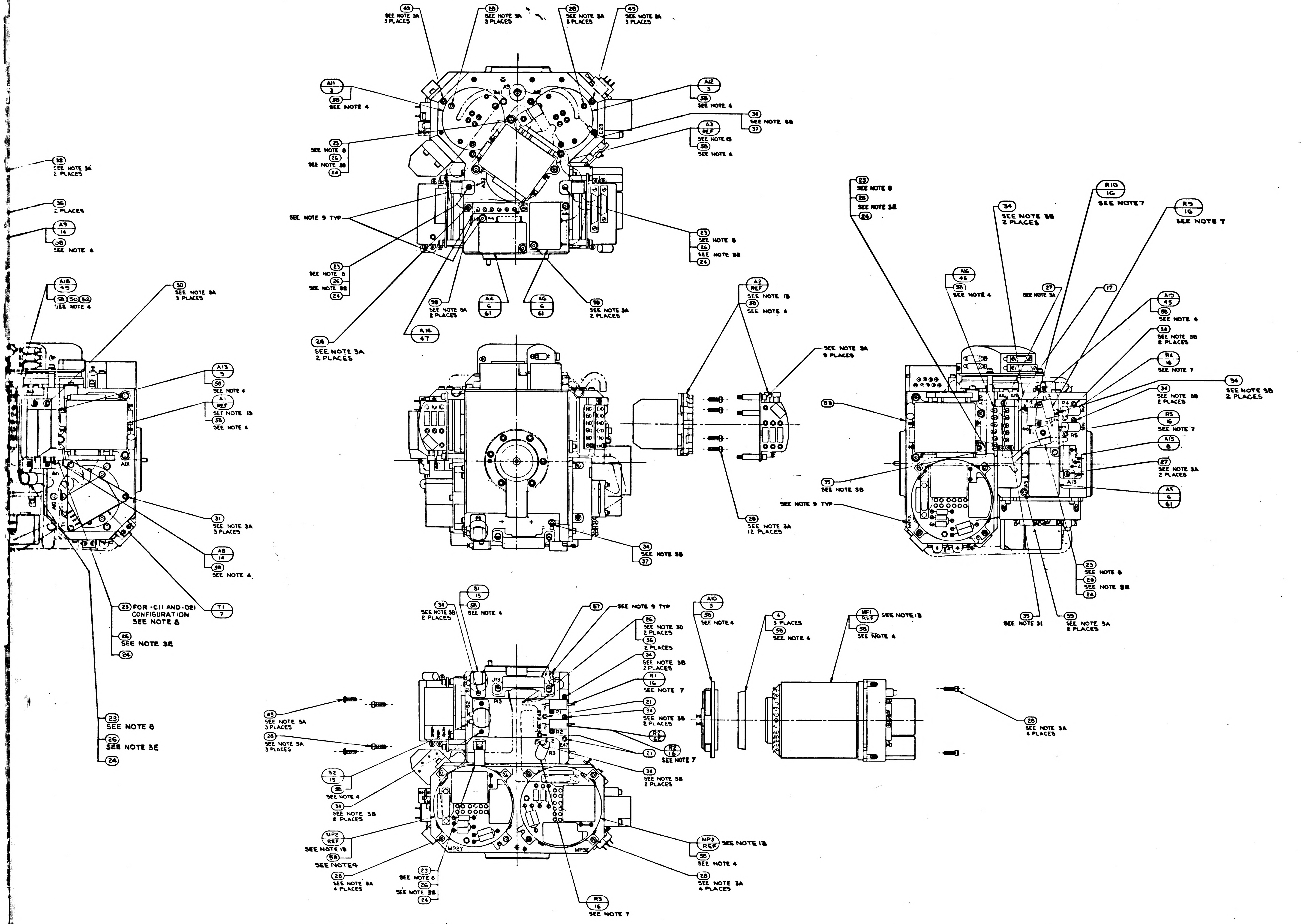
(32) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9/14
(58) SEE NOTE 4
A18/49
(58)(50)(52) SEE NOTE 4
(30) SEE NOTE 3A 3 PLACES
(55) SEE NOTE 3B
A17/51
(27) SEE NOTE 3A 2 PLACES
(18)
(38) SEE NOTE 3A
Y
(48)
(56)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
(34) SEE NOTE 3B 2 PLACES
R6/16 SEE NOTE 7
A17
A18
A13
A8
A10
A1X
R6
T1
(23) FOR -011 AND -021 CONFIGURATION SEE NOTE 8
(26) SEE NOTE 3E
(24)
(23) SEE NOTE 8
(26) SEE NOTE 3E
(24)

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TQROUE REQUIREMENTS ±7%
   A. 5.0 IN-LB
   B. 3.5 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   D. INSTALL FINGER TIGHT
   E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14),(15),(45),(46),(47) AND (50), BETWEEN ITEM (2) AND ITEM (3). BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (49) AND ITEM (50)
5. SOLDER PER ND1002071, EXCEPT SEE NOTE 16.
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM (24) FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

15. FOR -031 ASSY. PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021. FOR -041 ASSY. PIP PREAMP PN 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021 *IN THE A4 OR A5 POSITION ONLY. PIP PREAMP P/N 2021269-031 MAY BE USED IN PLACE OF P/N 2007060-021 IN THE A6 POSITION ONLY.*
16. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.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A11 3
58 SEE NOTE 4
A12 3
58 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
A9
A10
A2
E28
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
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24
59 SEE NOTE 3A 2 PLACES
A6 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
28 SEE NOTE 3A 2 PLACES
32 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
58 SEE NOTE 4
A18 49
58 50 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
58 SEE NOTE 4
A1 REF SEE NOTE 13
58 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
59 SEE NOTE 4
T1 7
23 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
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26 SEE NOTE 3E
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R10 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R9 16 SEE NOTE 7
A16 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
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A5 6 61
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35 SEE NOTE 3B
SEE NOTE 9 TYP
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57 SEE NOTE 9 TYP
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R1 16 SEE NOTE 7
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R2 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 REF SEE NOTE 13
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28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
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58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
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28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
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R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
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QTY REQD	QTY REQD	QTY REQD	QTY REQD	
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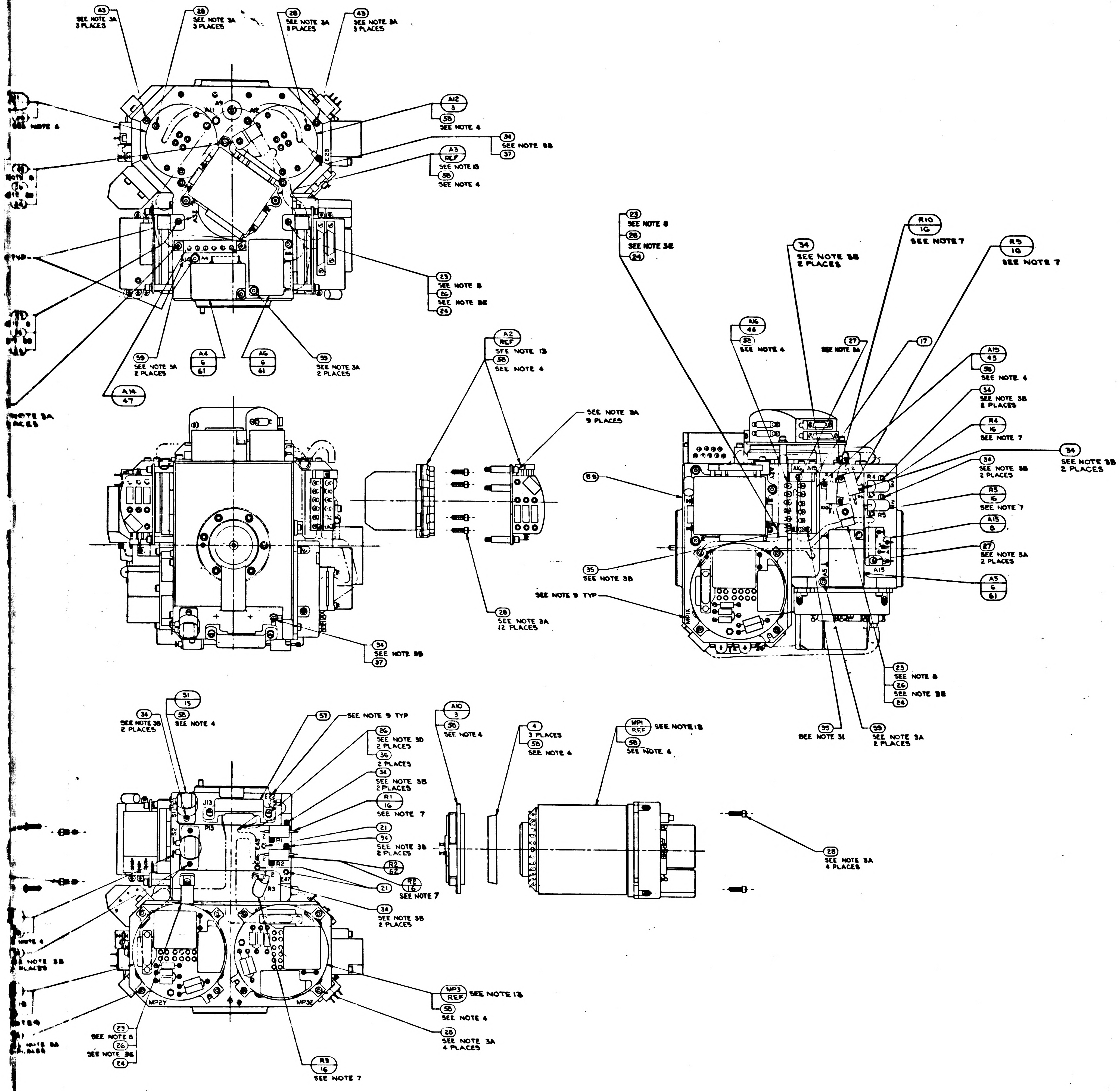
2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLE ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

2018605	REV BF	SHEET 1

22 2018605

REVISIONS TDRR 17755			
SYM	DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	EF
AY	REVISED PER TDRR 33712	1 AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ JAC
BA	REVISED PER TDRR 34021	9 AUG 67	JJJ
BB	REVISED PER TDRR 34724	2 OCT 67	GC RWH
BC	REVISED PER TDRR 34725	17 OCT 67	RWH
BD	REVISED PER TDRR 34726	26 OCT 67	JRK
BE	REVISED PER TDRR 34727	13 NOV 67	JRK RWH
BF	REVISED PER TDRR 3479		



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SEE NOTE 3A 3 PLACES
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A3
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SEE NOTE 4
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SEE NOTE 3E
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SEE NOTE 3A 2 PLACES
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SEE NOTE 3A 9 PLACES
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SEE NOTE 4
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SEE NOTE 3B 2 PLACES
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SEE NOTE 3A 2 PLACES
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SEE NOTE 3B 2 PLACES
51
15
58
SEE NOTE 4
57
SEE NOTE 9 TYP
26
SEE NOTE 3D 2 PLACES
36
2 PLACES
34
SEE NOTE 3B 2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 3B 2 PLACES
R2
62
21
R2
16
SEE NOTE 7
34
SEE NOTE 3B 2 PLACES
A10
3
58
SEE NOTE 4
4
3 PLACES
58
SEE NOTE 4
MP1
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A 4 PLACES
MP3
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A 4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3E
24
R3
16
SEE NOTE 7
MP2Y
MP3Z
J13
P13

1	1	–	–	1010928-184	RESISTOR, R2	62
3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
6	6	6	–	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
A/R	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	1	1	2018837	BRACKET, CONN. 44 PIN	56
1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
–	–	–	1	1010928-295	RESISTOR FIXED	54
1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
1	1	1	–	2018830	SHIELD THERMOSTAT	52
1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	1	1	–	2018828	WIRING HARNESS 'A' STABLE MEMBER	48
1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC., SELF-LOCKING	43
A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
–	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
2	2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
7	7	8	8	1000223	WASHER, CABLE CLAMP	24
7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	2018776	CLAMP, THERMOSTAT	17
7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
–	–	–	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
–	–	–	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
–	–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
–	–	–	1	2018750	HOUSING STABLE MEMBER	1
QTY REQD	QTY REQD	QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
041	031	021	011	LIST OF MATERIALS		

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
Cambridge, Mass
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO. 80230
SIZE J3
NASA DRAWING NO 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 BF

2018605 REV BF SHEET 1

3/2018605

9 8 7 6

2018605

D

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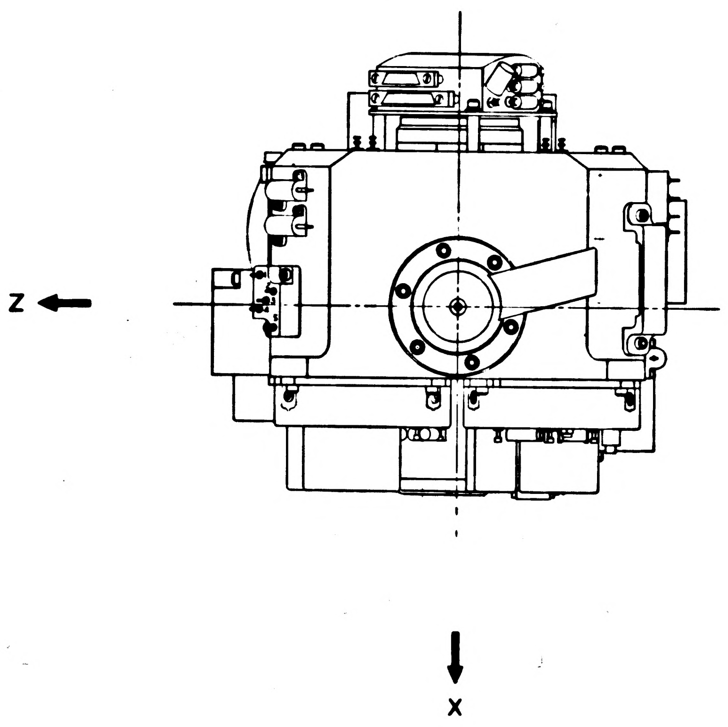
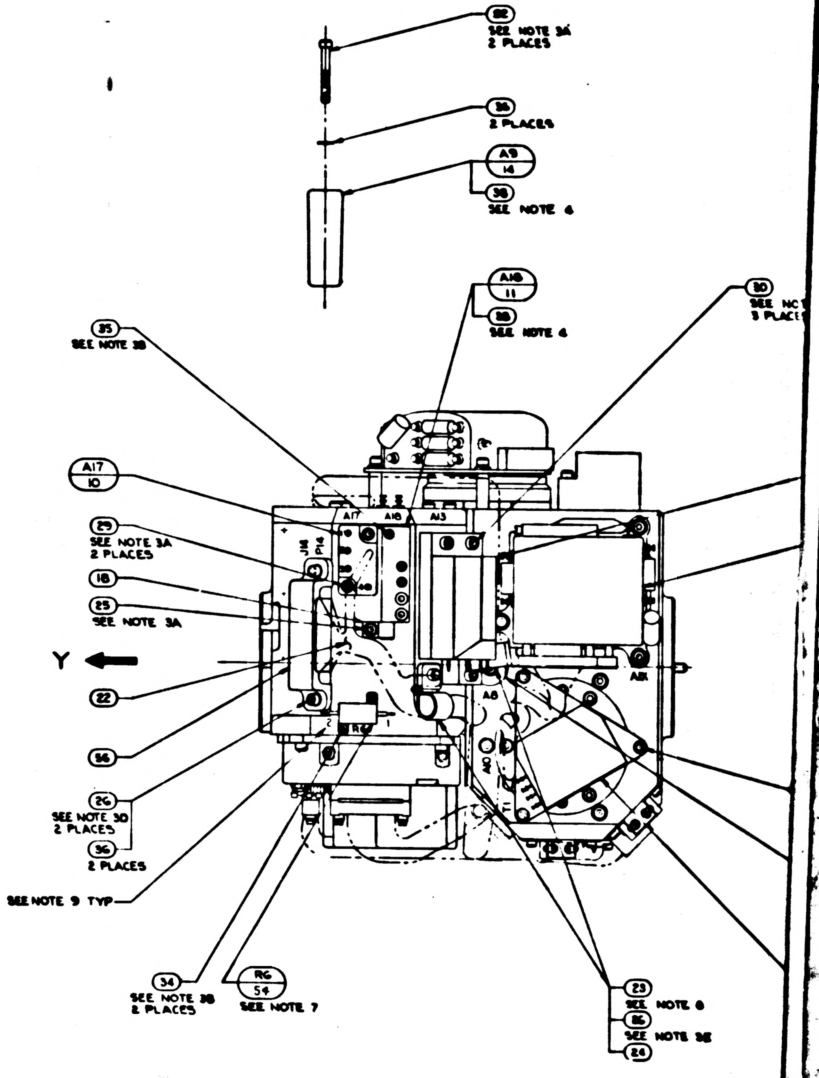
B

A

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SEE NC
3 PLAC
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
RG
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SEE NOTE 7
23
SEE NOTE 6
86
SEE NOTE 3E
24
A17
A16
A13
J14
P14
A8
A10
A11
R6

NOTES:

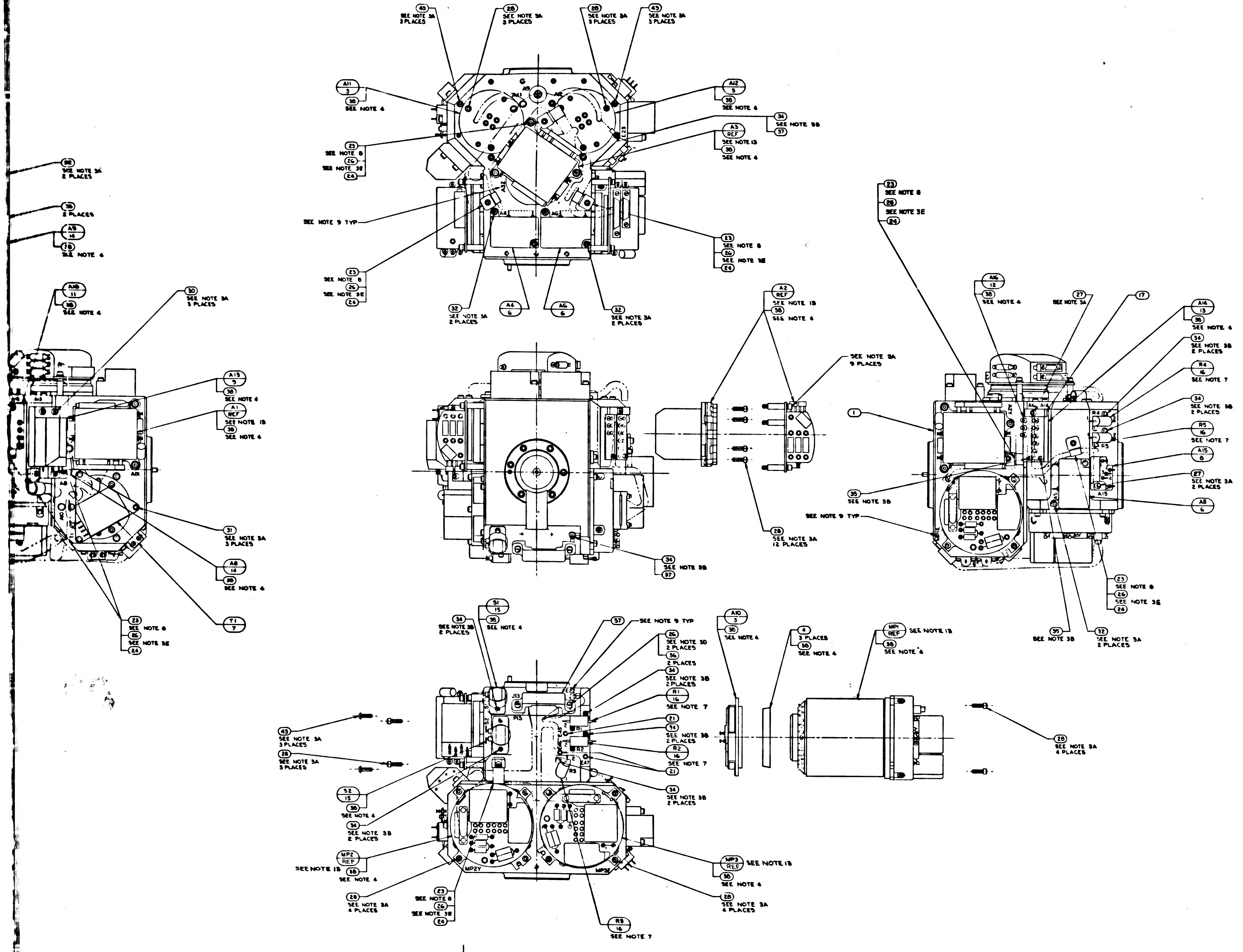
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

2018605	REV BF	SHEET 2

9 8 7 6

1/2018605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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
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SEE NOTE 4
A12
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38
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SEE NOTE 3B
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A3
REF
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SEE NOTE 4
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SEE NOTE 8
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SEE NOTE 3E
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SEE NOTE 9 TYP
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SEE NOTE 3E
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2 PLACES
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SEE NOTE 3A
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2 PLACES
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3 PLACES
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9 PLACES
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SEE NOTE 3B
2 PLACES
R4
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
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SEE NOTE 3A
2 PLACES
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R5
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MP1X
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SEE NOTE 3B
SEE NOTE 9 TYP
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SEE NOTE 8
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SEE NOTE 3E
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SEE NOTE 3B
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SEE NOTE 3A
2 PLACES
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SEE NOTE 3B
2 PLACES
S1
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SEE NOTE 4
57
SEE NOTE 9 TYP
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SEE NOTE 3D
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2 PLACES
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SEE NOTE 3B
2 PLACES
R1
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SEE NOTE 7
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SEE NOTE 3B
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R2
16
SEE NOTE 7
21
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SEE NOTE 3B
2 PLACES
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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
3 PLACES
S2
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SEE NOTE 13
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SEE NOTE 3A
4 PLACES
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SEE NOTE 8
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SEE NOTE 3E
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R3
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SEE NOTE 7
MP3
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SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
J13
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S1
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E22
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R1
R2
R3
MP2Y
MP3Z
A10
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SEE NOTE 4
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3 PLACES
38
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SEE NOTE 4
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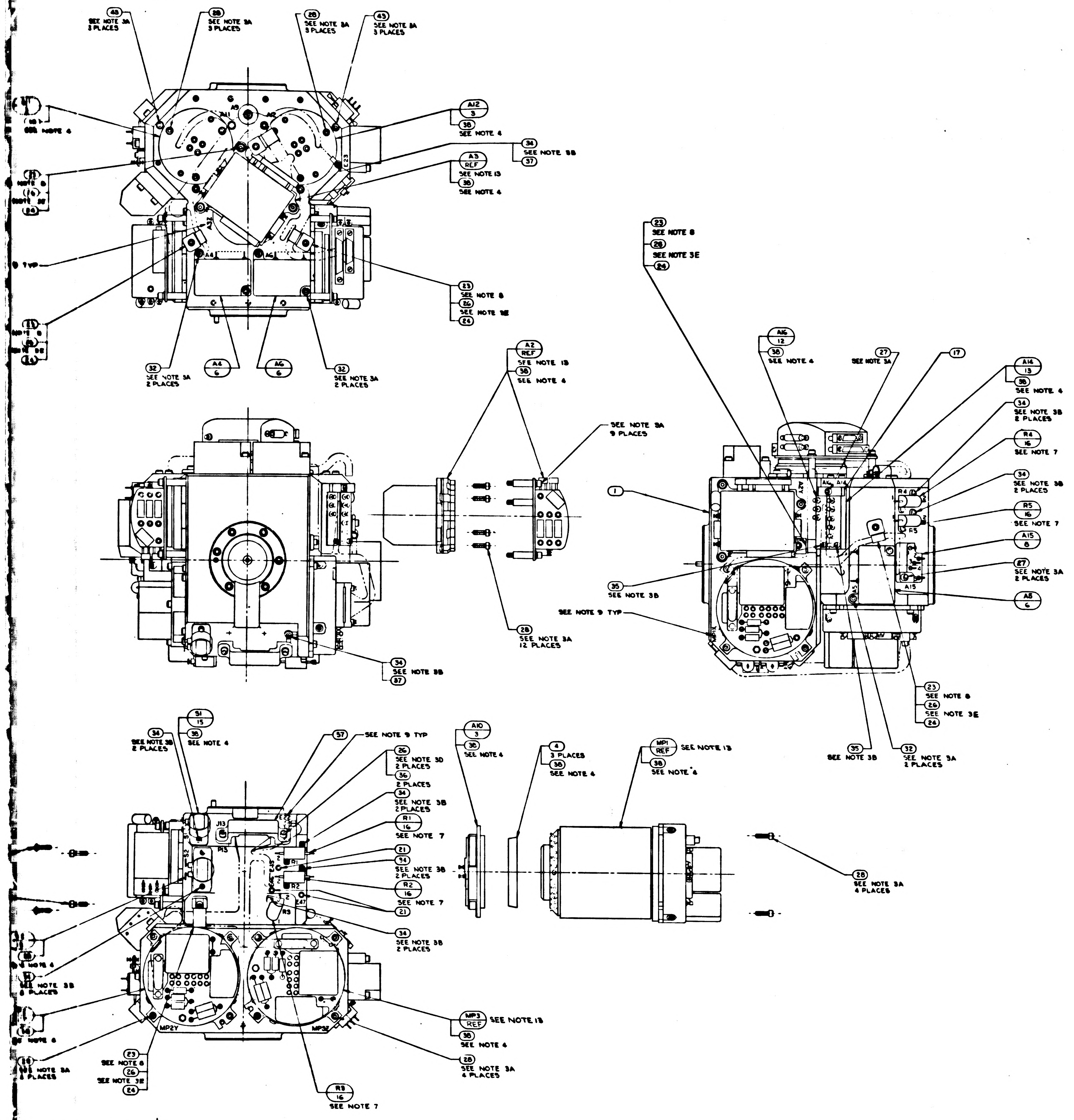
SEE NOTE 3A
4 PLACES

-01 CON

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	DL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	5 MAY 67	
	AY	REVISION STATUS CHANGED	1 AUG 67	
	AZ	REVISION STATUS CHANGED	8 AUG 67	JJJ JAG
	BA	REVISION STATUS CHANGED	9 AUG 67	JJJ
	BB	REVISION STATUS CHANGED	12 OCT 67	GD RWH
	BC	REVISED PER TDRR 34725	17 OCT 67	JSM RWH
	BD	REVISION STATUS CHANGED	26 OCT 67	JRK
	BE	REVISION STATUS CHANGED	13 NOV 67	JRK RWH
	BF	REVISION STATUS CHANGED	21 NOV	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3 PLACES
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3 PLACES
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SEE NOTE 3A
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43
SEE NOTE 3A
3 PLACES
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38
SEE NOTE 4
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SEE NOTE 3B
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A3
REF
SEE NOTE 13
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SEE NOTE 4
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A11
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E23
A32
A4
A6
9 TYP
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SEE NOTE 8
26
SEE NOTE 3E
24
32
SEE NOTE 3A
2 PLACES
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A6
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32
SEE NOTE 3A
2 PLACES
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SEE NOTE 13
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SEE NOTE 4
SEE NOTE 3A
9 PLACES
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SEE NOTE 3A
12 PLACES
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SEE NOTE 3E
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SEE NOTE 3A
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SEE NOTE 4
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SEE NOTE 3B
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SEE NOTE 3B
2 PLACES
R5
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SEE NOTE 7
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SEE NOTE 3B
SEE NOTE 9 TYP
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SEE NOTE 8
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SEE NOTE 3E
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SEE NOTE 9 TYP
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SEE NOTE 3D
2 PLACES
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SEE NOTE 3B
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
R2
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
J13
P13
S1
S2
E22
E45
E46
E47
R1
R2
R3
MP2Y
MP3Z
MP3
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
16
SEE NOTE 7
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SEE NOTE 8
26
SEE NOTE 3E
24
A10
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38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

-011 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL 17/3/65 APPROVAL	STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230 · SIZE J3 · NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	SCALE 1/1 · WT · SHEET 2 OF 2
APPLICATION				

2018605 BF

2018605

2018605	REV	SHEET
	BF	2

3/2018605

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

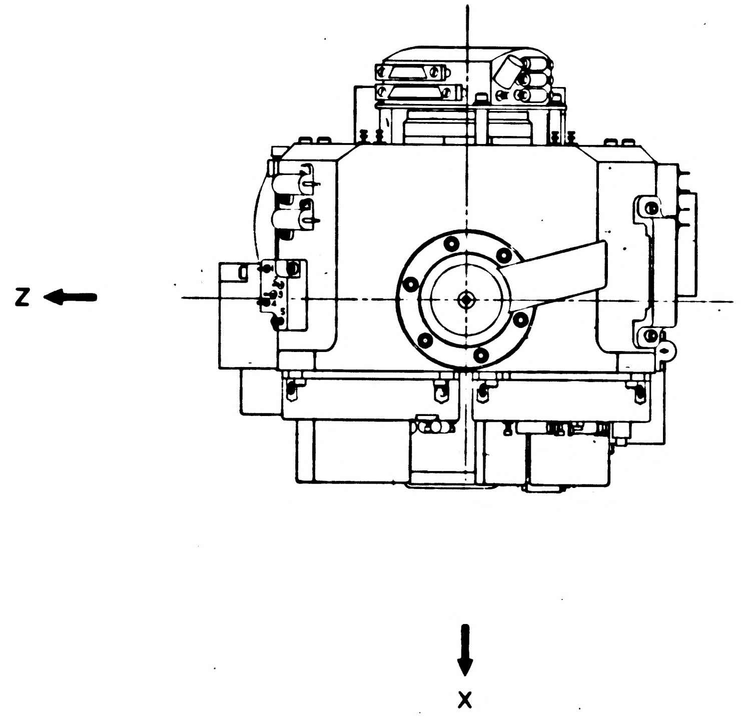
CABLE CLAMP ㉓

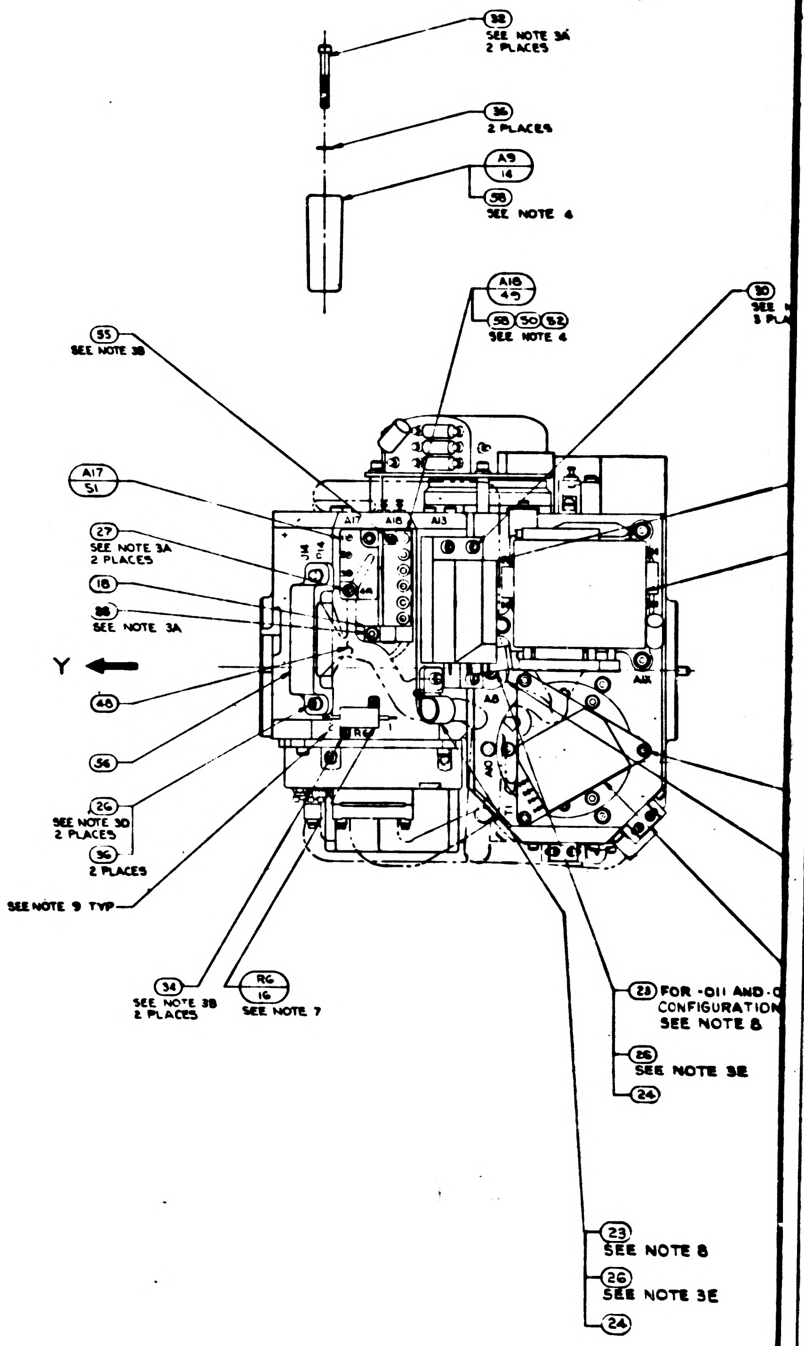
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9, & R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010528-057	1.0	1010528-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-386	1020
-248	37.4	1010528-400	1430
1010528-251	40.2		

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A9
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SEE NOTE 4
A18
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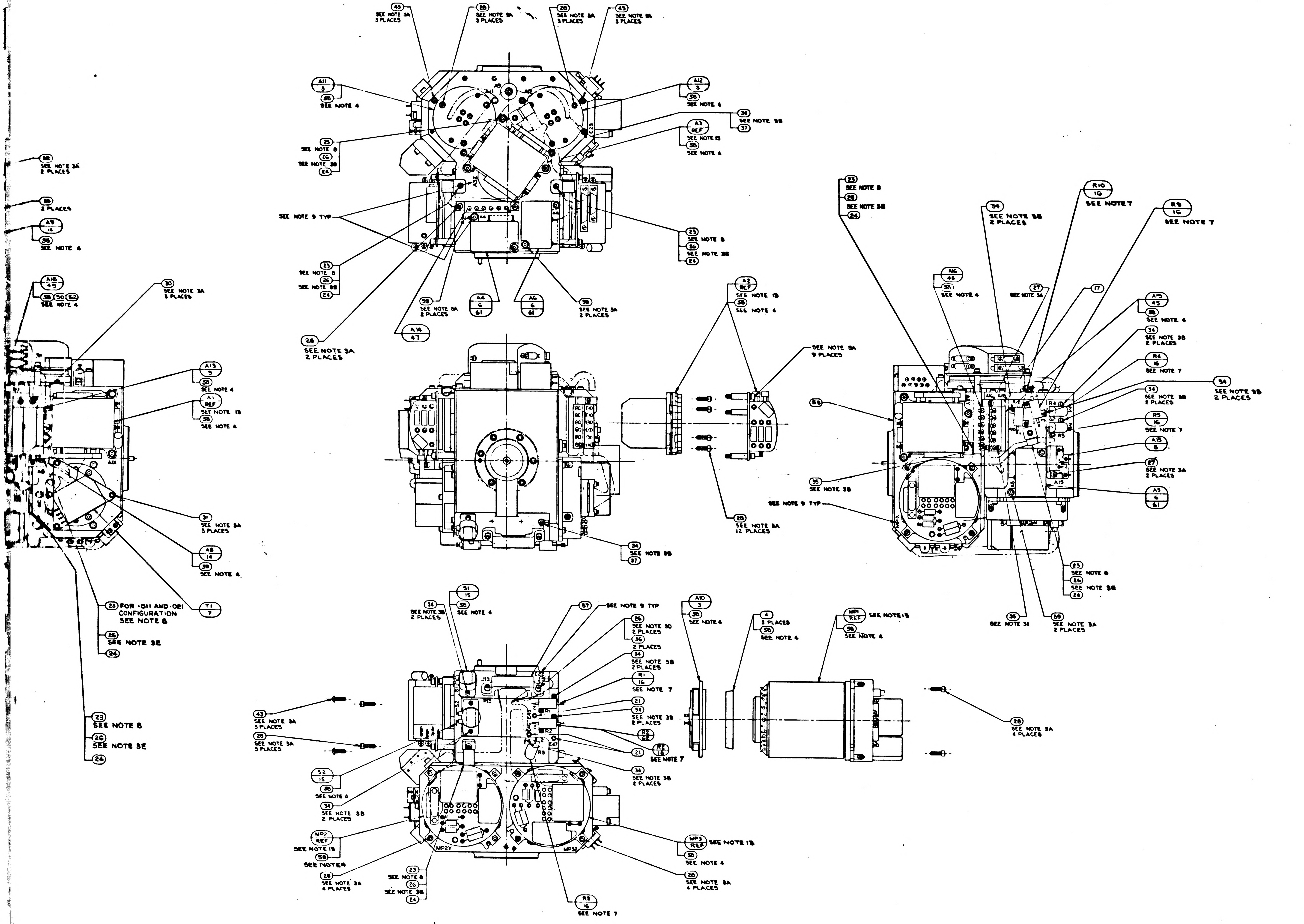
50
52
SEE NOTE 4
30
SEE
3 PL
55
SEE NOTE 3B
A17
51
27
SEE NOTE 3A
2 PLACES
18
38
SEE NOTE 3A
Y
48
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
A17
A18
A13
J14
P14
A8
A10
A11
R6
23
FOR -011 AND -0
CONFIGURATION
SEE NOTE 8
26
SEE NOTE 3E
24
23
SEE NOTE 8
26
SEE NOTE 3E
24

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
4. APPLY A THIN FILM OF ITEM ㊳ OR (58) TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ② ③ ⑤ ⑨ ⑪ ⑫ ⑬ ⑭ ⑮ ㊺ ㊻ ㊼ AND ㊿, BETWEEN ITEM ② AND ITEM ③. BETWEEN ITEM ③ AND ITEM ④ AND BETWEEN ITEM ㊺ AND ITEM ㊿
5. SOLDER PER ND1002071, EXCEPT SEE NOTE 16.
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM ③ FOR-011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

15. FOR -031 ASSY, PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021. *FOR -041 & -051 ASSY(S), PIP PREAMP P/N 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021. IN THE A4 OR A5 POSITION ONLY. PIP PREAMP P/N 2021269-031 MAY BE USED IN PLACE OF P/N 2007060-021 IN THE A6 POSITION ONLY.*
16. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS .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28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3 58 SEE NOTE 4
A12 3 58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13 58 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3E 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3E 24
23 SEE NOTE 8 26 SEE NOTE 3E 24
59 SEE NOTE 3A 2 PLACES
A6 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
28 SEE NOTE 3A 2 PLACES
18 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14 58 SEE NOTE 4
A16 45 58 50 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9 58 SEE NOTE 4
A1 REF SEE NOTE 13 58 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14 58 SEE NOTE 4
T1 7
23 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
26 SEE NOTE 3E 24
23 SEE NOTE 8 26 SEE NOTE 3E 24
A2 REF SEE NOTE 13 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
36 SEE NOTE 3B 37
23 SEE NOTE 8 28 SEE NOTE 3E 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
58
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3E 24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
51 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 62
21
R6 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
52 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13 P13 MP2Y MP3Z E47 R2 R3 A1K

1	–	–	–	–	–	–	202140
–	1	1	–	–	–	–	20213
–	–	1	1	1	–	–	010928
–	–	3	3	3	–	–	200706
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-I-181
–	6	6	6	6	6	–	001488
–	AR	AR	A/R	A/R	A/R	–	MIL-I-868
1	1	1	1	1	1	1	2018838
1	1	1	1	1	1	1	2018837
–	1	1	1	1	1	–	1011625-
1	–	–	–	–	–	1	1010928
–	1	1	1	1	1	–	201879
–	1	1	1	1	1	–	201887
–	1	1	1	1	1	–	200717
–	1	1	1	1	1	–	201882
–	1	1	1	1	1	–	201881
–	–	–	1	1	1	–	201882
–	1	1	1	1	1	–	201881
–	1	1	1	1	1	–	201882
–	1	1	1	1	1	–	201882
9	9	9	9	9	9	9	1010881-
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-T-71
AR	–	–	–	–	–	A/R	1006879
2	2	2	2	2	2	2	MS15795
6	6	6	6	6	6	6	MS15791
3	2	2	2	2	2	3	1011625-
18	22	22	22	22	22	18	1011625-
8	2	2	2	2	2	8	1001488
3	3	3	3	3	3	3	1001488
3	3	3	3	3	3	3	1001488
33	33	33	33	33	33	33	1001488
5	7	7	7	7	7	5	1001488
12	15	14	14	14	15	12	1001488
1	–	–	–	–	–	1	1001488
8	8	7	7	7	8	8	1000223
8	8	7	7	7	8	8	1000220
–	–	–	–	–	–	1	201879
3	3	3	3	3	3	3	1001600
1	1	1	1	1	1	1	2018778
1	1	1	1	1	1	1	2018776
5	8	7	7	7	8	5	1010925
2	2	2	2	2	2	2	1001488
2	2	2	2	2	2	2	2018641
	–	–	–	–	–	1	2018637
	–	–	–	–	–	1	2018686
	–	–	–	–	–	1	2018639
	–	–	–	–	–	1	2007171-
				1	1	1	200706
				1	1	1	200717
			1	1	1	1	200701
3	3	–	–	–	3	3	200706
3	3	3	3	3	3	3	201882
3	3	3	3	3	3	3	2018741
	–	–	–	–	–	1	2018750
QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	
-07	-06	-05	-04	-031	-021	-011	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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FRACTIONS DECIMALS ANGLES
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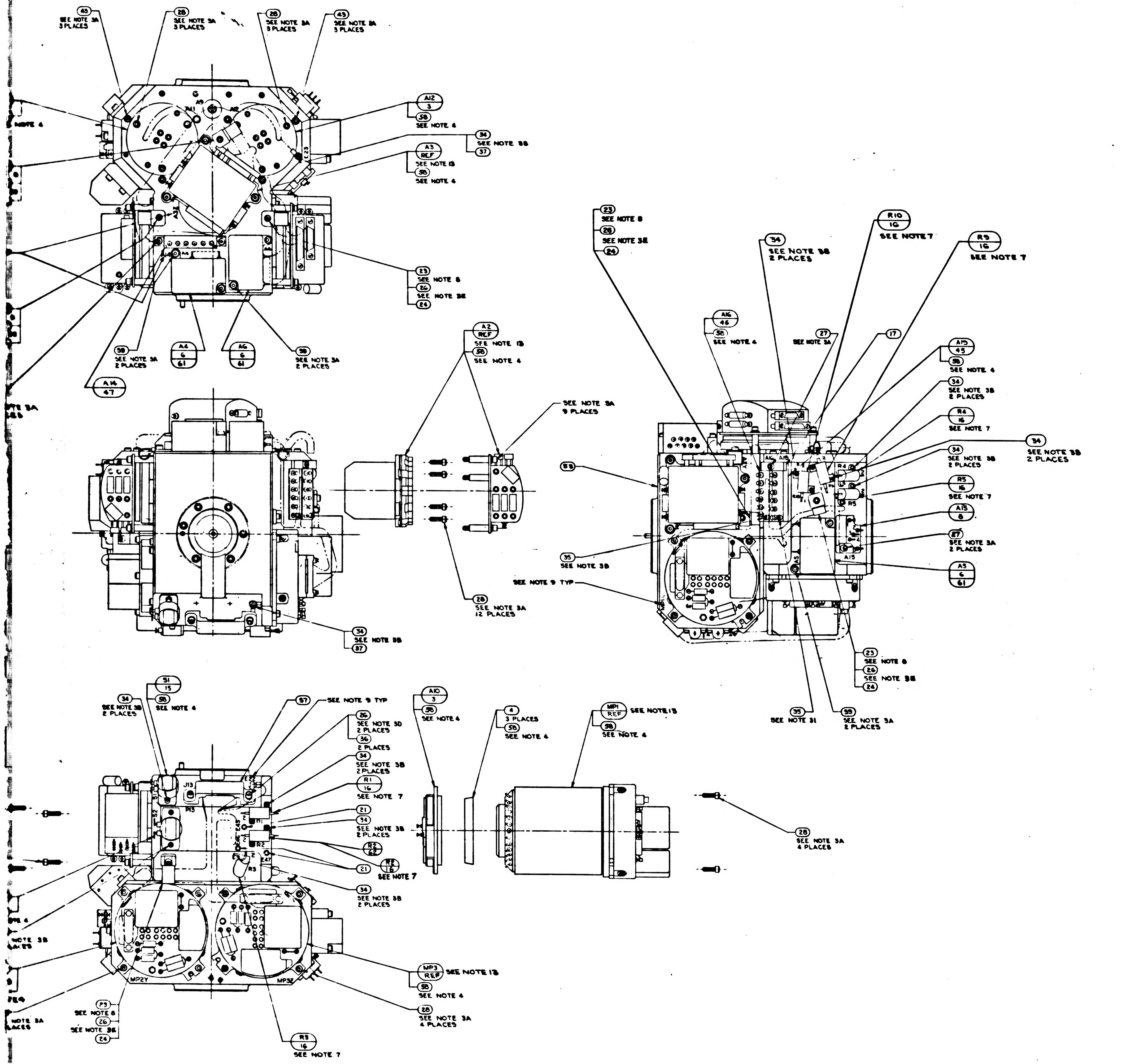
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SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
A12
3
58
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
58
SEE NOTE 4
23
SEE NOTE 8
26
SEE NOTE 3E
24
59
SEE NOTE 3A
2 PLACES
A4
6
61
A6
6
61
59
SEE NOTE 3A
2 PLACES
A14
47
A2
REF
SEE NOTE 13
58
SEE NOTE 4
SEE NOTE 3A
9 PLACES
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
87
23
SEE NOTE 8
26
SEE NOTE 3E
24
34
SEE NOTE 3B
2 PLACES
R10
16
SEE NOTE 7
R9
16
SEE NOTE 7
A16
46
58
SEE NOTE 4
27
SEE NOTE 3A
17
A13
45
58
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A5
6
61
34
SEE NOTE 3B
2 PLACES
59
35
SEE NOTE 3B
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3E
24
35
SEE NOTE 31
59
SEE NOTE 3A
2 PLACES
36
SEE NOTE 3B
2 PLACES
51
15
58
SEE NOTE 4
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
31
SEE NOTE 3B
2 PLACES
21
R2
62
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
A10
3
58
SEE NOTE 4
4
3 PLACES
58
SEE NOTE 4
MP1
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
MP3
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
R3
16
SEE NOTE 7
P3
SEE NOTE 8
26
SEE NOTE 3E
24
J13
P13
MP2Y
MP3Z
A15
R5
4
3
2
1
D
C
B
A

REVISIONS TDRR 17755			
SYM	DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33562	8 MAY 67	EF
AY	REVISED PER TDRR 33712	1 AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ JRC
BA	REVISED PER TDRR 34021	9 AUG 67	JJJ
BB	REVISED PER TDRR 34724	2 OCT 67	RWM
BC	REVISED PER TDRR 34725	17 OCT 67	
BD	REVISED PER TDRR 34726	26 OCT 67	JRK
BE	REVISED PER TDRR 34727	13 NOV 67	JRK RWM
BF	REVISED PER TDRR 34791	21 NOV 67	
BG	REVISED PER TDRR 35724	23 FEB 68	

QTY REQD 07	QTY REQD 06	QTY REQD 05	QTY REQD 04	QTY REQD 03	QTY REQD 02	QTY REQD 01	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	–	–	–	–	–	–	2021401	WIRING HARNESS "A", STABLE MEM	64
–	1	1	–	–	–	–	2021397	WIRING HARNESS "A", STABLE MEM	63
–	–	1	1	1	–	–	1010928-184	RESISTOR, R2	62
–	–	3	3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
–	6	6	6	6	6	–	1001488-9	SCREW, HEX, SOC. HD SELF-LOCKING	59
–	AR	AR	A/R	A/R	A/R	--	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	1	1	1	2018838	BRACKET, CONN 34 PIN	57
1	1	1	1	1	1	1	2018837	BRACKET, CONN. 44 PIN	56
–	1	1	1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
1	–	–	–	–	–	1	1010928-298	RESISTOR FIXED	54
–	1	1	1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
–	1	1	1	1	1	–	2018830	SHIELD THERMOSTAT	52
–	1	1	1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
–	1	1	1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
–	1	1	1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
–	–	–	1	1	1	–	2018828	WIRING HARNESS 'A' STABLE MEMBER	48
–	1	1	1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
–	1	1	1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
–	1	1	1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC, SELF-LOCKING	43
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
AR	–	–	–	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	2	2	2	2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
18	22	22	22	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
8	2	2	2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	7	7	7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	15	14	14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	–	–	–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	7	7	7	8	8	1000223	WASHER, CABLE CLAMP	24
8	8	7	7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	1	1	1	2018776	CLAMP, THERMOSTAT	17
5	8	7	7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
1	–	–	–	–	–	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
1	–	–	–	–	–	1	2018686	THERMO. ASS'Y TEMP. ALARM	12
1	–	–	–	–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	–	–	–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	–	–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
1	–	–	–	–	–	1	2018750	HOUSING STABLE MEMBER	1

LIST OF MATERIALS

2018605 BG

2018604	DL 2018601
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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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MATERIAL
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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R.G.S. DATE
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APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

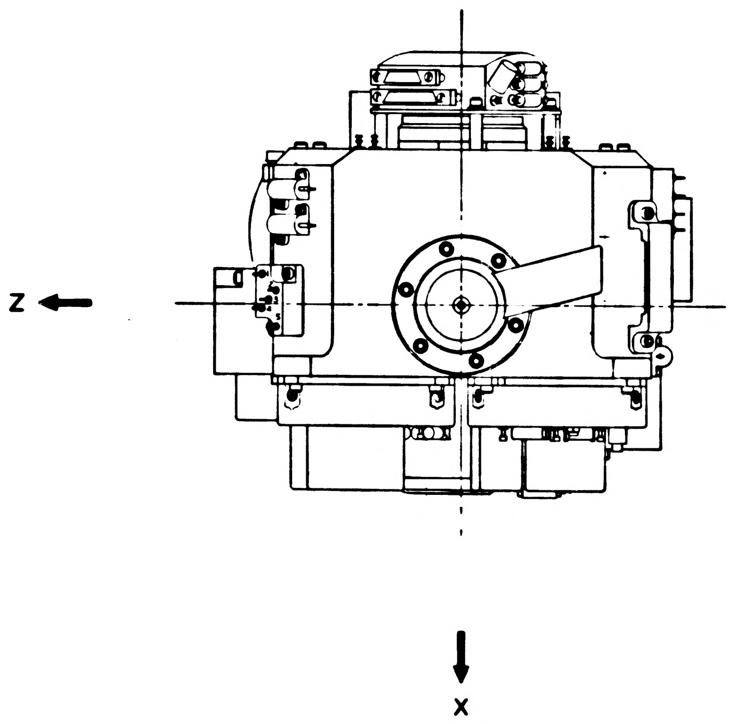
STABLE MEMBER ASSEMBLY

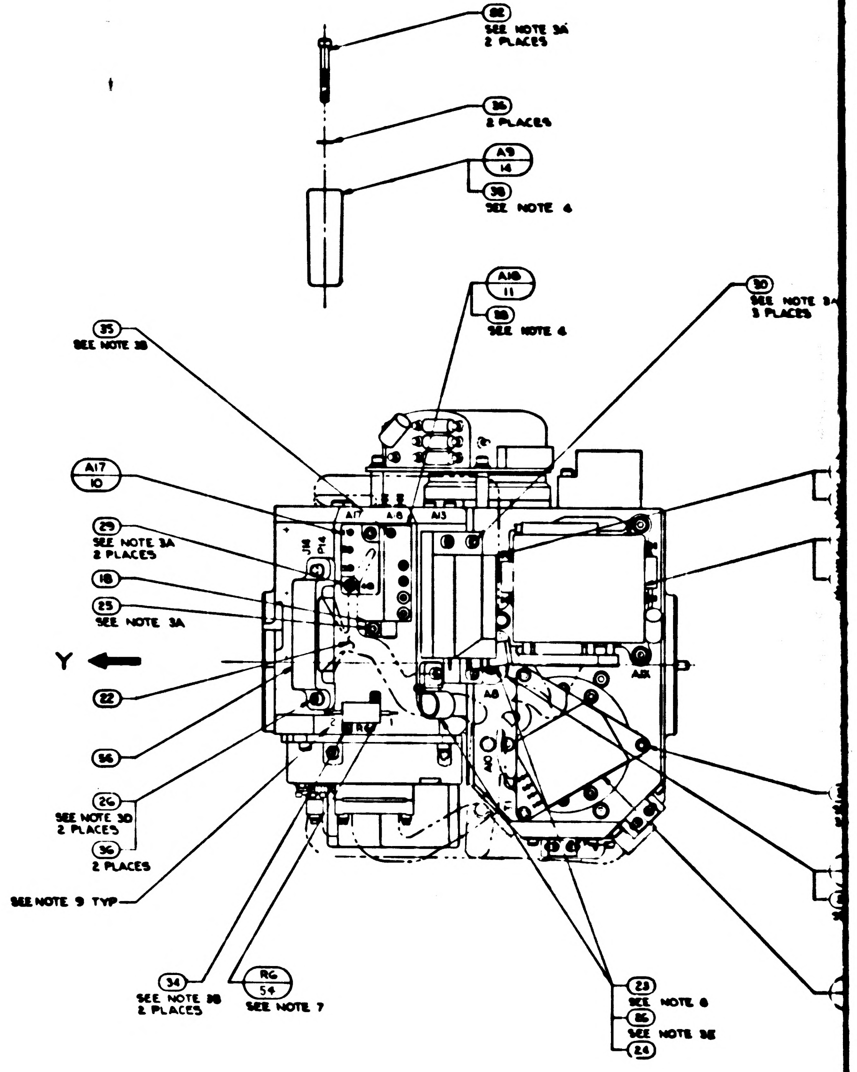
CODE IDENT NO 80230 | SIZE J3 | NASA DRAWING NO. 2018605
SCALE 1/1 | WT | SHEET 1 OF 2

2018605 | REV BG | SHEET 1

3/4201-8605

2018605




82
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
38
SEE NOTE 4
A18
11
38
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
RG
54
SEE NOTE 7
23
SEE NOTE 8
86
SEE NOTE 3E
24
A17
A18
A13
A8
A10
A11

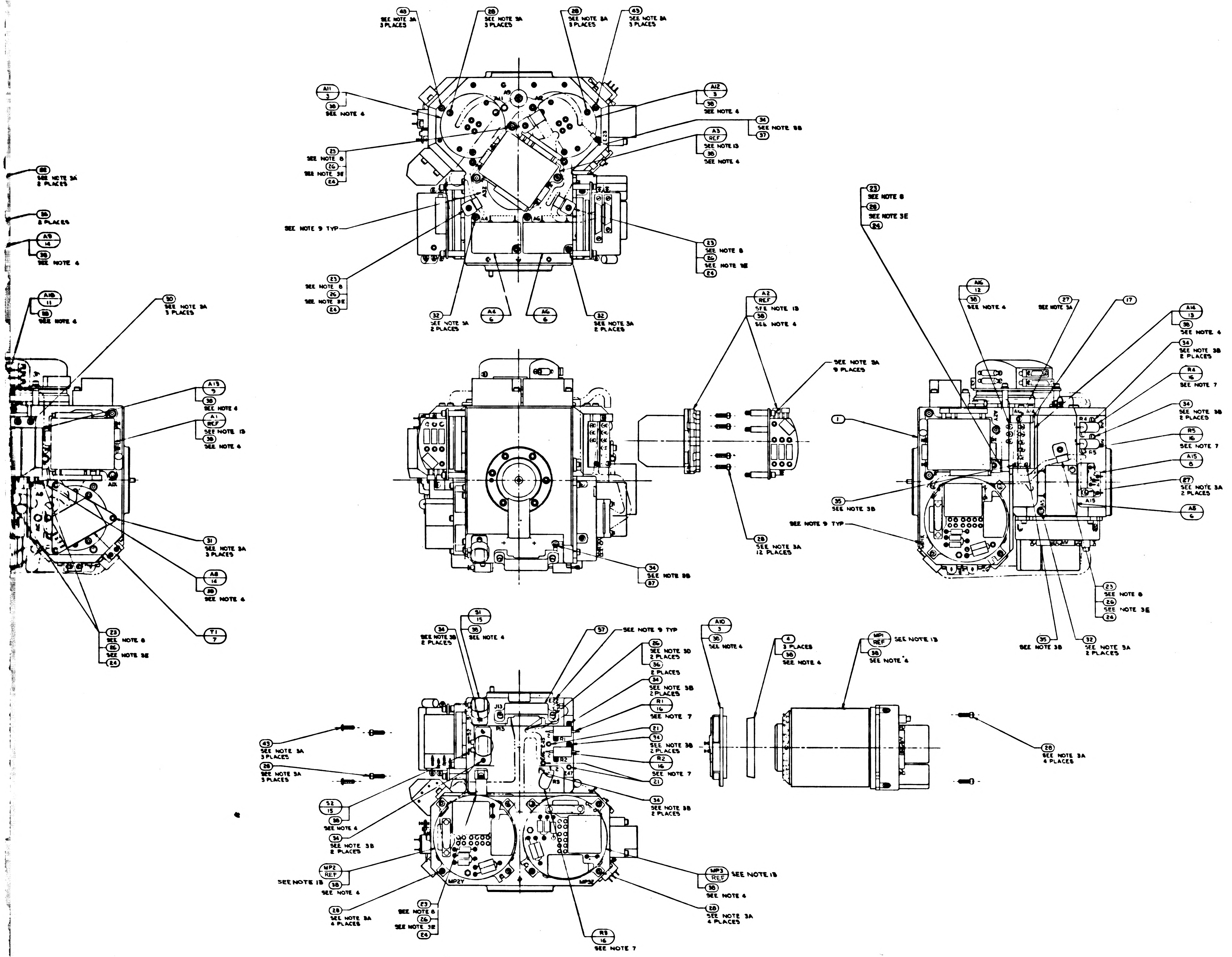
NOTES:

1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

2018605	REV	SHEET
	BG	2

1/2018605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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3E 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3E 24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
28 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
38 SEE NOTE 4
A10 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 REF SEE NOTE 13
38 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
23 SEE NOTE 8 26 SEE NOTE 3E 24
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3E 24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 6
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3E 24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
MP2Y
MP3Z
A9
A4
A6
A15
R4
R5
R1
R2
R3
E22
E47

-011 CONFI

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± DO NOT SCALE THIS DRAWING	DRAWN R.G.S. CHECKED APPROVAL APPROVAL
		MATERIAL	
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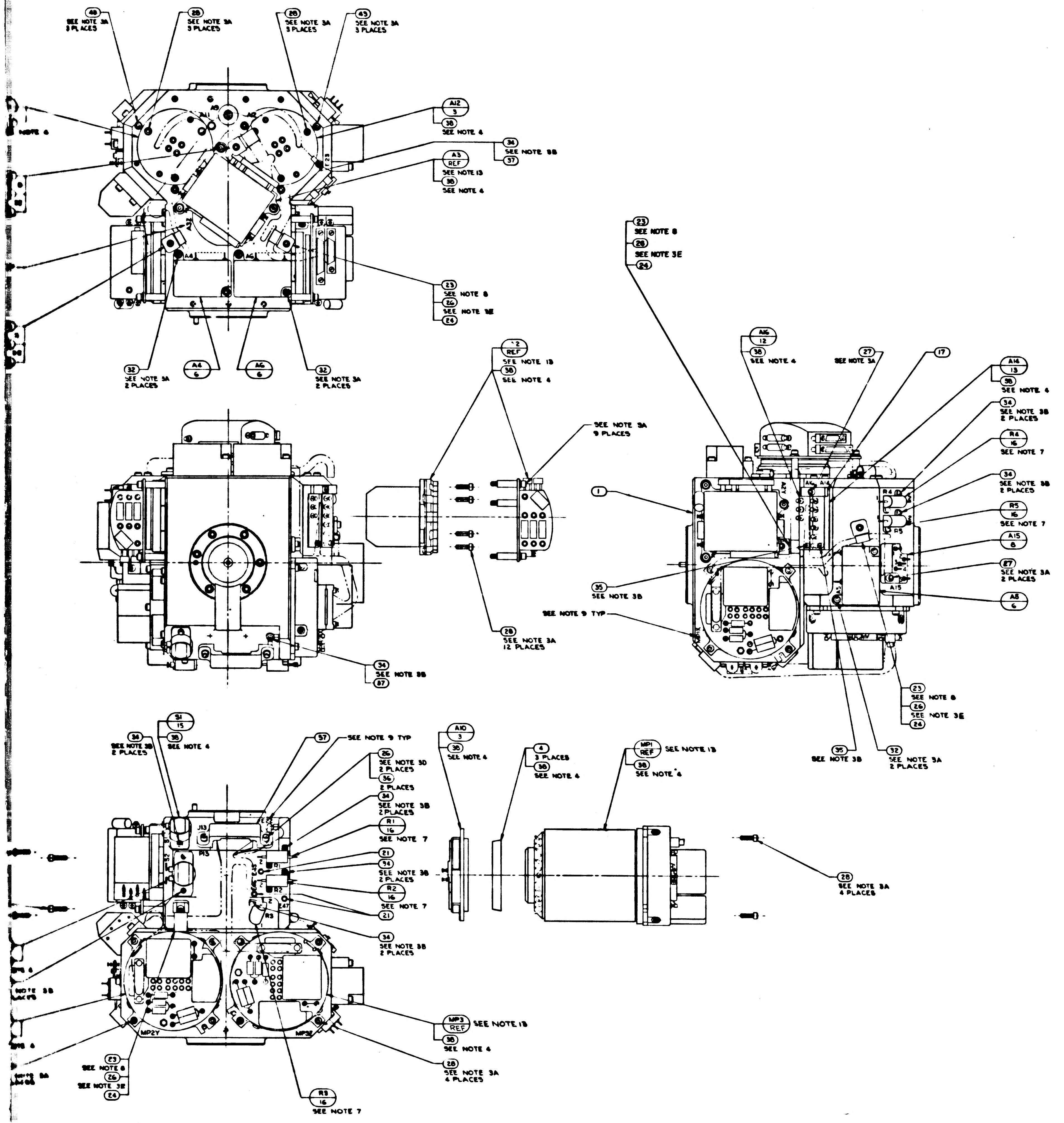
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SEE NOTE 3A 3 PLACES
28
SEE NOTE 3A 3 PLACES
28
SEE NOTE 3A 3 PLACES
43
SEE NOTE 3A 3 PLACES
NOTE 6
A12
3
38
SEE NOTE 4
34
SEE NOTE 3B
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A3
REF
SEE NOTE 13
38
SEE NOTE 4
A9
A11
A2
A32
A4
A6
E23
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A16
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R4
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SEE NOTE 7
34
SEE NOTE 3B 2 PLACES
R5
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SEE NOTE 7
A15
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27
SEE NOTE 3A 2 PLACES
A5
6
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
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SEE NOTE 3E
24
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SEE NOTE 3B
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SEE NOTE 3A 2 PLACES
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SEE NOTE 3B 2 PLACES
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57
SEE NOTE 9 TYP
26
SEE NOTE 3D 2 PLACES
36
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SEE NOTE 3B 2 PLACES
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SEE NOTE 7
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SEE NOTE 3B 2 PLACES
R2
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SEE NOTE 7
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SEE NOTE 3B 2 PLACES
J13
P13
R1
R2
R3
E47
MP2Y
MP3Z
A10
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38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A 4 PLACES
MP3
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A 4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3E
24
R3
16
SEE NOTE 7

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	JJ EF
	AY	REVISION STATUS CHANGED	1 AUG 67	A.N.
	AZ	REVISION STATUS CHANGED	8 AUG 67	JJJ JAC
	BA	REVISION STATUS CHANGED	9 AUG 67	JJJ
	BB	REVISION STATUS CHANGED	2 OCT 67	GD
	BC	REVISED PER TDRR 34725	17 Oct 67	JSM RWH
	BD	REVISION STATUS CHANGED	26 OCT 67	JRK
	BE	REVISION STATUS CHANGED	13 NOV 67	JRK RWH
	BF	REVISION STATUS CHANGED	21 NOV 67	DL
	BG	REVISION STATUS CHANGED	20 FEB 68	B.

-011 CONFIGURATION

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HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO	SIZE	NASA DRAWING NO
80230	J3	2018605

SCALE 1/1 WT SHEET 2 OF 2

2018605 BG

18605 REV BG SHEET 2

372018605

WIRING LEGEND				
COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

CABLE CLAMP (23)	
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9, & R10			
PART NO	VALUE Ω	PART NO	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
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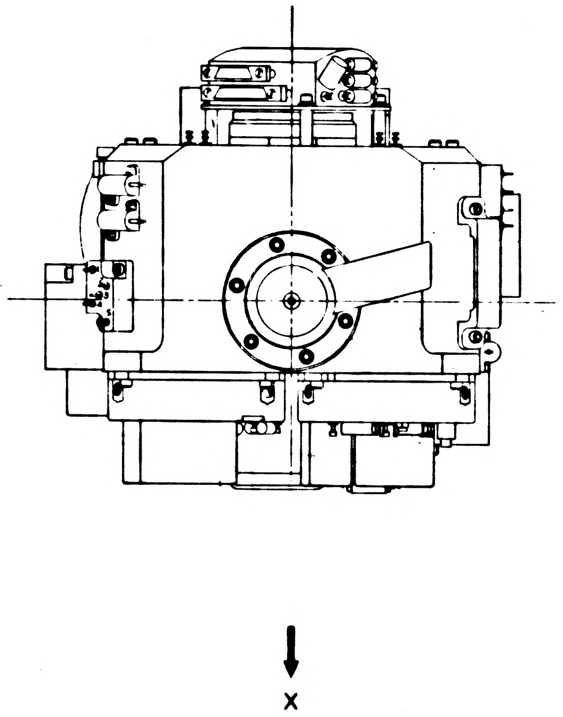
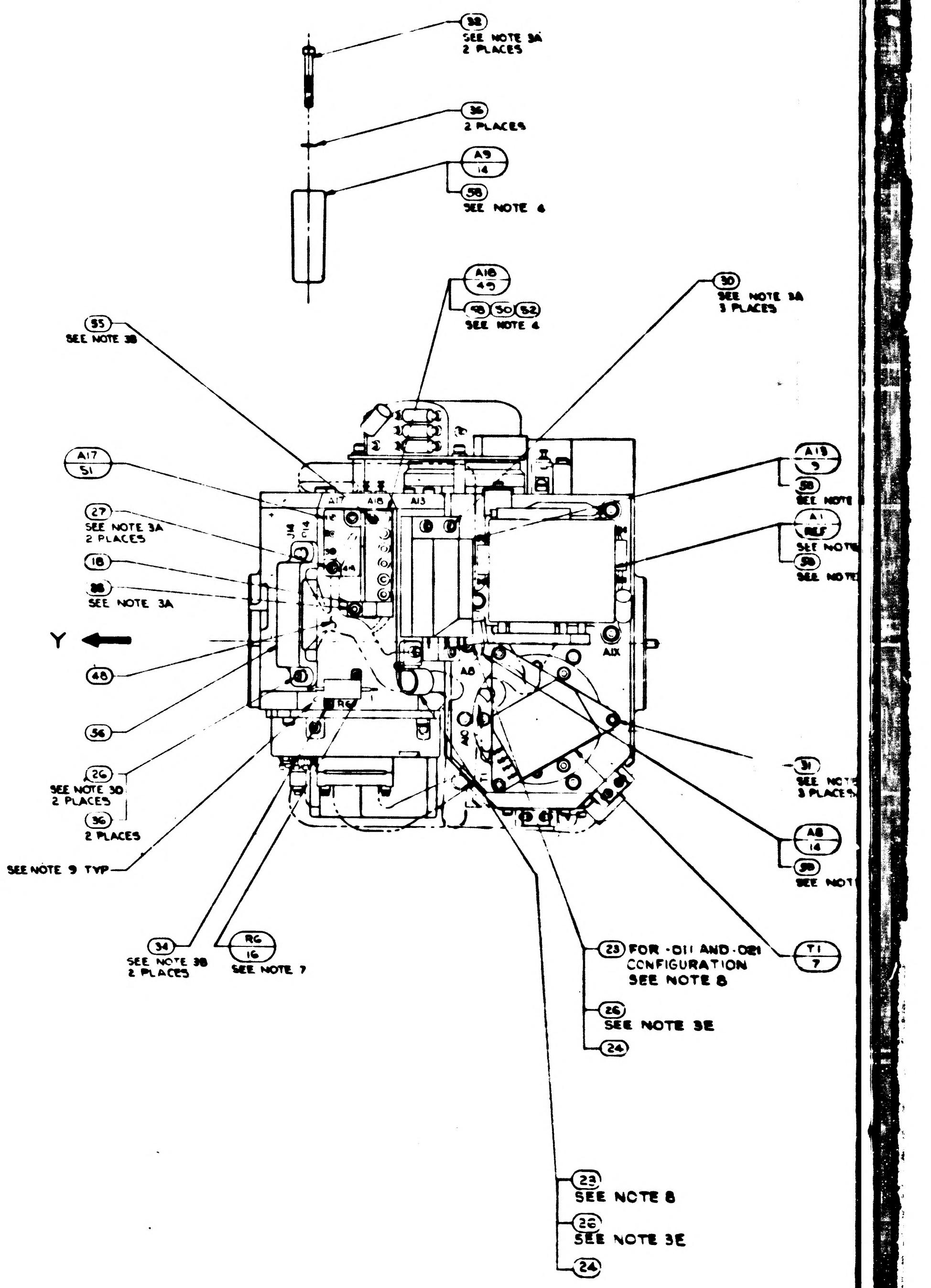
1010928-251	40.2		



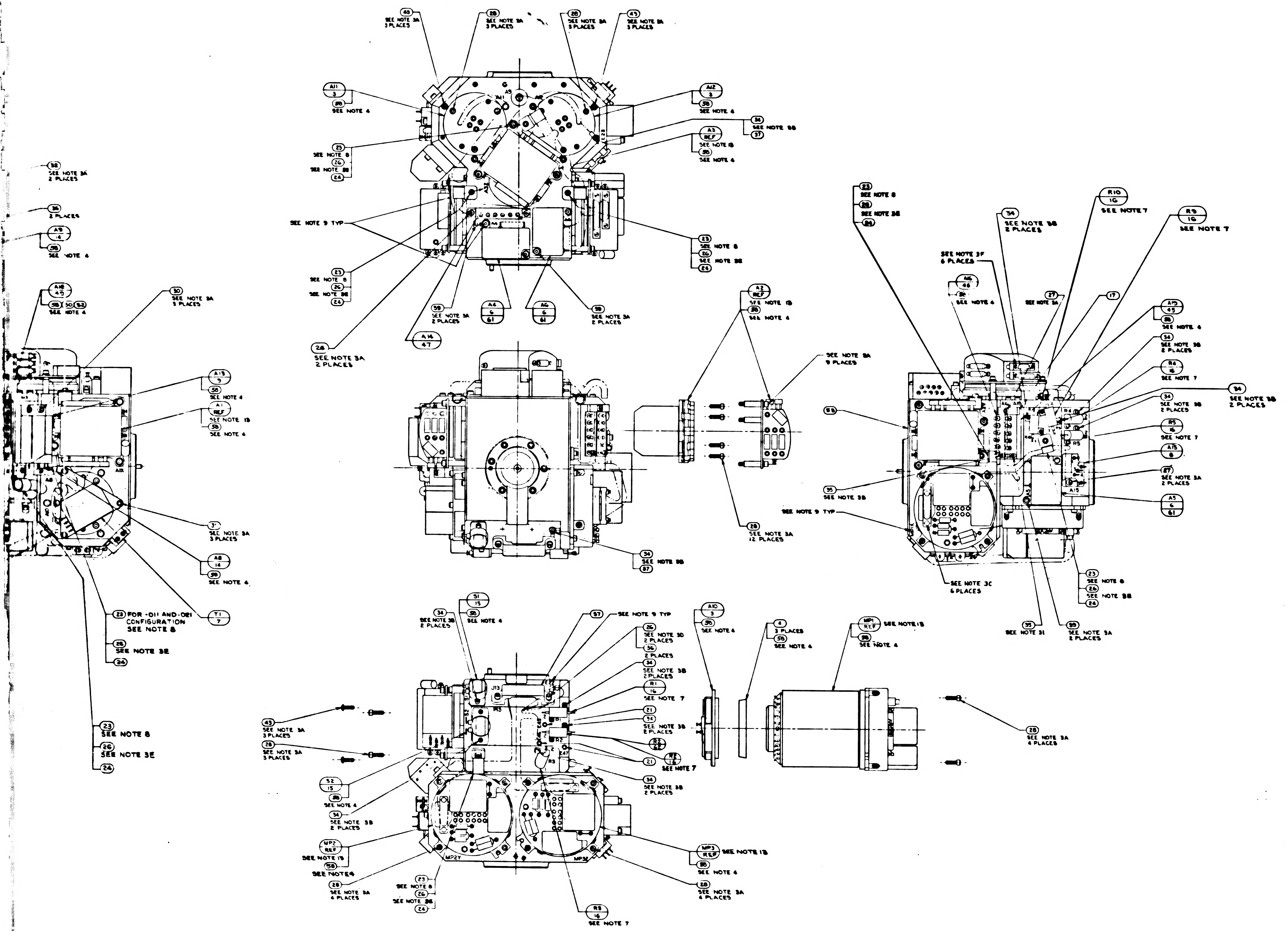

(32) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9 / 14
(58) SEE NOTE 4
A18 / 49
(48)(50)(52) SEE NOTE 4
(30) SEE NOTE 3A 3 PLACES
(55) SEE NOTE 3B
A17 / 51
A17
A18
A13
(27) SEE NOTE 3A 2 PLACES
(18)
(38) SEE NOTE 3A
Y
(48)
(56)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
(34) SEE NOTE 3B 2 PLACES
R6 / 16 SEE NOTE 7
A13 / 9
(58) SEE NOTE
A1 / REF
SEE NOTE
(58) SEE NOTE
A1X
A8
(31) SEE NOTE 3 PLACES
A8 / 14
(58) SEE NOTE
T1 / 7
(23) FOR -011 AND -021 CONFIGURATION SEE NOTE 8
(26) SEE NOTE 3E
(24)
(23) SEE NOTE 8
(26) SEE NOTE 3E
(24)

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 6.5 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
   - F. 1.5 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14),(15),(45),(46),(47) AND (50), BETWEEN ITEM (2) AND ITEM (3), BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (45) AND ITEM (50)
5. SOLDER PER ND1002071, EXCEPT SEE NOTE 16.
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM (2) FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

15. FOR -031 ASSY. PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021. FOR -041 & -051 ASSY(S), PIP PREAMP P/N 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021. IN THE A4 OR A5 POSITION ONLY. PIP PREAMP P/N 2021269-031 MAY BE USED IN PLACE OF P/N 2007060-021 IN THE A6 POSITION ONLY.
16. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.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4
3
2
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3 58 SEE NOTE 4
A12 3 58 SEE NOTE 4
36 SEE NOTE 3B 37
A3 REF SEE NOTE 13 58 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3E 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3E 24
23 SEE NOTE 8 26 SEE NOTE 3E 24
59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
58 SEE NOTE 3A 2 PLACES
A14 47
28 SEE NOTE 3A 2 PLACES
38 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14 58 SEE NOTE 4
A18 49 58 50 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9 58 SEE NOTE 4
A1 REF SEE NOTE 13 58 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14 58 SEE NOTE 4
23 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
26 SEE NOTE 3E 24
T1 7
23 SEE NOTE 8 26 SEE NOTE 3E 24
A2 REF SEE NOTE 13 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
34 SEE NOTE 3B 37
28 SEE NOTE 3A 12 PLACES
23 SEE NOTE 8 28 SEE NOTE 3E 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
SEE NOTE 3F 6 PLACES
A16 46 SEE NOTE 4
27 SEE NOTE 3A
17
A17 49 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
33
35 SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
35 SEE NOTE 31
39 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
51 15 58 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 62
21
R3 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
52 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
R8 16 SEE NOTE 7
MP3 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
J13
P13
MP2Y
MP3Z

1	–	–	–	–	–	–	2021
–	1	1	–	–	–	–	20213
–	–	1	1	1	–	–	10109
–	–	3	3	3	–	–	200
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-I-1
–	6	6	6	6	6	–	1001
–	AR	AR	A/R	A/R	A/R	–	MIL
1	1	1	1	1	1	1	2018
1	1	1	1	1	1	1	201883
–	1	1	1	1	1	–	10116
1	–	–	–	–	–	1	101092
–	1	1	1	1	1	–	2018
–	1	1	1	1	1	–	2018
–	1	1	1	1	1	–	2007
–	1	1	1	1	1	–	2018
–	1	1	1	1	1	–	2018
–	–	–	1	1	1	–	2018
–	1	1	1	1	1	–	20
–	1	1	1	1	1	–	20
–	1	1	1	1	1	–	2018
9	9	9	9	9	9	9	10100
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-
AR	–	–	–	–		A/R	10068
2	2	2	2	2	2	2	MS157
6	6	6	6	6	6	6	MS157
3	2	2	2	2	2	3	101162
18	22	22	22	22	22	18	101162
8	2	2	2	2	2	8	10014
3	3	3	3	3	3	3	10014
3	3	3	3	3	3	3	10014
33	33	33	33	33	33	33	10014
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12	15	14	14	14	15	12	10014
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1	1			1	1	1	20187
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	–	–	–	–	–	1	20186
	–	–	–	–	–	1	20186
	–	–	–	–	–	1	2007
				1	1	1	2007
				1	1	1	2007
				1	1	1	2007
3	3	–	–	–	3	3	2007
3	3	3	3	3	3	3	2018
3	3	3	3	3	3	3	20187
	–	–	–	–	–	1	2018
QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	
07	06	05	04	031	021	011	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

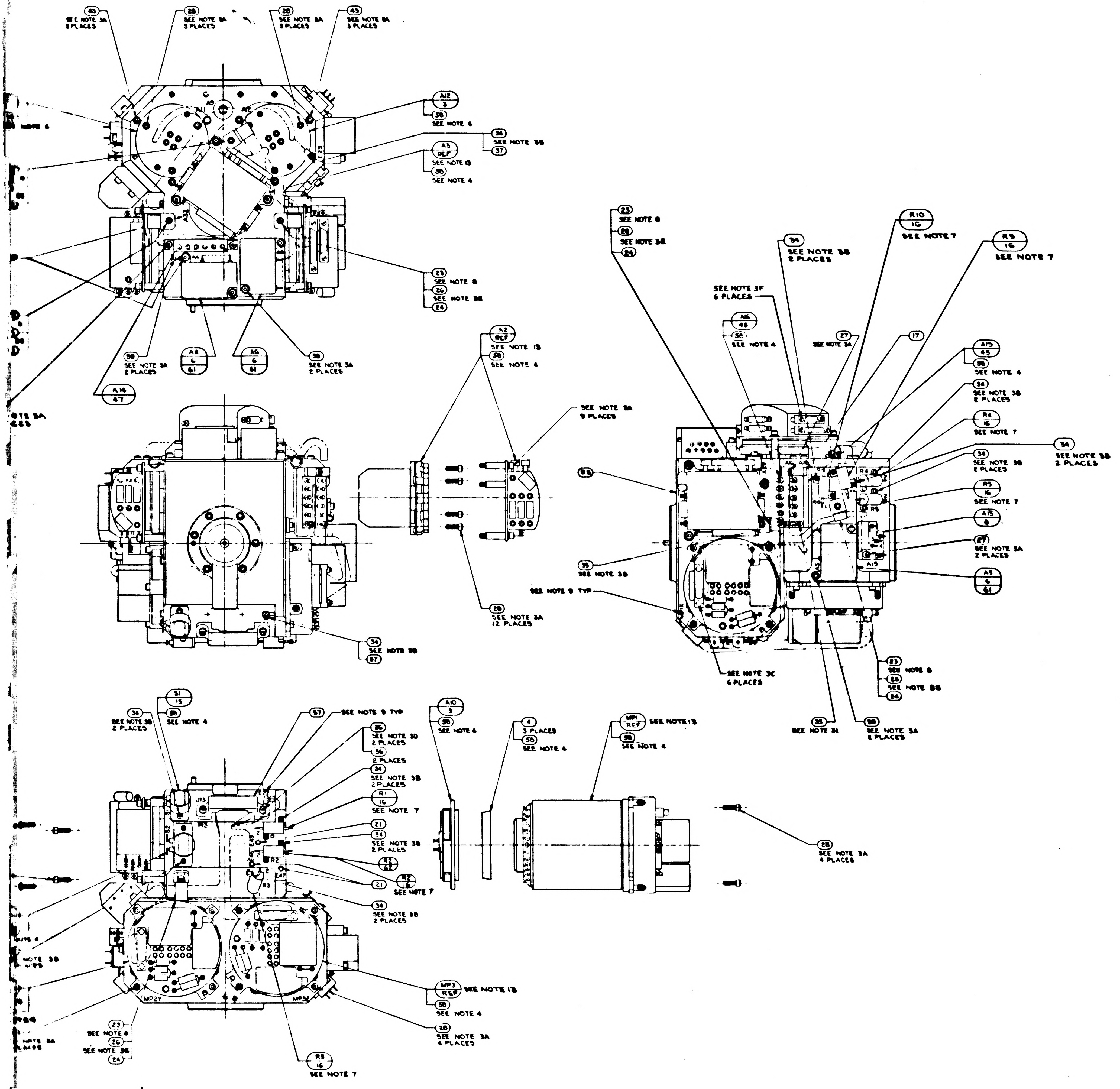
2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

DRAWN B.A.S.
CHECKED
APPROVAL
APPROVAL

2018605	REV BH	SHEET 1

2 / 2018605

REVISIONS TDRR 17755			
SYM	DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	
AY	REVISED PER TDRR 33712	AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ
BA	REVISED PER TDRR 3402	8 AUG 67	JJJ
BB	REVISED PER TDRR 34724	2 OCT 67	
BC	REVISED PER TDRR 34725	OCT 67	
BD	REVISED PER TDRR 34726	26 OCT 67	JRK
BE	REVISED PER TDRR 34727	13 NOV 67	JRK
BF	REVISED PER TDRR 3479	21 NOV 67	
BG	REVISED PER TDRR 35724	23 FEB 68	
BH	REVISED PER TDRR 36007	3 APR 68	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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A9
A11
A12
A12 / 3
58 SEE NOTE 4
34 SEE NOTE 3B
37
A3 / REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A8 / 6 / 61
A6 / 6 / 61
59 SEE NOTE 3A 2 PLACES
A14 / 47
A2 / REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
59
35 SEE NOTE 3B
SEE NOTE 9 TYP
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
28 SEE NOTE 3E
24
34 SEE NOTE 3B 2 PLACES
R10 / 16 SEE NOTE 7
R9 / 16 SEE NOTE 7
SEE NOTE 3F 6 PLACES
A16 / 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 / 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 / 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 / 16 SEE NOTE 7
A15 / 8
27 SEE NOTE 3A 2 PLACES
A5 / 6 / 61
SEE NOTE 3C 6 PLACES
23 SEE NOTE 8
26 SEE NOTE 3B
24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
51 / 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 / 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 / 62
R2 / 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
MP2Y
MP3Z
R1
R2
R3
MP3 / REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 / 16 SEE NOTE 7
A10 / 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 / REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

QTY REQD 07	QTY REQD 06	QTY REQD 05	QTY REQD 04	QTY REQD 03	QTY REQD 02	QTY REQD 01	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	–	–	–	–	–	–	2021401	WIRING HARNESS "A", STABLE MEM	64
–	1	1	–	–	–	–	2021397	WIRING HARNESS "A", STABLE MEM	63
–	–	1	1	1	–	–	1010928-184	RESISTOR, R2	62
–	–	3	3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
–	6	6	6	6	6	–	1001488-9	SCREW, HEX, SOC HD SELF-LOCKING	59
–	AR	AR	A/R	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	1	1	1	2018838	BRACKET, CONN 34 PIN	57
1	1	1	1	1	1	1	2018837	BRACKET, CONN 44 PIN	56
–	1	1	1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
1	–	–	–	–	–	1	1010928-295	RESISTOR FIXED	54
–	1	1	1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
–	1	1	1	1	1	–	2018830	SHIELD THERMOSTAT	52
–	1	1	1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
–	1	1	1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
–	1	1	1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
–	–	–	1	1	1	–	2018828	WIRING HARNESS "A" STABLE MEMBER	48
–	1	1	1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
–	1	1	1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
–	1	1	1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC, SELF-LOCKING	43
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
AR	–	–	–	–	–	A/R	1006879 SEE NOTE 6	SILICONE COMPOUND THERMO.	38
2	2	2	2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	2	2	2	2	2	3	1011625-11	SCREW, HEX, SOC HD., SELF-LOCKING	35
18	22	22	22	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
8	2	2	2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	7	7	7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	15	14	14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	–	–	–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	7	7	7	8	8	1000229	WASHER, CABLE CLAMP	24
8	8	7	7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	1	1	1	2018776	CLAMP, THERMOSTAT	17
5	8	7	7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2	2	2	2	2018641	HTR ASS'Y. STABLE MEMBER	14
1	–	–	–	–	–	1	2018637	THERMO & HTR ASS'Y. TEMP CONTROL	13
1	–	–	–	–	–	1	2018636	THERMO. ASS'Y TEMP. ALARM	12
1	–	–	–	–	–	1	2018635	THERMO. & HTR. ASS'Y BLO. CONTROL	11
1	–	–	–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y	10
1	1	1	1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	–	–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
1	–	–	–	–	–	1	2018750	HOUSING STABLE MEMBER	1

LIST OF MATERIALS

2018605 BH

2018604	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL 23 Mar 65 APPROVAL	STABLE MEMBER ASSEMBLY
APPLICATION		HEAT TREATMENT FINAL FINISH	NASA APPROVAL 3-23-65 MIT APPROVAL 23 Mar 65	CODE IDENT NO 80230 SIZE J3 NASA DRAWING NO 2018605 SCALE 1/1 WT SHEET 1 OF 2

2018605 REV BH SHEET 1

3/2018605

9 8 7 6

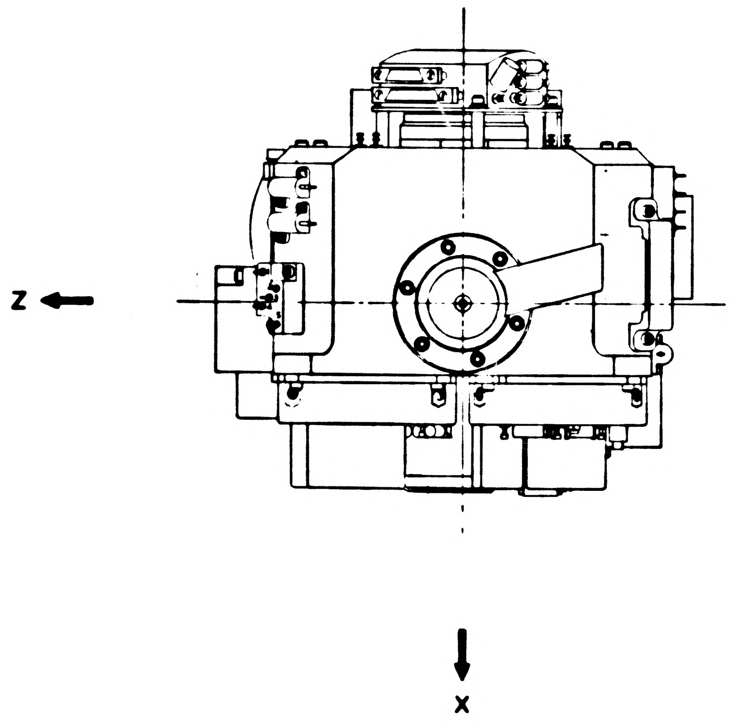
D

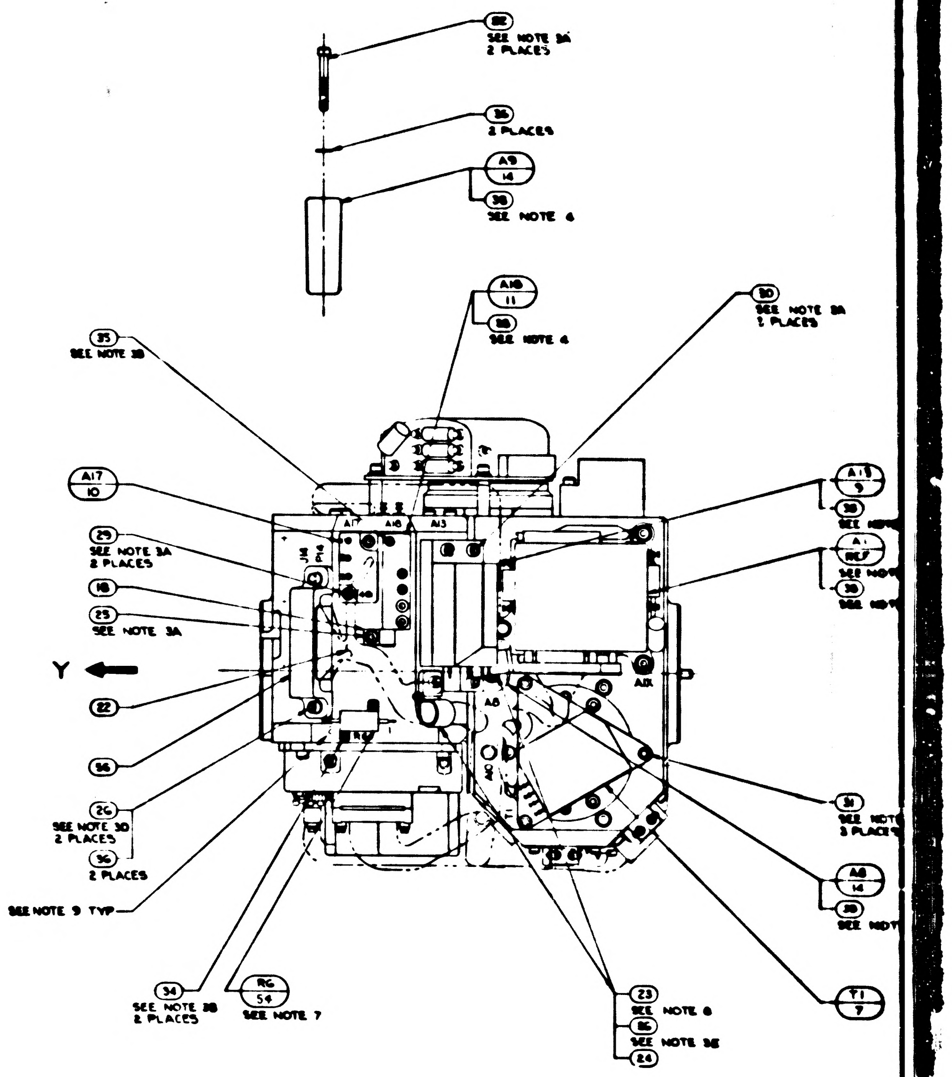
C

B

A

2018605





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SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
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SEE NOTE 4
A10
11
38
SEE NOTE 4
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SEE NOTE 3A
2 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
RG
54
SEE NOTE 7
23
SEE NOTE 6
86
SEE NOTE 3E
24
A17
A16
A13
A8
A11
A13
9
38
A1
REF
38
31
3 PLACES
A8
14
38
T1
7

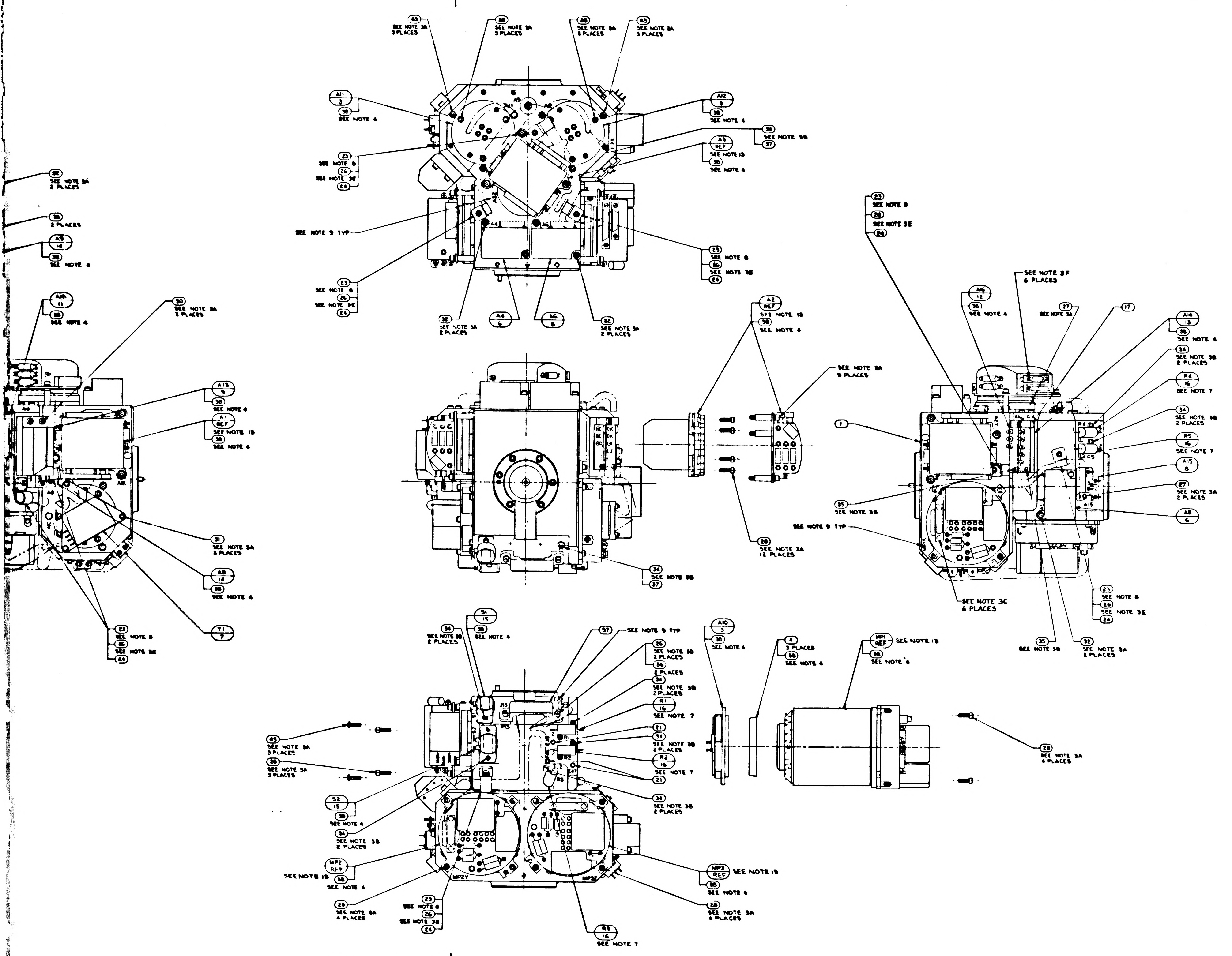
NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

2018605	SH 2

9 8 7 6

1/2018605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SEE NOTE 3A
3 PLACES
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3 PLACES
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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
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3
38
SEE NOTE 4
A12
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38
SEE NOTE 4
36
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
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23
SEE NOTE 8
26
SEE NOTE 3E
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SEE NOTE 9 TYP
23
SEE NOTE 8
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2 PLACES
A4
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3 PLACES
A8
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SEE NOTE 4
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SEE NOTE 8
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SEE NOTE 3E
24
T1
7
A2
REF
SEE NOTE 13
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
23
SEE NOTE 8
28
SEE NOTE 3E
24
SEE NOTE 3F
6 PLACES
A16
12
38
SEE NOTE 4
27
SEE NOTE 3A
17
A14
13
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A5
6
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C
6 PLACES
23
SEE NOTE 8
26
SEE NOTE 3E
24
35
SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
S1
15
34
SEE NOTE 3B
2 PLACES
38
SEE NOTE 4
57
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
S2
15
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
MP2
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3E
24
R3
16
SEE NOTE 7
MP3
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
J13
MP2Y
MP3Y
E47
A15
R4
R5

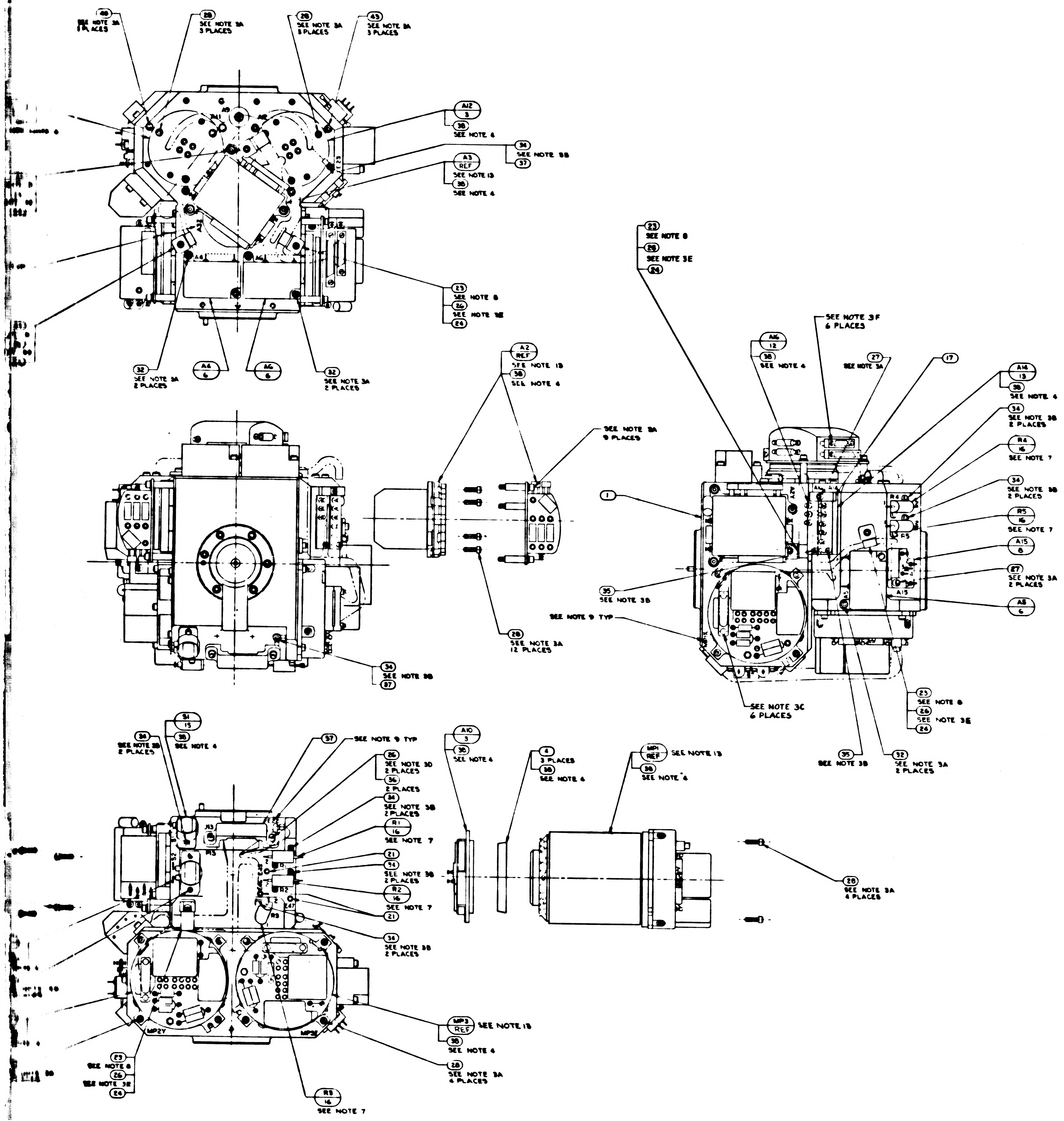
-011 CONT

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	UL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

2018605 REV SHEET 2

2V2018605

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	
	AY	REVISION STATUS CHANGED	AUG 67	
	AZ	REVISION STATUS CHANGED	8 AUG 67	JAG
	BA	REVISION STATUS CHANGED	8 AUG 67	
	BB	REVISION STATUS CHANGED	2 OCT 67	GD
	BC	REVISED PER TDRR 34725	17 OCT 67	JSM
	BD	REVISION STATUS CHANGED	26 OCT 67	JRK
	BE	REVISION STATUS CHANGED	13 NOV 67	JRA
	BF	REVISION STATUS CHANGED	2 NOV	DL
	BG	REVISION STATUS CHANGED	23 FEB 68	B.
	BH	REVISED PER TDRR 36007	3 APR 68	



SEE NOTE 3A 8 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF
SEE NOTE 13
38 SEE NOTE 4
A11
A9
A6
A5
A7
23 SEE NOTE 8
26 SEE NOTE 3E
26
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 REF
SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
29 SEE NOTE 3E
24
SEE NOTE 3F 6 PLACES
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A8 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
26
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
R4
R5
F5
A15
S1 15
38 SEE NOTE 4
36 SEE NOTE 3D 2 PLACES
37 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7
23 SEE NOTE 8
26 SEE NOTE 3E
24
J13
R2
R3
MP2Y
MP3Z

-011 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL APPROVAL	STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230 · SIZE J3 · NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	SCALE 1/1 · WT · SHEET 2 OF 2
APPLICATION				

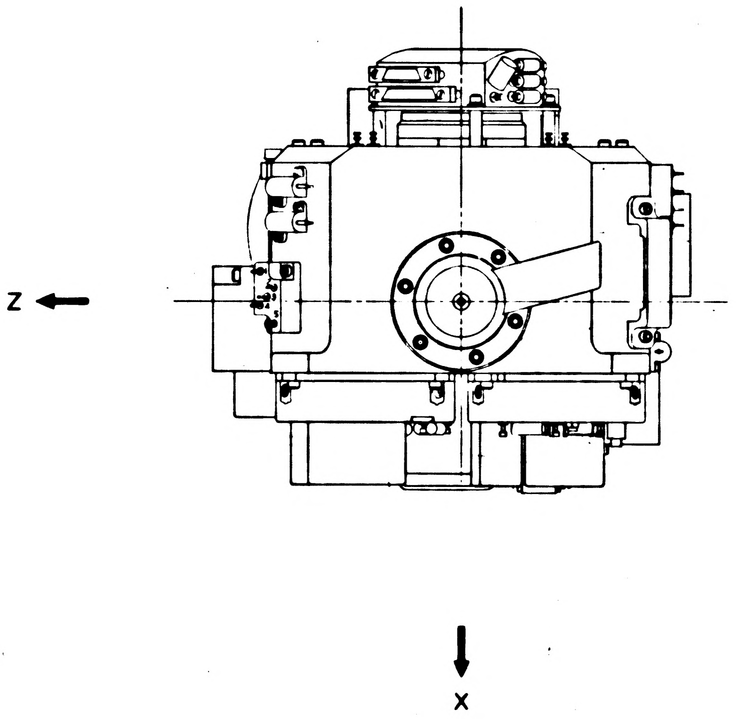
2018605 BH

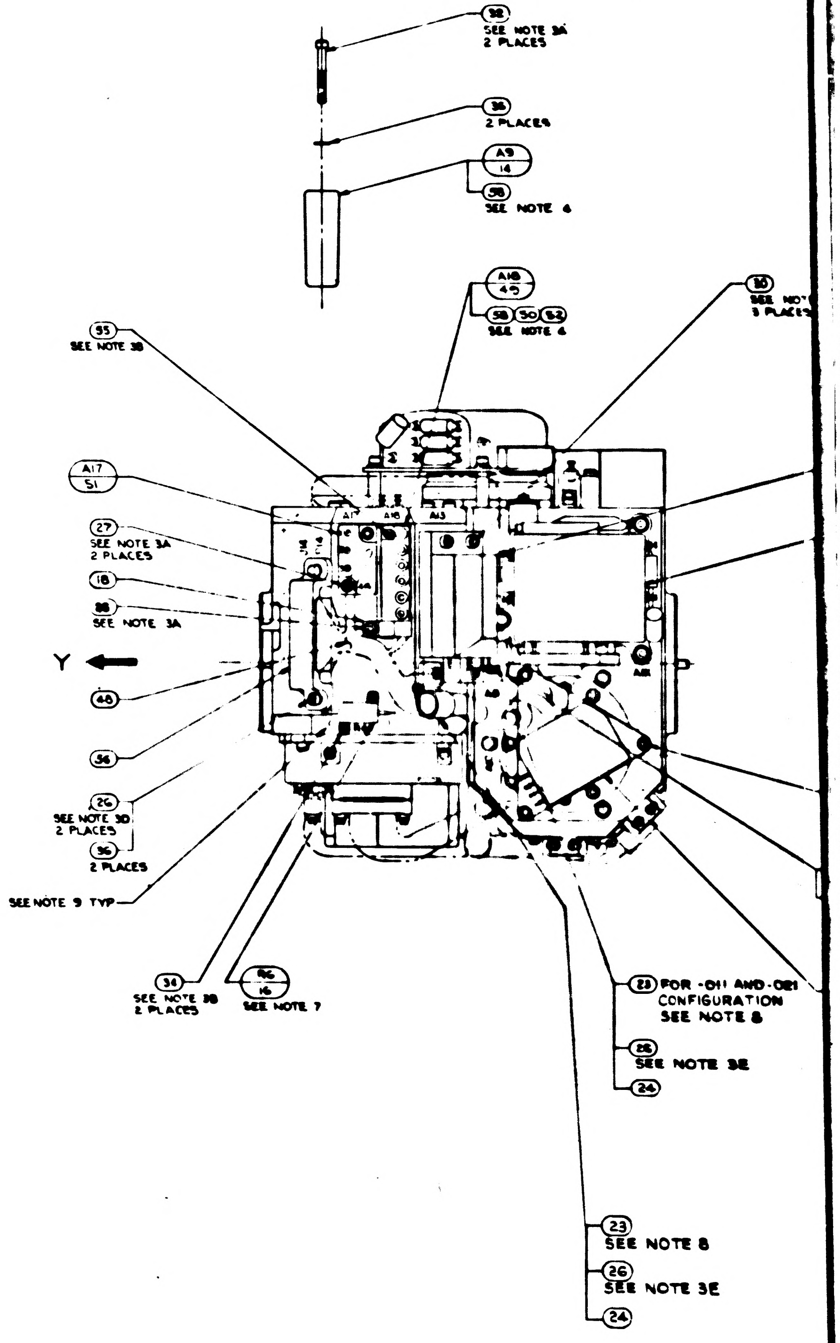
3/2018605

WIRING LEGEND				
COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2	↕	↕
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3	↕	↕
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I	
CABLE CLAMP ㉓	
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II			
RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10			
PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	876
-242	32.4	-369	681
-244	34.0	-386	1020
-248	37.4	1010928-400	1430
1010928-251	40.2		




㉜
SEE NOTE 3A
2 PLACES
㊱
2 PLACES
A9
14
㊽
SEE NOTE 4
A18
45
㊽ ㊿ (52)
SEE NOTE 4
㉚
SEE NOTE
3 PLACES
㉟
SEE NOTE 3B
A17
51
㉗
SEE NOTE 3A
2 PLACES
⑱
㊳
SEE NOTE 3A
Y
㊽
㊺
㉖
SEE NOTE 3D
2 PLACES
㊱
2 PLACES
SEE NOTE 9 TYP
㉞
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
㉓ FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
㉖
SEE NOTE 3E
㉔
㉓
SEE NOTE 8
㉖
SEE NOTE 3E
㉔

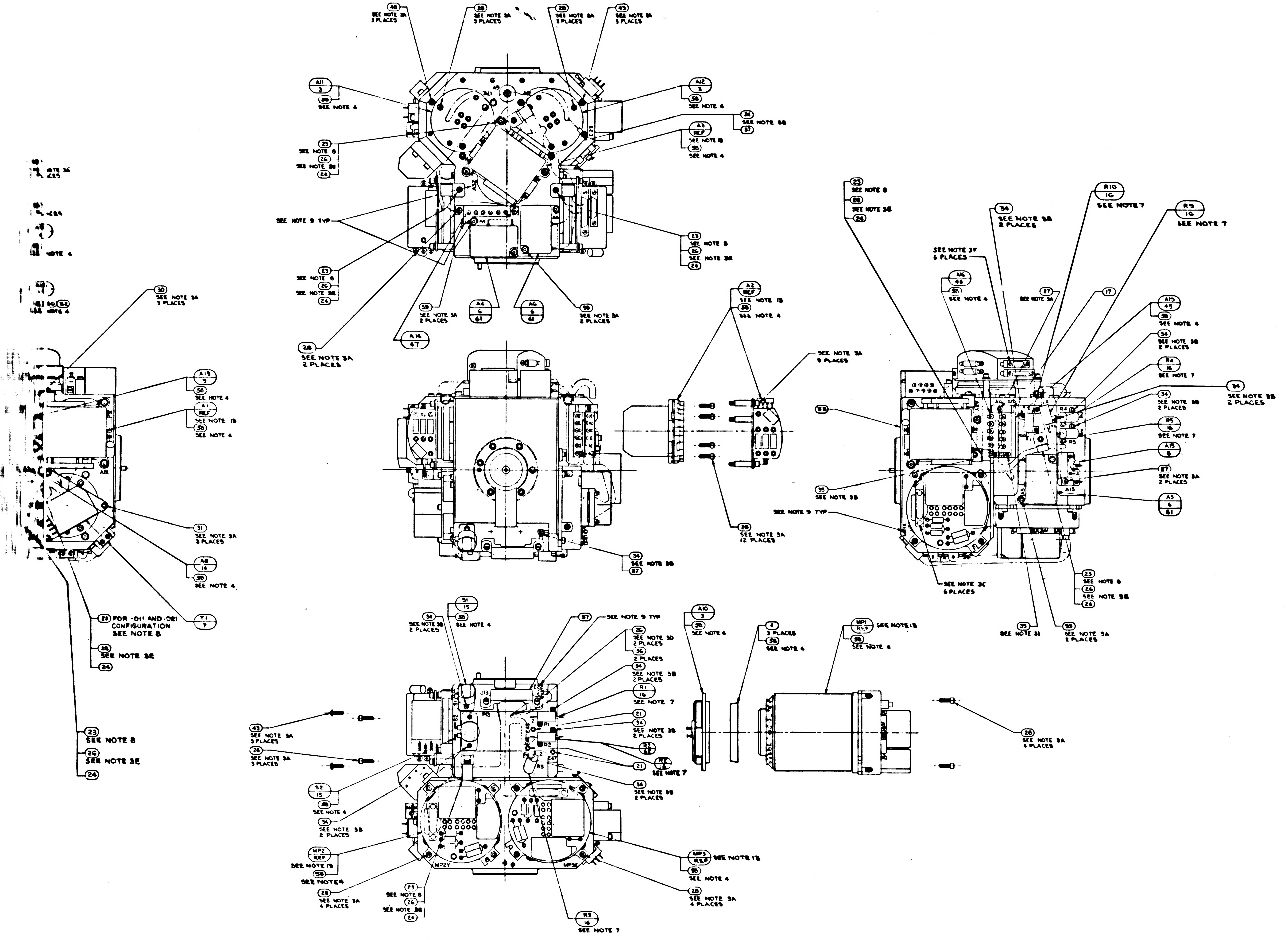
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 6.5 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.6 IN-LB
   - F. 1.5 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
4. APPLY A THIN FILM OF ITEM ㊳ OR ㊽ TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ②,③,⑤,⑨,⑪,⑫,⑬,⑭,⑮,㊺,㊻,㊼ AND ㊿, BETWEEN ITEM ② AND ITEM ③, BETWEEN ITEM ③ AND ITEM ④ AND BETWEEN ITEM ㊺ AND ITEM ㊿
5. SOLDER PER ND1002071, EXCEPT SEE NOTE 16.
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM ② FOR-011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

15. FOR -031 ASSY, PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021. *FOR -041 & -051 ASSY(S), PIP PREAMP P/N 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021. IN THE A4 OR A5 POSITION ONLY. PIP PREAMP P/N 2021269-031 MAY BE USED IN PLACE OF P/N 2007060-021 IN THE A6 POSITION ONLY.*

16. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.
17. REMOVE .24-.26 FROM ALL UNTERMINATED LEADS OF ITEM (63); RESTRIP AND TIN PER 202 397; SOLDER PER ND1002071.


48 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
58 SEE NOTE 4
A12 3
58 SEE NOTE 4
36 SEE NOTE 3B 37
A3 REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3E 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3E 24
59 SEE NOTE 3A 2 PLACES
A6 6 61
A6 6 61
58 SEE NOTE 3A 2 PLACES
A14 47
28 SEE NOTE 3A 2 PLACES
30 SEE NOTE 3A 3 PLACES
A13 9
58 SEE NOTE 4
A1 REF SEE NOTE 13
58 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
58 SEE NOTE 4
T1 7
23 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
59
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8 26 SEE NOTE 3E 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
SEE NOTE 3F 6 PLACES
A16 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
35 SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
51 15
55 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
56 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
55 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
55 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
MP2Y
MP3Y
A9
A8
A15
R4
R5

SEE NOTE 17

QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD
-07	-06	-05	-04	-031
1	–	–	–	–
–	1	1	–	–
–	–	1	1	1
–	–	3	3	3
AR	AR	AR	A/R	A/R
–	6	6	6	6
–	AR	AR	A/R	A/R
1	1	1	1	1
1	1	1	1	1
–	1	1	1	1
1	–	–	–	–
–	1	1	1	1
–	1	1	1	1
–	1	1	1	1
–	1	1	1	1
–	1	1	1	1
–	–	–	1	1
–	1	1	1	1
–	1	1	1	1
–	1	1	1	1
9	9	9	9	9
AR	AR	AR	A/R	A/R
AR	–	–	–	–
2	2	2	2	2
6	6	6	6	6
3	2	2	2	2
18	22	22	22	22
8	2	2	2	2
3	3	3	3	3
3	3	3	3	3
33	33	33	33	33
5	7	7	7	7
12	15	14	14	14
1	–	–	–	–
8	8	7	7	7
8	8	7	7	7
–	–	–	–	–
3	3	3	3	3
1	1	1	1	1
1	1	1	1	1
5	8	7	7	7
2	2	2	2	2
2	2	2	2	2
1	–	–	–	–
1	–	–	–	–
	–	–	–	–
	–	–	–	–
				1
				1
				1
3	3	–	–	–
3	3	3	3	3
3	3	3	3	3
	–	–	–	–

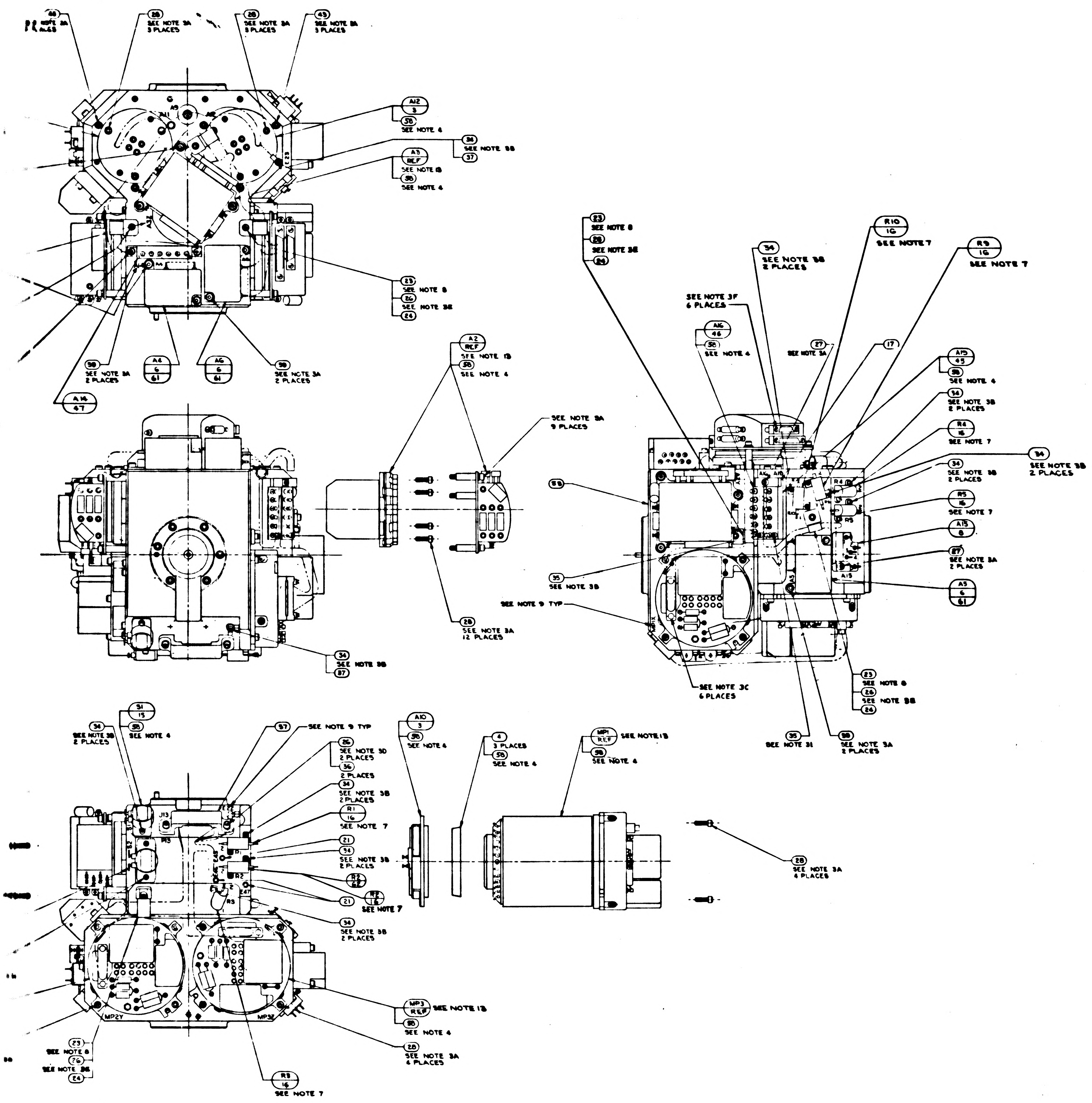
2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANG ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

2018605 REV BJ SHEET 1

2/72018605

SYM	REVISIONS TDRR 17755 DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	
AY	REVISED PER TDRR 33718	1 AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJ
BA	REVISED PER TDRR 34021	8 AUG 67	JJ
BB	REVISED PER TDRR 34724	4 OCT 67	
BC	REVISED PER TDRR 34725		
BD	REVISED PER TDRR 34726	26 OCT 67	WRK
BE	REVISED PER TDRR 34727	13 NOV 67	WRK
BF	REVISED PER TDRR 34791	21 NOV 67	DL
BG	REVISED PER TDRR 35724	23 FEB 68	
BH	REVISED PER TDRR 36007		LK
BJ	REVISED PER TDRR 36230	68	LK



A8 SEE NOTE 3A
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A12 3
58 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF
SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
38 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
38 SEE NOTE 3A 2 PLACES
A14 47
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
59
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
29
SEE NOTE 3E
24
SEE NOTE 3F 6 PLACES
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A16 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A13 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
35 SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
35 SEE NOTE 31
38 SEE NOTE 3A 2 PLACES
23 SEE NOTE 8
26
SEE NOTE 3B
24
34 SEE NOTE 3B 2 PLACES
31 15
55 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 62
21
R3 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
A10 3
55 SEE NOTE 4
4 3 PLACES
55 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 6 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R8 16 SEE NOTE 7
J13
MP2Y
MP3Z

SEE NOTE 17

QTY REQD 071	QTY REQD 061	QTY REQD 051	QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	–	–	–	–	–	–	2021401	WIRING HARNESS "A", STABLE MEM	64
–	1	1	–	–	–	–	2021397	WIRING HARNESS "A, STABLE MEM	63
–	–	1	1	1	–	–	1010928-184	RESISTOR, R2	62
–	–	3	3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
–	6	6	6	6	6	–	1001488-9	SCREW, HEX, SOC HD SELF-LOCKING	59
–	AR	AR	A/R	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	1	1	1	2018838	BRACKET, CONN 34 PIN	57
1	1	1	1	1	1	1	2018837	BRACKET, CONN 44 PIN	56
–	1	1	1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
1	–	–	–	–	–	1	1010928-298	RESISTOR FIXED	54
–	1	1	1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
–	1	1	1	1	1	–	2018830	SHIELD THERMOSTAT	52
–	1	1	1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
–	1	1	1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
–	1	1	1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
–	–	–	1	1	1	–	2018828	WIRING HARNESS "A" STABLE MEMBER	48
–	1	1	1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
–	1	1	1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
–	1	1	1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC, SELF-LOCKING	43
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
AR	–	–	–	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	2	2	2	2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
18	22	22	22	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
8	2	2	2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	7	7	7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	15	14	14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	–	–	–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	7	7	7	8	8	1000223	WASHER, CABLE CLAMP	24
8	8	7	7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	1	1	1	2018776	CLAMP, THERMOSTAT	17
5	8	7	7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	2	2	2	1001486	THERMOSTAT, SAFETY	15
2	2	2	2	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
1	–	–	–	–	–	1	2018637	THERMO & HTR. ASS'Y. TEMP CONTROL	13
1	–	–	–	–	–	1	2018636	THERMO. ASS'Y TEMP. ALARM	12
1	–	–	–	–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	–	–	–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y	10
1	1	1	1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	–	–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
1	–	–	–	–	–	1	2018750	HOUSING STABLE MEMBER	1

LIST OF MATERIALS

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

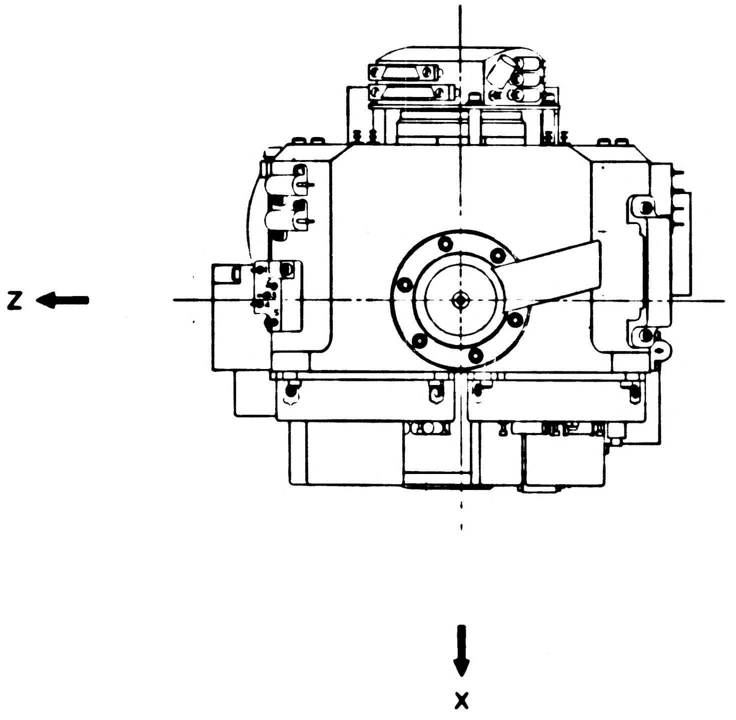
STABLE MEMBER ASSEMBLY

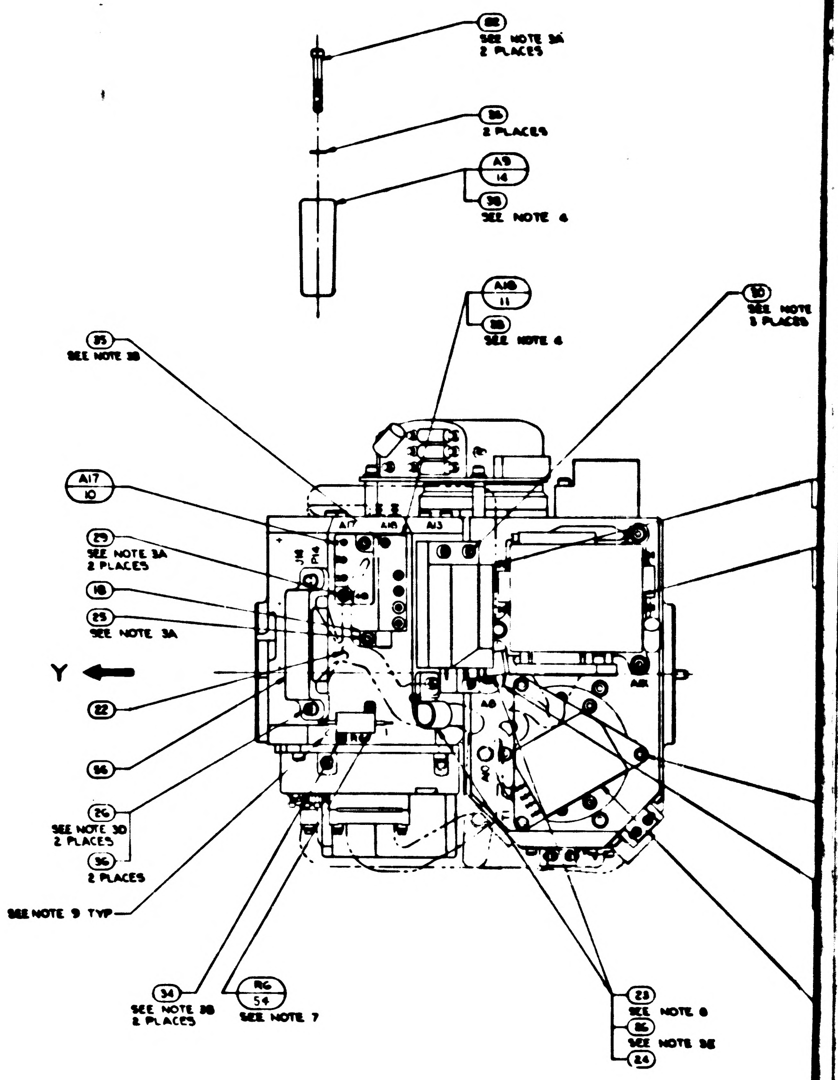
CODE IDENT NO. 80230
SIZE J3
NASA DRAWING NO. 2018605
SCALE 1/1 WT
SHEET 1 OF 2

2018605 BJ

REV A SHEET 1

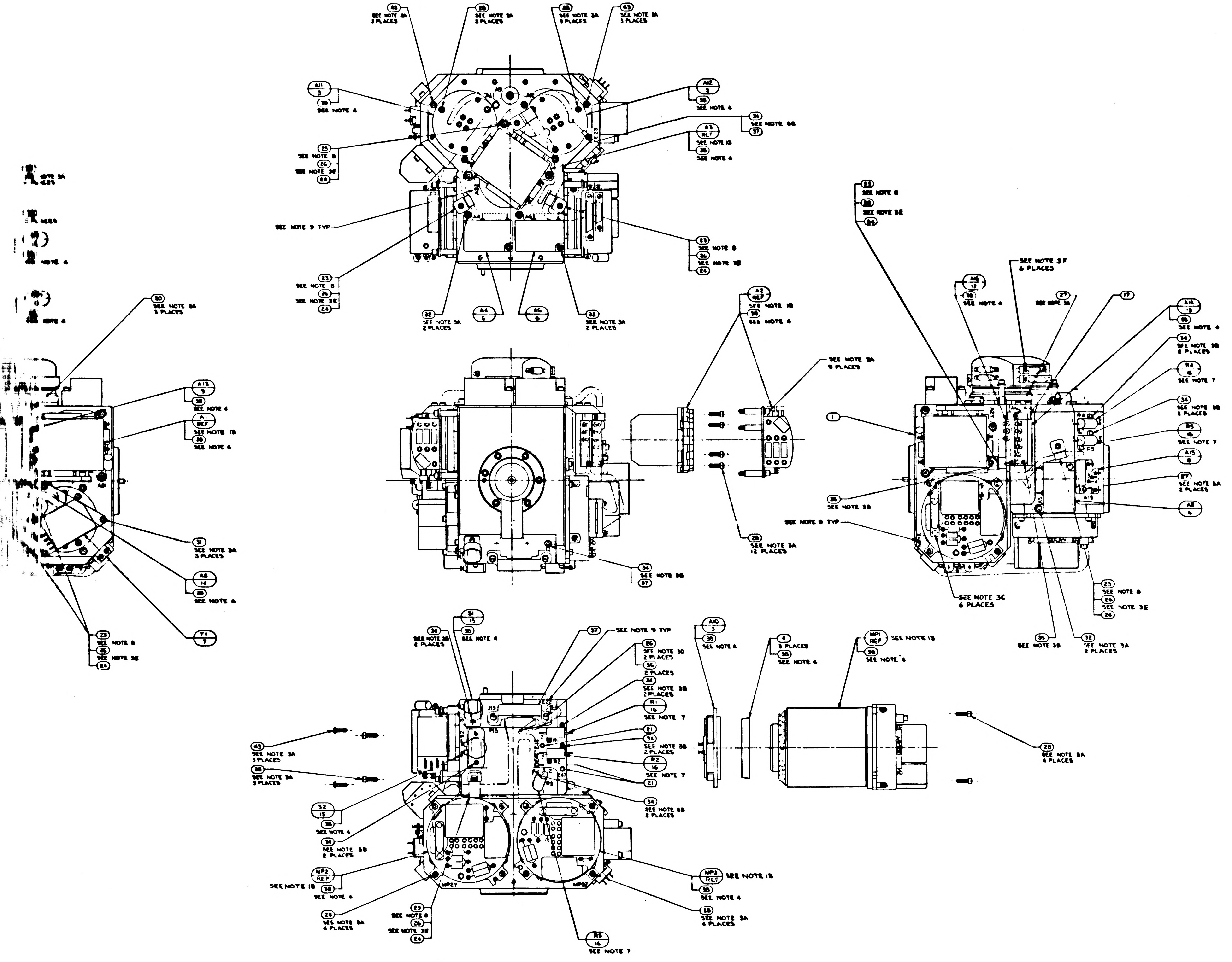
3/2018605




32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
38
SEE NOTE 4
A16
11
38
SEE NOTE 4
30
SEE NOTE
3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
RG
54
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3E
24
A17
A16
A13
A11
A8
J18
P14

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

D C B A



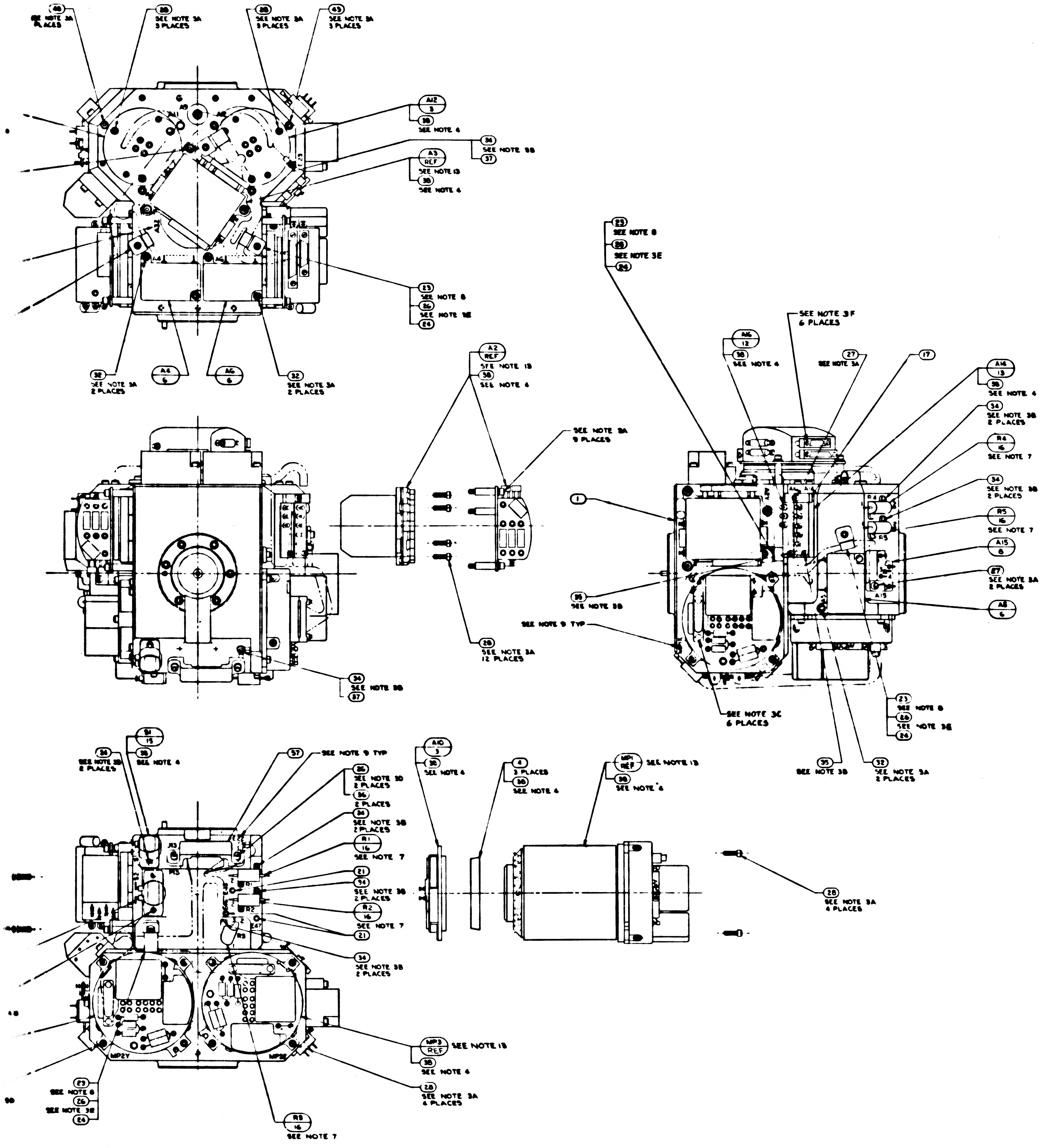
5
4
3
2
SEE NOTE 3A 3 PLACES
SEE NOTE 4
SEE NOTE 6
SEE NOTE 8
SEE NOTE 3E
SEE NOTE 3B
SEE NOTE 13
SEE NOTE 9 TYP
SEE NOTE 3A 2 PLACES
SEE NOTE 3A 9 PLACES
SEE NOTE 3A 12 PLACES
SEE NOTE 3F 6 PLACES
SEE NOTE 3C 6 PLACES
SEE NOTE 3B 2 PLACES
SEE NOTE 3D 2 PLACES
SEE NOTE 7
SEE NOTE 3A 4 PLACES
A11
A12
A3 REF
A2 REF
A1 REF
A4
A6
A8
A13
A14
A15
A16
A10
MP1 REF
MP2 REF
MP3 REF
R1
R2
R3
R4
R5
T1
J13
P13

2018605

2

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ± ± ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	DL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

2/2018605



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SEE NOTE 3A
PLACES
28
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
A12
3
38
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
38
SEE NOTE 4
23
SEE NOTE 8
26
SEE NOTE 3E
24
32
SEE NOTE 3A
2 PLACES
A4
6
A6
6
32
SEE NOTE 3A
2 PLACES
A2
REF
SEE NOTE 13
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
23
SEE NOTE 8
26
SEE NOTE 3E
24
SEE NOTE 3F
6 PLACES
A16
12
38
SEE NOTE 4
27
SEE NOTE 3A
17
A14
13
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
8
27
SEE NOTE 3A
2 PLACES
A8
6
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C
6 PLACES
23
SEE NOTE 8
26
SEE NOTE 3E
24
35
SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
34
SEE NOTE 3B
2 PLACES
31
15
38
SEE NOTE 4
57
SEE NOTE 9 TYP
36
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
MP3
REF
SEE NOTE 13
38
SEE NOTE 4
28
SEE NOTE 3A
6 PLACES
R8
16
SEE NOTE 7
23
SEE NOTE 8
26
SEE NOTE 3E
24
MP2Y
MP2Z
J13
R1
R2
R3
A1
A2
A4
A6
A9
A11
A15
R4
R5

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	
	AY	REVISION STATUS CHANGED	1 AUG 67	
	AZ	REVISION STATUS CHANGED	8 AUG 67	JJJ
	BA	REVISION STATUS CHANGED	8 AUG 67	JJJ
	BB	REVISION STATUS CHANGED	4 OCT 67	
	BC	REVISED PER TDRR 34725	17 OCT 67	
	BD	REVISION STATUS CHANGED	26 OCT 67	JRK
	BE	REVISION STATUS CHANGED	13 NOV 67	JRK RWH
	BF	REVISION STATUS CHANGED		
	BG	REVISION STATUS CHANGED	FEB 68	
	BH	REVISED PER TDRR 36007	68	
	BJ	REVISION STATUS CHANGED	30 MAY 68	RWH

-011 CONFIGURATION

2018604	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	MATERIAL	DRAWN R.G.S. DATE	STABLE MEMBER ASSEMBLY
APPLICATION		HEAT TREATMENT	CHECKED	CODE IDENT NO 80230
		FINAL FINISH	APPROVAL	SIZE J3
			APPROVAL	NASA DRAWING NO 2018605
			NASA APPROVAL	SCALE 1/1
			MIT APPROVAL	WT
				SHEET 2 OF 2

2018605 BJ

3/2018605

2018602

WIRING LEGEND

COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

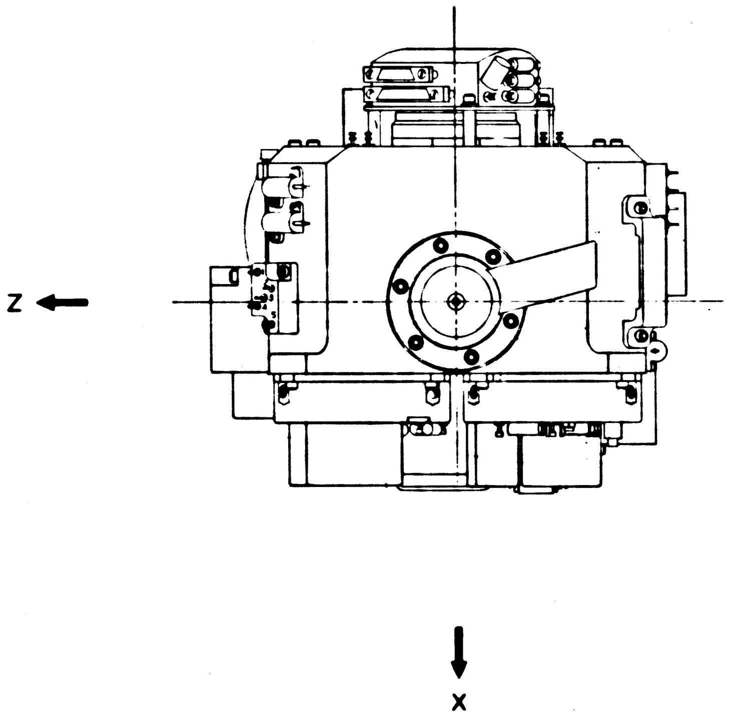
TABLE I

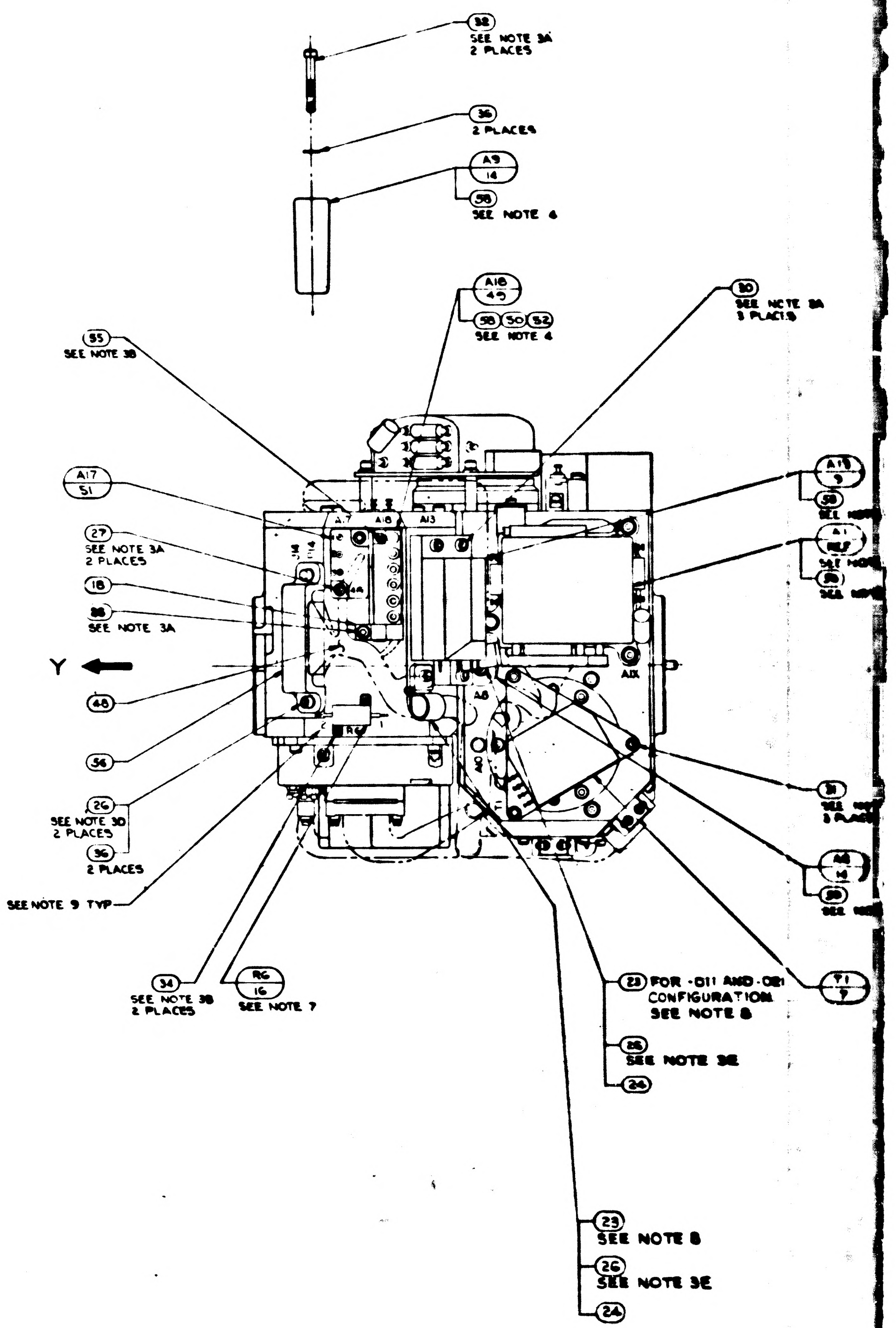
CABLE CLAMP (23)	
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-386	1020
-248	37.4	1010928-[illegible]	1430
1010928-251	40.2	1010928-354	475
		1010928-358	523
		1010928-365	619




32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
58
SEE NOTE 4
A18
49
58
50
52
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
55
SEE NOTE 3B
A17
51
A7
A18
A13
27
SEE NOTE 3A
2 PLACES
18
38
SEE NOTE 3A
Y
48
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
A8
A1X
A19
9
58
A1
A6
14
T1
9
23
FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
26
SEE NOTE 3E
24
23
SEE NOTE 8
26
SEE NOTE 3E
24

NOTES:

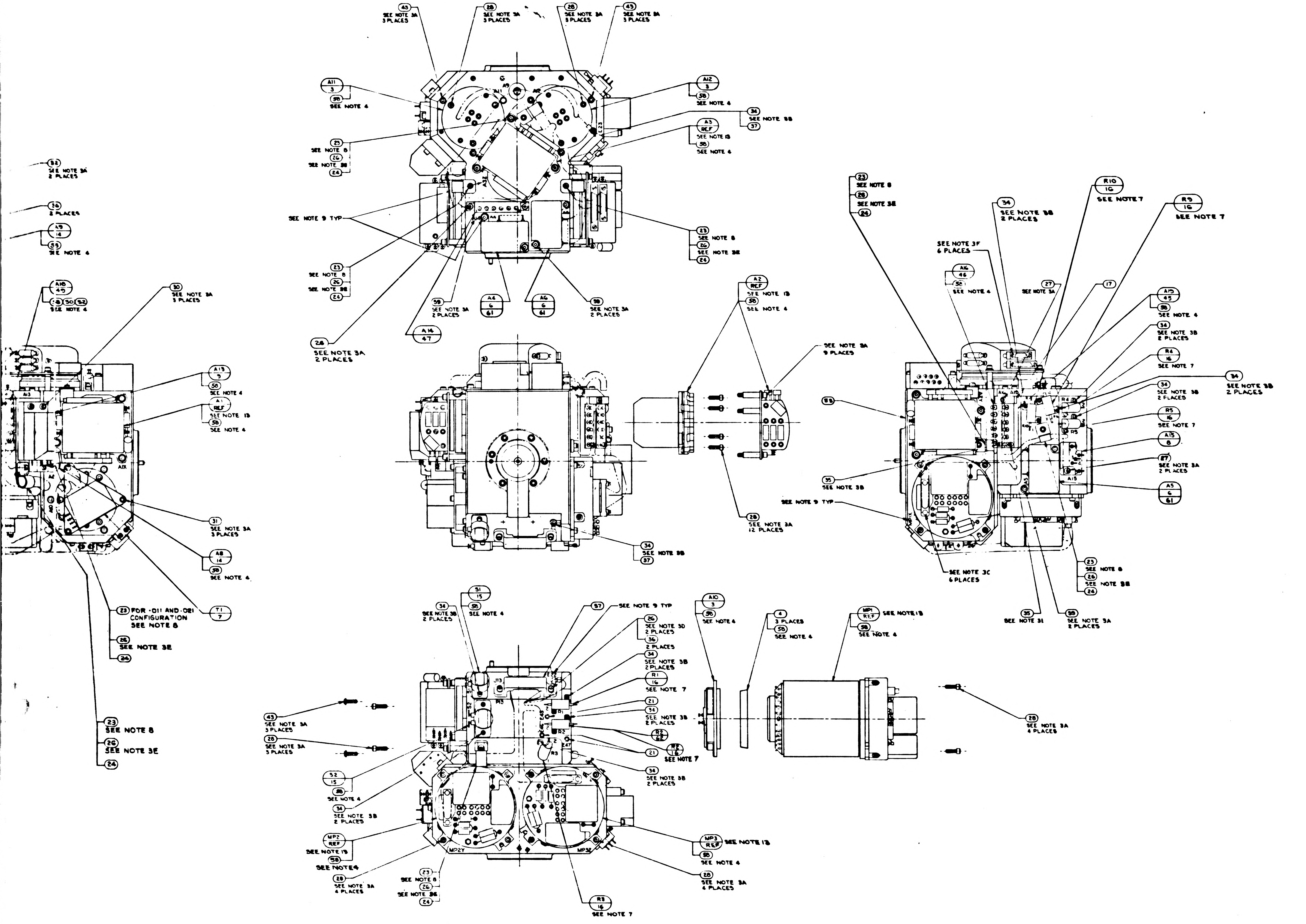
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 6.5 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.6 IN-LB
   - F. 1.5 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
4. APPLY A THIN FILM OF ITEM (38) OR (53) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14),(15),(45),(46),(47) AND (50), BETWEEN ITEM (2) AND ITEM (3). BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (49) AND ITEM (50)
5. SOLDER PER ND1002071, EXCEPT SEE NOTE 16.
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM (2) FOR-011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

15. FOR-031 ASSY. PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021. *FOR -041 & -051 ASSY(S), PIP PREAMP P/N 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021. IN THE A4 OR A5 POSITION ONLY. PIP PREAMP P/N 2021269-031 MAY BE USED IN PLACE OF P/N 2007060-021 IN THE A6 POSITION ONLY.*
16. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.
17. REMOVE .24-.26 FROM ALL UNTERMINATED LEADS OF ITEM (63); RESTRIP AND TIN PER 2021397; SOLDER PER ND1002071.

2018605	REV BK	SHEET 1

1/2018605



43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3 58 SEE NOTE 4
A12 3 58 SEE NOTE 4
34 SEE NOTE 3B 37
A3 REF SEE NOTE 13 58 SEE NOTE 4
25 SEE NOTE 8 26 SEE NOTE 3B 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3E 24
23 SEE NOTE 8 26 SEE NOTE 3E 24
39 SEE NOTE 3A 2 PLACES
A6 6 61
A6 6 61
39 SEE NOTE 3A 2 PLACES
A14 47
28 SEE NOTE 3A 2 PLACES
32 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14 59 SEE NOTE 4
A16 45 48 50 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9 50 SEE NOTE 4
A1 REF SEE NOTE 13 58 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14 59 SEE NOTE 4
23 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
25 SEE NOTE 3E
24
T1 7
23 SEE NOTE 8
26 SEE NOTE 3E
24
34 SEE NOTE 3B 37
A2 REF SEE NOTE 13 58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
34 SEE NOTE 3B 2 PLACES
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
SEE NOTE 3F 6 PLACES
A16 46 58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
55
35 SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
35 SEE NOTE 31
39 SEE NOTE 3A 2 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
S1 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
36 SEE NOTE 3B 2 PLACES
R2 62
21
R3 16 SEE NOTE 7
36 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15 58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3E 24
R8 16 SEE NOTE 7
MP3 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3 58 SEE NOTE 4
4 3 PLACES 58 SEE NOTE 4
MP1 REF SEE NOTE 13 58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP2Y
MP3Y
J13
A13
A15
5
4
3
2

SEE NOTE 17

1	–	–	–	–
–	1	1	–	–
–	–	1	1	1
–	–	3	3	3
AR	AR	AR	A/R	A/R
–	6	6	6	6
–	AR	AR	A/R	A/R
1	1	1	1	1
1	1	1	1	1
–	1	1	1	1
1	–	–	–	–
–	1	1	1	1
–	1	1	1	1
–	1	1	1	1
–	1	1	1	1
–	1	1	1	1
–	–	–	1	1
–	1	1	1	1
–	1	1	1	1
9	9	9	9	9
AR	AR	AR	A/R	A/R
AR	–	–	–	–
2	2	2	2	2
6	6	6	6	6
3	2	2	2	2
18	22	22	22	22
8	2	2	2	2
3	3	3	3	3
3	3	3	3	3
33	33	33	33	33
5	7	7	7	7
12	15	14	14	14
1	–	–	–	–
8	8	7	7	7
8	8	7	7	7
–	–	–	–	–
3	3	3	3	3
1	1	1	1	1
1	1	1	1	1
5	8	7	7	–
2	2	2	2	2
2	2	2	2	2
1	–	–	–	–
1	–	–	–	–
1	–	–	–	–
	–	–	–	–
				1
				1
			1	1
3	3	–	–	–
3	3	3	3	3
3	3	3	3	3
	–	–	–	–
QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD
07	06	05	04	03

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

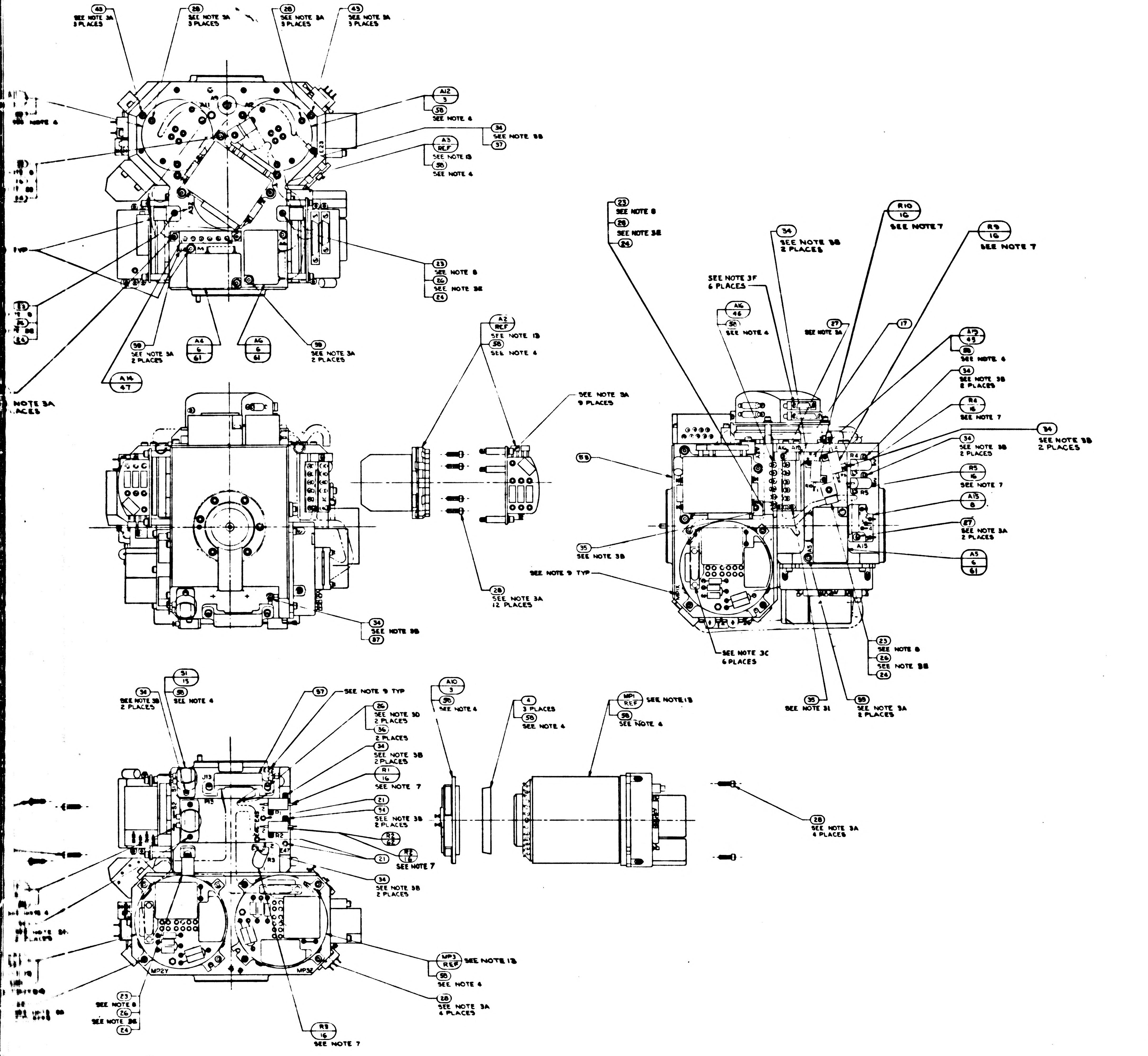
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS
± ±
DO NOT SCALE THIS DRAWING
MATERIAL

HEAT TREATMENT

FINAL FINISH

2018605 REV BK SHEET 1

2/2018605



REV	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 17755		
AX	REPLACES REV AX WITHOUT CHANGE PER TDRR 33582	MAY 67	EF
AY	REVISED PER TDRR 33712	AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ
BA	REVISED PER TDRR 34021	8 AUG 67	JJJ
BB	REVISED PER TDRR 34724	2 OCT 67	GC
BC	REVISED PER TDRR 34725	67	
BD	REVISED PER TDRR 34726	26 OCT 67	JRK
BE	REVISED PER TDRR 34727	13 NOV 67	JRK
BF	REVISED PER TDRR 3479	21 NOV 67	
BG	REVISED PER TDRR 35724	29 FEB 68	
BH	REVISED PER TDRR 36007	JAN 68	LR
BJ	REVISED PER TDRR 36230	20 MAY 68	
BK	REVISED PER TDRR 36385	68	

QTY REQD 071	QTY REQD 061	QTY REQD 051	QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	–	–	–	–	–	–	2021401	WIRING HARNESS "A", STABLE MEM	64
–	1	1	–	–	–	–	2021397	WIRING HARNESS "A", STABLE MEM	63
–	–	1	1	1	–	–	1010928-184	RESISTOR, R2	62
–	–	3	3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
AR	AR	AR	A/R	A/R	A/R	A/R	MIL I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
–	6	6	6	6	6	–	1001488-9	SCREW, HEX, SOC HD SELF-LOCKING	59
–	AR	AR	A/R	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	1	1	1	2018838	BRACKET, CONN 34 PIN	57
1	1	1	1	1	1	1	2018837	BRACKET, CONN 44 PIN	56
–	1	1	1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
1	–	–	–	–	–	1	1010928-206	RESISTOR FIXED	54
–	1	1	1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
–	1	1	1	1	1	–	2018830	SHIELD THERMOSTAT	52
–	1	1	1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
–	1	1	1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
–	1	1	1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
–	–	–	1	1	1	–	2018828	WIRING HARNESS "A" STABLE MEMBER	48
–	1	1	1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
–	1	1	1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
–	1	1	1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC., SELF-LOCKING	43
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
AR	–	–	–	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	2	2	2	2	2	3	1011625-11	SCREW, HEX, SOC HD., SELF-LOCKING	35
18	22	22	22	22	22	18	1011625-9	SCREW, HEX., SOC HD., SELF-LOCKING	34
8	2	2	2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	7	7	7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	15	14	14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	–	–	–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	7	7	7	8	8	1000223	WASHER, CABLE CLAMP	24
8	8	7	7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	1	1	1	2018776	CLAMP, THERMOSTAT	17
5	8	7	7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	2	2	2	1001486	THERMOSTAT, SAFETY	15
2	2	2	2	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
1	–	–	–	–	–	1	2018637	THERMO & HTR ASS'Y. TEMP CONTROL	13
1	–	–	–	–	–	1	2018686	THERMO ASS'Y TEMP ALARM	12
1	–	–	–	–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	–	–	–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	1	1	1	1	2007064-011	TEMP CONTROL MODULE ASS'Y.	9
1	1	1	1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	–	–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
1	–	–	–	–	–	1	2018750	HOUSING STABLE MEMBER	1

LIST OF MATERIALS

NEXT ASSY	USED ON
2018604	DL 2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Nov 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Nov 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

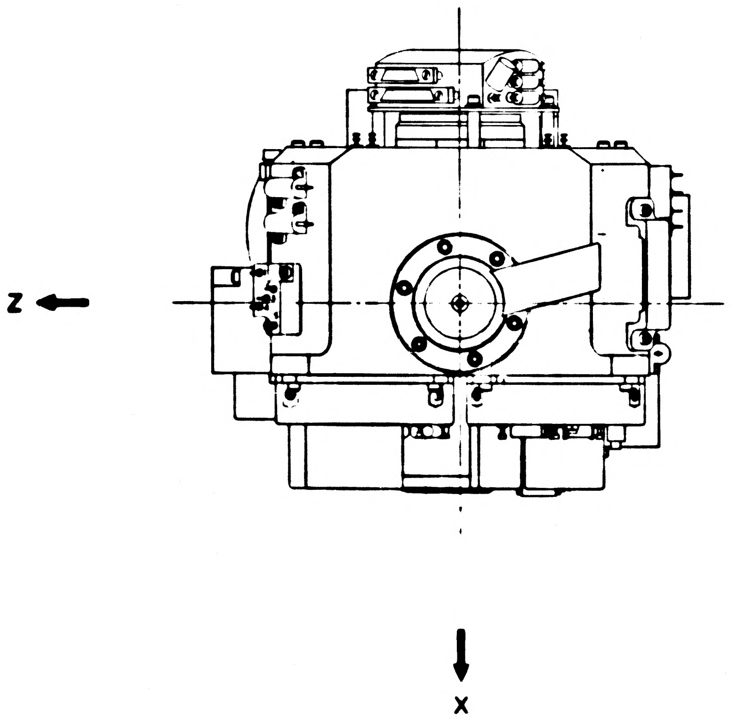
STABLE MEMBER ASSEMBLY

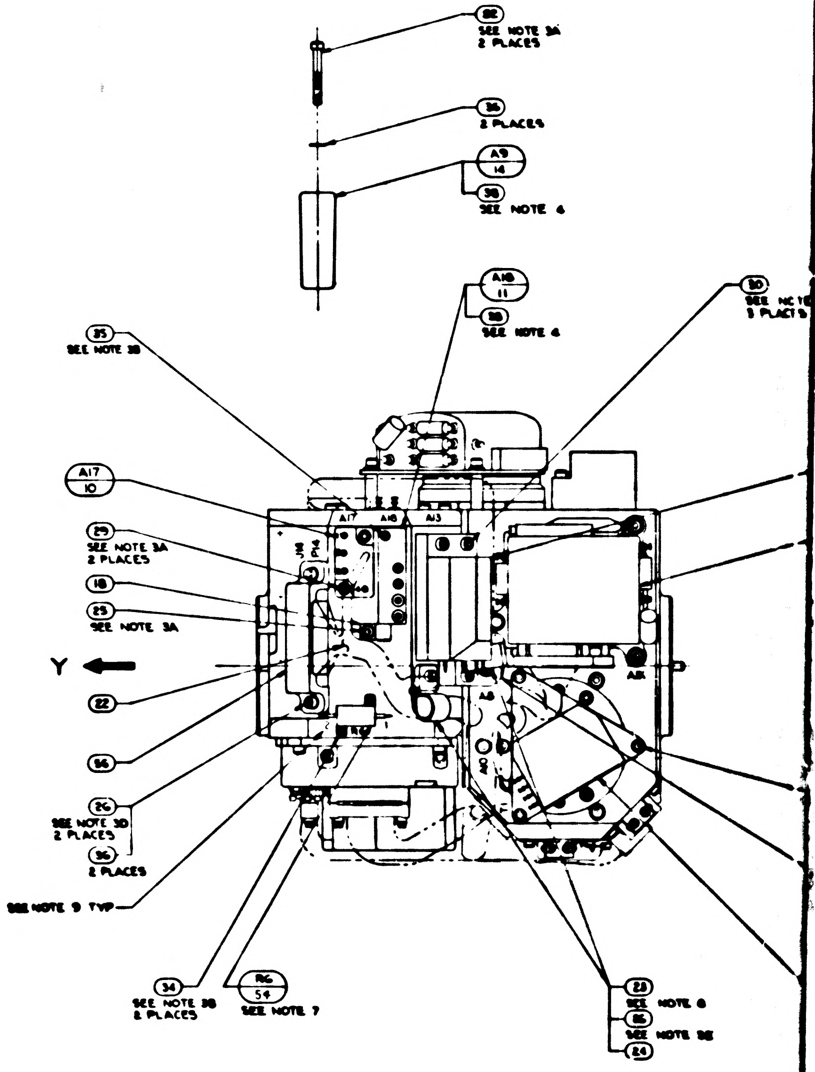
CODE IDENT NO 80230
SIZE J3
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 UK

18605 REV BK SHEET 1

3/2018605

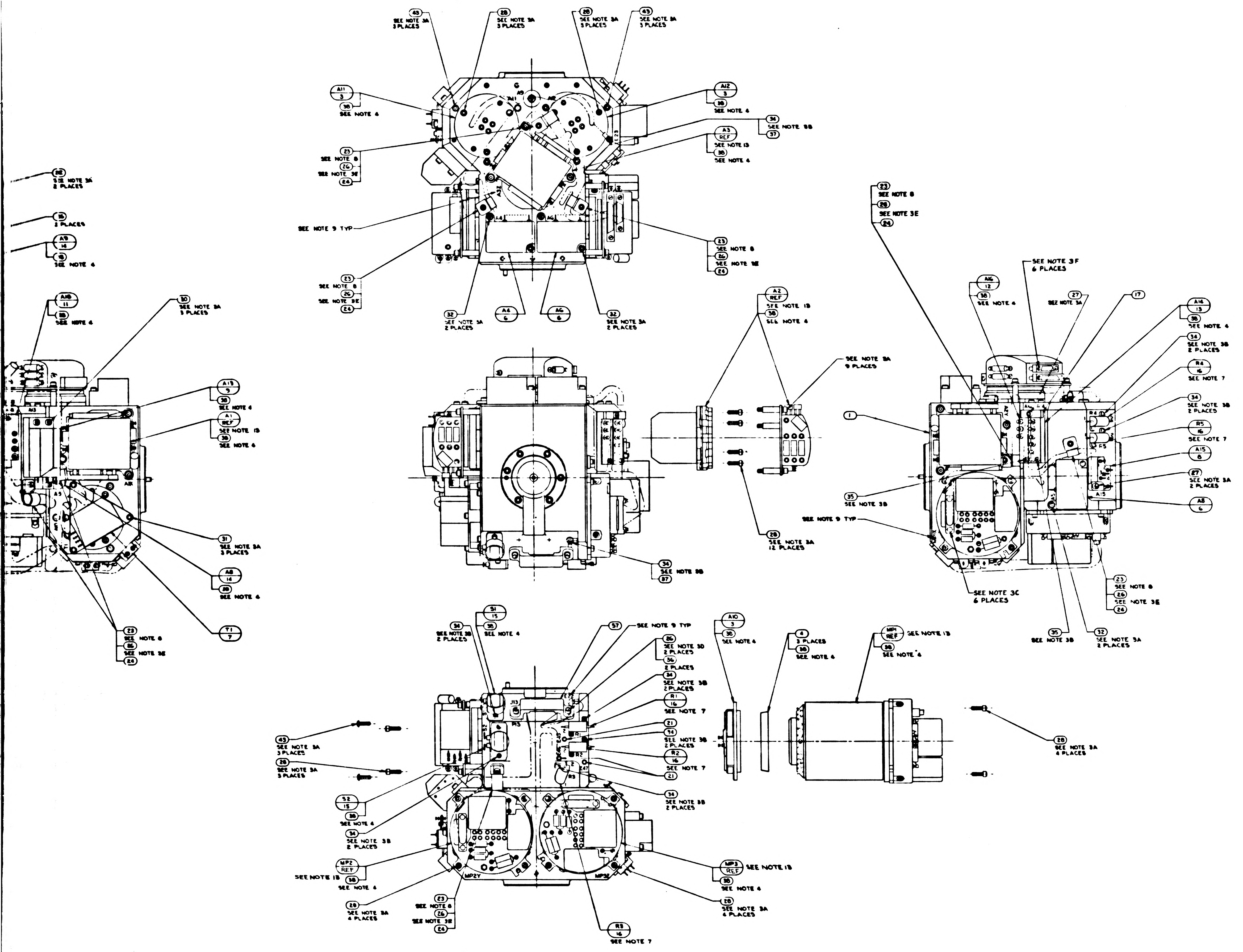



32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
38
SEE NOTE 4
A16
11
38
SEE NOTE 4
30
SEE NOTE
3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
RG
54
SEE NOTE 7
23
SEE NOTE 8
35
SEE NOTE 3E
24
A17
A16
A13
A8
A1R

NOTES:

1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

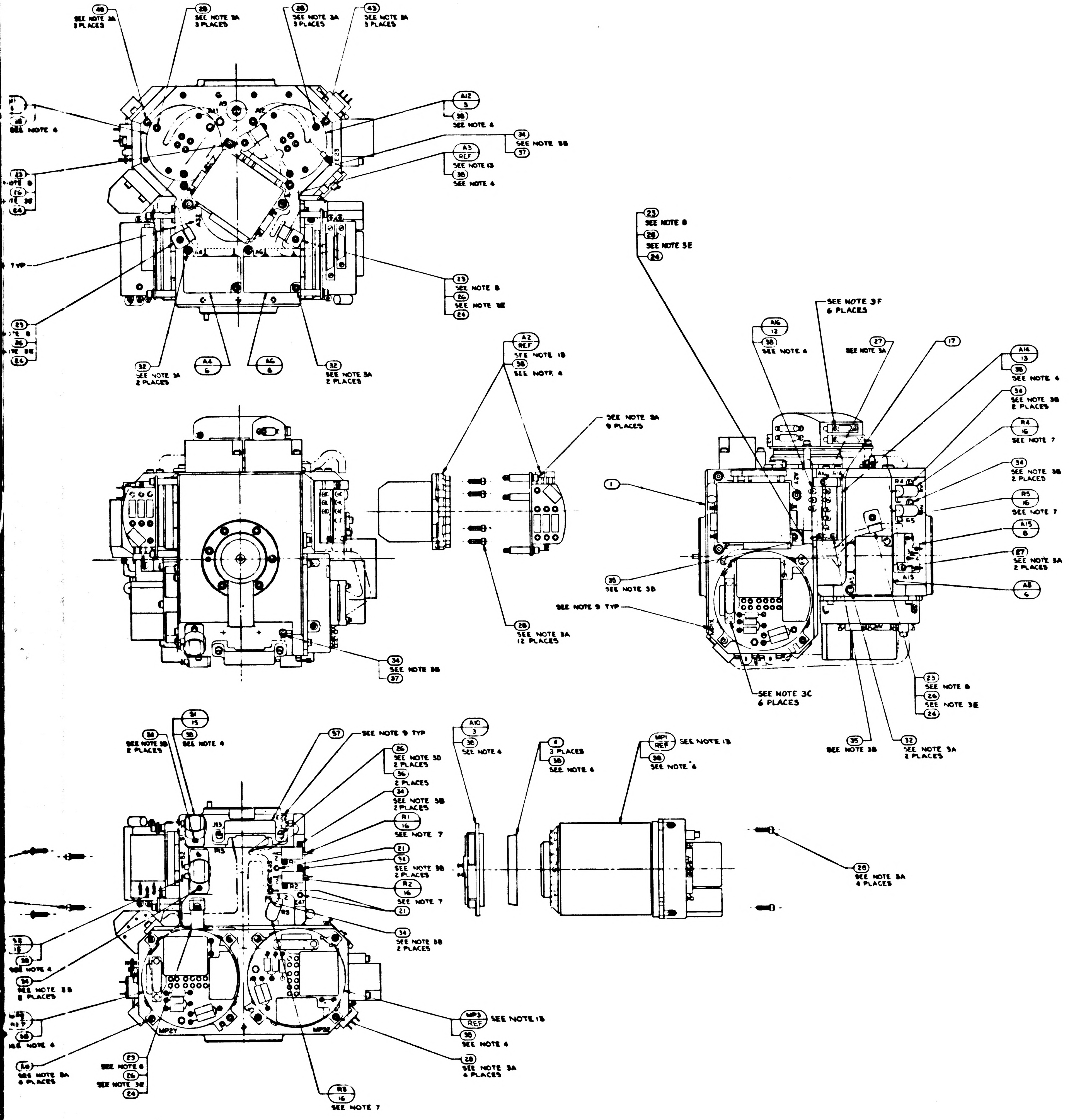
3H


5
4
3
2
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A9
A11
A12
A32
A4
A6
E23
32 SEE NOTE 3A 2 PLACES
35 2 PLACES
A9 14
18 SEE NOTE 4
A10 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 REF SEE NOTE 13
38 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
28 SEE NOTE 8
26 SEE NOTE 3E
24
A13
A5
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
28 SEE NOTE 3E
24
SEE NOTE 3F 6 PLACES
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
A2Y
A15
R4
R5
S1 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
E22
E45
E47
R1
R2
R3
MP2Y
MP3Z
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

-011 CON

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	DL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

DRAWN
CHECKED
APPROVAL
APPROVAL



(40) SEE NOTE 3A 3 PLACES
(28) SEE NOTE 3A 3 PLACES
(28) SEE NOTE 3A 3 PLACES
(43) SEE NOTE 3A 3 PLACES
A12 3
(38) SEE NOTE 4
(34) SEE NOTE 3B (37)
A3 REF SEE NOTE 13
(38) SEE NOTE 4
SEE NOTE 4
TYP
(23) SEE NOTE 8
(26) SEE NOTE 3E
(24)
(32) SEE NOTE 3A 2 PLACES
A4 6
A6 6
(32) SEE NOTE 3A 2 PLACES
A2 REF SEE NOTE 13
(38) SEE NOTE 4
SEE NOTE 3A 9 PLACES
(28) SEE NOTE 3A 12 PLACES
(34) SEE NOTE 3B
(37)
(23) SEE NOTE 8
(28) SEE NOTE 3E
(24)
SEE NOTE 3F 6 PLACES
A16 12
(38) SEE NOTE 4
(27) SEE NOTE 3A
(17)
A14 13
(38) SEE NOTE 4
(34) SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
(34) SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
(27) SEE NOTE 3A 2 PLACES
A8 6
(1)
(35) SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
(23) SEE NOTE 8
(26) SEE NOTE 3E
(24)
(35) SEE NOTE 3B
(32) SEE NOTE 3A 2 PLACES
(34) SEE NOTE 3B 2 PLACES
91 15
(38) SEE NOTE 4
(57) SEE NOTE 9 TYP
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
(34) SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
(21)
(94) SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
(21)
(34) SEE NOTE 3B 2 PLACES
A10 3
(38) SEE NOTE 4
(4) 3 PLACES
(38) SEE NOTE 4
MP1 REF SEE NOTE 13
(38) SEE NOTE 4
(28) SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
(38) SEE NOTE 4
(28) SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7
(23) SEE NOTE 8
(26) SEE NOTE 3E
(24)
(40) SEE NOTE 3A 6 PLACES
(38) SEE NOTE 4
(34) SEE NOTE 3B 2 PLACES
A1 A2 A9 A12 A4 A6 A2Y A15 F5 J13 E22 E47 R3 MP2Y MP3Z

-011 CONFIGURATION

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	6 MAY 67	
	AY	REVISION STATUS CHANGED	AUG 67	
	AZ	REVISION STATUS CHANGED	8 AUG 67	JJJ JAC
	BA	REVISION STATUS CHANGED	9 AUG 67	JJJ
	BB	REVISION STATUS CHANGED	2 OCT 67	GD
	BC	REVISED PER TDRR 34725	17 OCT 67	JSM RWM
	BD	REVISION STATUS CHANGED	26 OCT 67	JRK
	BE	REVISION STATUS CHANGED	19 NOV 67	JRK RWM
	BF	REVISION STATUS CHANGED	21 [illegible]	
	BG	REVISION STATUS CHANGED	23 FEB 68	
	BH	REVISED PER TDRR 36007	3 APR 68	
	BJ	REVISION STATUS CHANGED	30 MAY 68	RWM
	BK	REVISION STATUS CHANGED	[illegible] 68	

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
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NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 2018605
SCALE 1/1
WT
SHEET 2 OF 2

2018605 REV BK SHEET 2

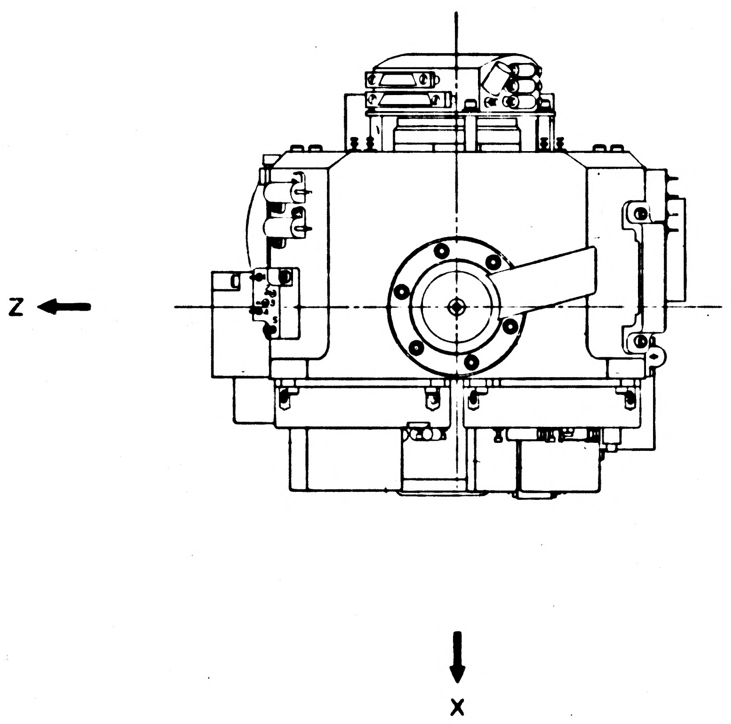
2018605 BK

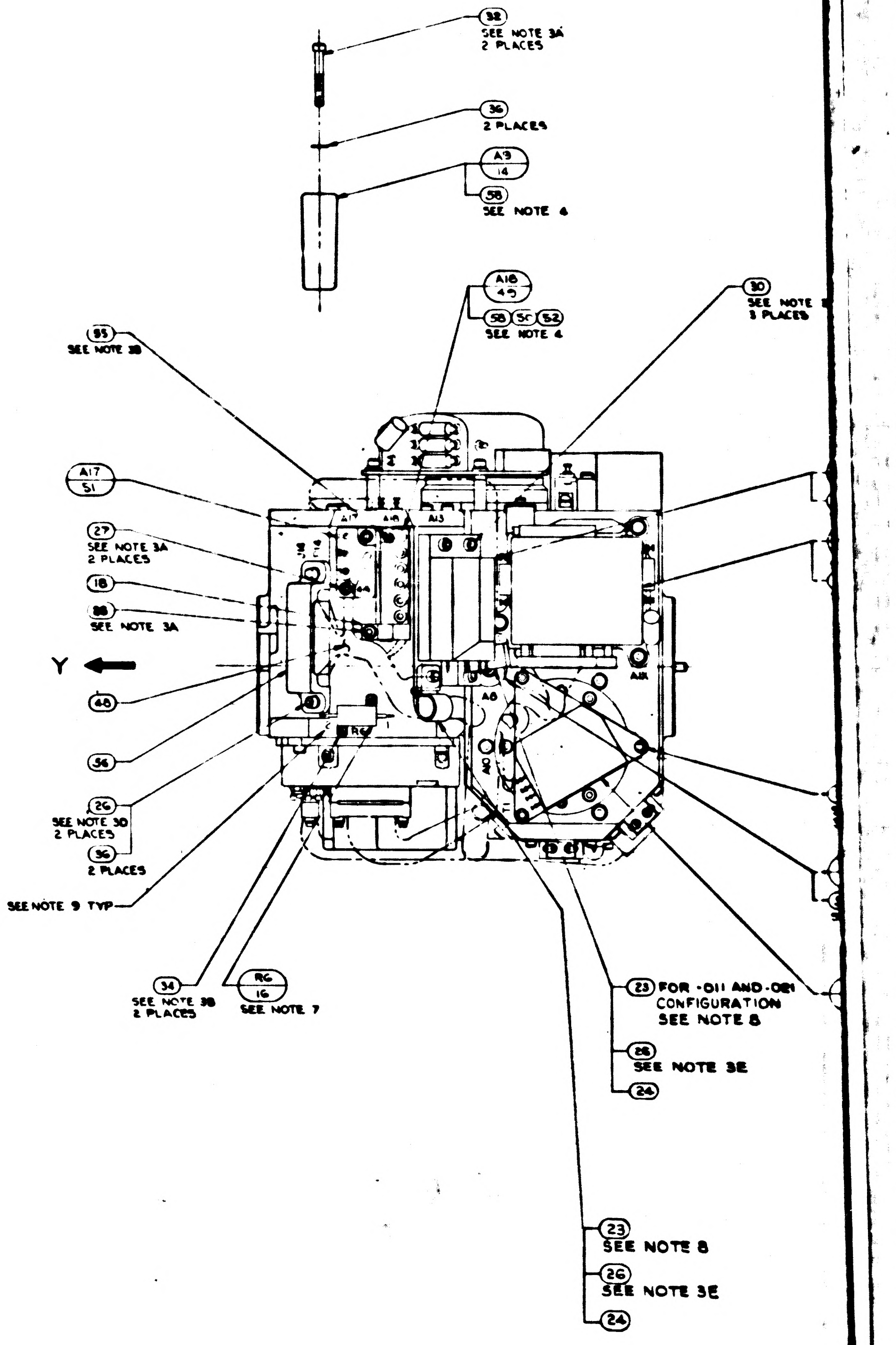
3/2018605

WIRING LEGEND				
COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I	
CABLE CLAMP (23)	
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II			
RESISTORS R1, R2, R3, R4, R5, R6, R9, & R10			
PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-386	1020
-248	37.4	1010928-400	1430
1010928-251	40.2	1010928-354	475
		1010928-358	523
		1010928-365	619





32
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
58
SEE NOTE 4
A18
49
58 50 52
SEE NOTE 4
30
SEE NOTE
3 PLACES
55
SEE NOTE 3B
A17
51
27
SEE NOTE 3A
2 PLACES
18
88
SEE NOTE 3A
Y
48
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
23 FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
26
SEE NOTE 3E
24
23
SEE NOTE 8
26
SEE NOTE 3E
24
A17
A18
A13
A8
A11
R6

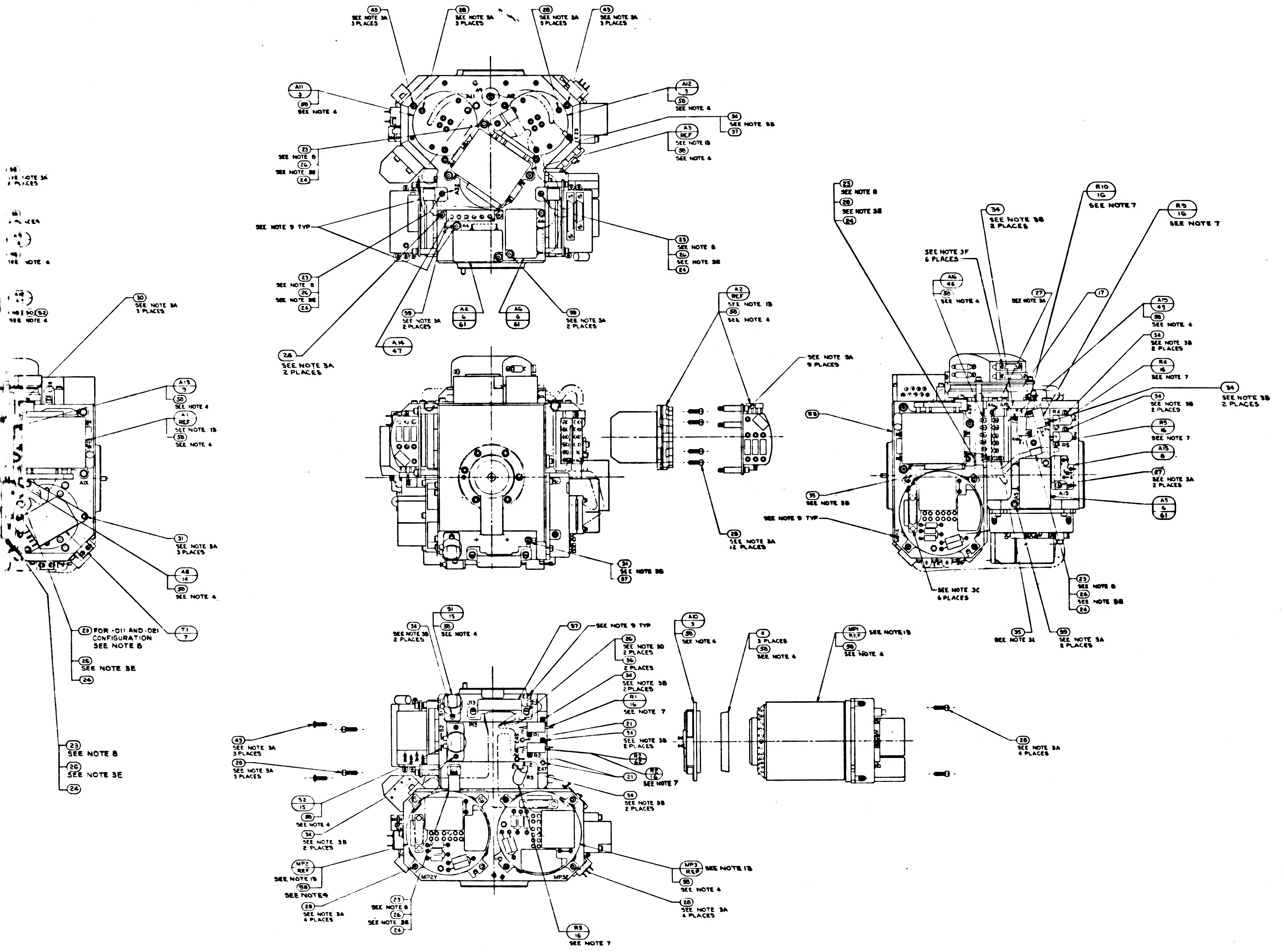
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 6.5 IN-LB
   B. 3.5 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   D. INSTALL FINGER TIGHT
   E. 6.5 IN-LB
   F. 1.5 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2), (3), (5), (9), (11), (12), (13), (14), (15), (45), (46), (47) AND (50), BETWEEN ITEM (2) AND ITEM (3). BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (49) AND ITEM (50)
5. SOLDER PER ND1002071, EXCEPT SEE NOTE 16.
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM (54) FOR -011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

15. FOR -031 ASSY, PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021. FOR -041 & -051 ASSY(S), PIP PREAMP P/N 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021. IN THE A4 OR A5 POSITION ONLY. PIP PREAMP P/N 2021269-031 MAY BE USED IN PLACE OF P/N 2007060-021 IN THE A6 POSITION ONLY.
16. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.
17. REMOVE .24-.26 FROM ALL UNTERMINATED LEADS OF ITEM (63); RESTRIP AND TIN PER 2021397; SOLDER PER ND1002071.

2018605 REV BL SHEET 1



5
4
3
2
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
58 SEE NOTE 4
A12 3
58 SEE NOTE 4
36 SEE NOTE 3B
37
A3 REF SEE NOTE 13
58 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3B
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3B
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A14 47
A6 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
28 SEE NOTE 3A 2 PLACES
30 SEE NOTE 3A 3 PLACES
A13 3
58 SEE NOTE 4
A1 REF SEE NOTE 13
58 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14
58 SEE NOTE 4
T1 7
23 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
28
SEE NOTE 3B
24
R10 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R9 16 SEE NOTE 7
SEE NOTE 3F 6 PLACES
A16 46
58 SEE NOTE 4
27 SEE NOTE 3A
17
A15 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
58
35 SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
35 SEE NOTE 3I
59 SEE NOTE 3A 2 PLACES
23 SEE NOTE 8
26 SEE NOTE 3B
24
34 SEE NOTE 3B 2 PLACES
51 15
58 SEE NOTE 4
37 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 62
R7 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
R3
MP2Y
MP3Z
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
52 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3B
24
R8 16 SEE NOTE 7
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 6 PLACES
5
4
3

SEE NOTE 17

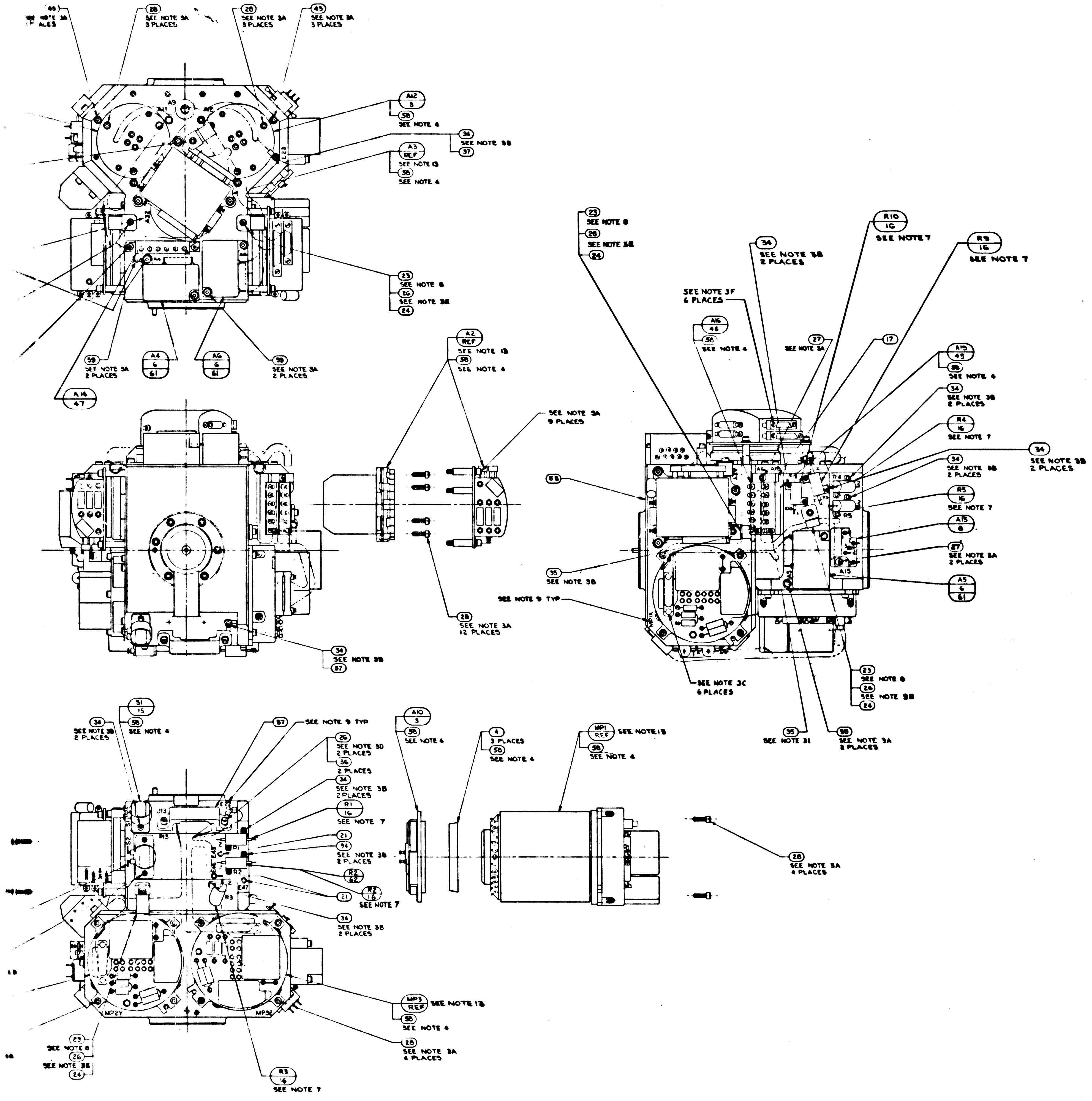
1	–	–	–	–	–
–	1	1	–	–	–
–	–	1	1	1	–
–	–	3	3	3	–
AR	AR	AR	A/R	A/R	A/R
	6	6	6	6	6
AR	AR	AR	A/R	A/R	A/R
1	1	1	1	1	1
1	1	1	1	1	1
–	1	1	1	1	1
1	–	–	–	–	–
–	1	1	1	1	1
–	1	1	1	1	1
–	1	1	1	1	1
–	1	1	1	1	1
–	1	1	1	1	1
–	–	–	1	1	1
–	1	1	1	1	1
–	1	1	1	1	1
–	1	1	1	1	1
9	9	9	9	9	9
AR	AR	AR	A/R	A/R	A/R
–	–	–	–	–	–
2	2	2	2	2	2
6	6	6	6	6	6
3	2	2	2	2	2
18	22	22	22	22	22
8	2	2	2	2	2
3	3	3	3	3	3
3	3	3	3	3	3
33	33	33	33	33	33
5	7	7	7	7	7
12	15	14	14	14	15
1	–	–	–	–	–
8	8	7	7	7	8
8	8	7	7	7	8
–	–	–	–	–	
3	3	3	3	3	3
1	1	1	1	1	1
1	1	1	1	1	1
5	8	–	7	–	8
2	2	2	2	2	2
2	2	2	2	2	2
1	–	–	–	–	–
	–	–	–	–	–
	–	–	–	–	–
	–	–	–	–	–
				1	1
				1	1
3	3	–	–	–	3
3	3	3	3	3	3
3	3	3	3	3	3
	–	–	–	–	–
QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD
-07	-06	-05	[illegible]	-031	-02

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

2018605 REV AL SHEET 1

2/2018605


4
3
2
1
D
C
B
A
A12 3
58 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
A14 47
A2 REF SEE NOTE 13
58 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
53
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
34 SEE NOTE 3B 2 PLACES
SEE NOTE 3F 6 PLACES
A16 46
56 SEE NOTE 4
27 SEE NOTE 3A
17
R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
A13 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
SEE NOTE 3C 6 PLACES
23 SEE NOTE 8
26 SEE NOTE 3B
24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
35 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 62
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3B
24
R3 16 SEE NOTE 7
J13
P13
MP2Y
MP3Y

SEE NOTE 17

REVISIONS TDRR 17755			
SYM	DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	
AY	REVISED PER TDRR 33712	AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	
BA	REVISED PER TDRR 34021	9 AUG 67	
BB	REVISED PER TDRR 34724	OCT 67	RWH
BC	REVISED PER TDRR 34725	27 OCT 67	RWH
BD	REVISED PER TDRR 34726	26 OCT 67	RK
BE	REVISED PER TDRR 34727	13 NOV 67	RK RWH
BF	REVISED PER TDRR 3479		
BG	REVISED PER TDRR 35724	29 FEB 68	
BH	REVISED PER TDRR 36007	AUG 68	
BJ	REVISED PER TDRR 36230	20 MAY 68	RWH
BK	REVISED PER TDRR 36385	68	
BL	REVISED PER TDRR 36973	6 NOV 68	

QTY REQD 071	QTY REQD 061	QTY REQD 051	QTY REQD 041	QTY REQD 031	QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	–	–	–	–	–	–	2021401	WIRING HARNESS "A", STABLE MEM	64
–	1	1	–	–	–	–	2021397	WIRING HARNESS "A", STABLE MEM	63
–	–	1	1	1	–	–	1010928-184	RESISTOR, R2	62
–	–	3	3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
–	6	6	6	6	6	–	1001488-9	SCREW, HEX, SOC. HD SELF-LOCKING	59
AR	AR	AR	A/R	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	1	1	1	2018838	BRACKET, CONN 34 PIN	57
1	1	1	1	1	1	1	2018837	BRACKET, CONN 44 PIN	56
–	1	1	1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
1	–	–	–	–	–	1	1010928-295	RESISTOR FIXED	54
–	1	1	1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
–	1	1	1	1	1	–	2018830	SHIELD THERMOSTAT	52
–	1	1	1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
–	1	1	1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
–	1	1	1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
–	–	–	1	1	1	–	2018828	WIRING HARNESS "A" STABLE MEMBER	48
–	1	1	1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
–	1	1	1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
–	1	1	1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC, SELF-LOCKING	43
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
–	–	–	–	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	2	2	2	2	2	3	1011625-11	SCREW, HEX, SOC. HD., SELF-LOCKING	35
18	22	22	22	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
8	2	2	2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	7	7	7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	15	14	14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	–	–	–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	7	7	7	8	8	1000223	WASHER, CABLE CLAMP	24
8	8	7	7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	1	1	1	2018776	CLAMP, THERMOSTAT	17
5	8	7	7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	2	2	2	1001465	THERMOSTAT, SAFETY	15
2	2	2	2	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
1	–	–	–	–	–	1	2018637	THERMO & HTR ASS'Y. TEMP CONTROL	13
1	–	–	–	–	–	1	2018636	THERMO. ASS'Y TEMP. ALARM	12
1	–	–	–	–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	–	–	–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	–	–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
1	–	–	–	–	–	1	2018750	HOUSING STABLE MEMBER	1

LIST OF MATERIALS

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

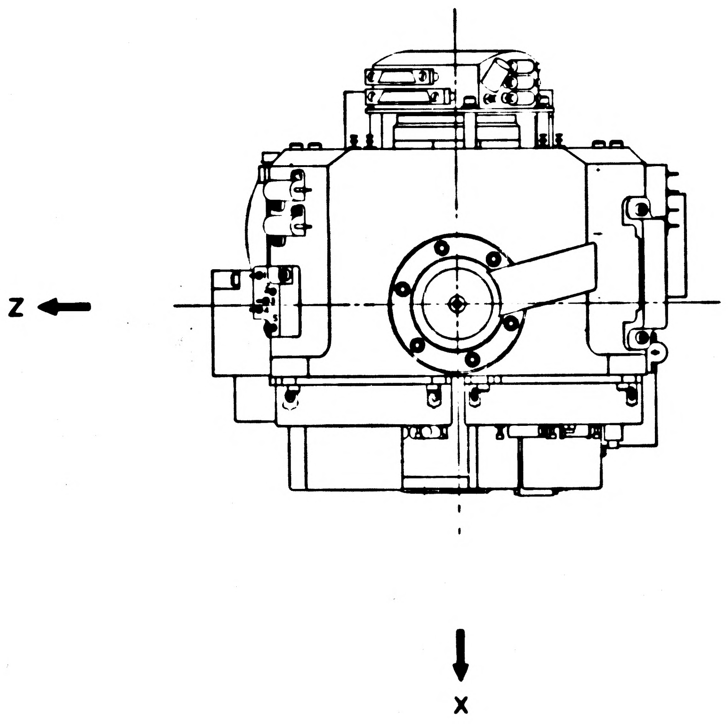
STABLE MEMBER ASSEMBLY

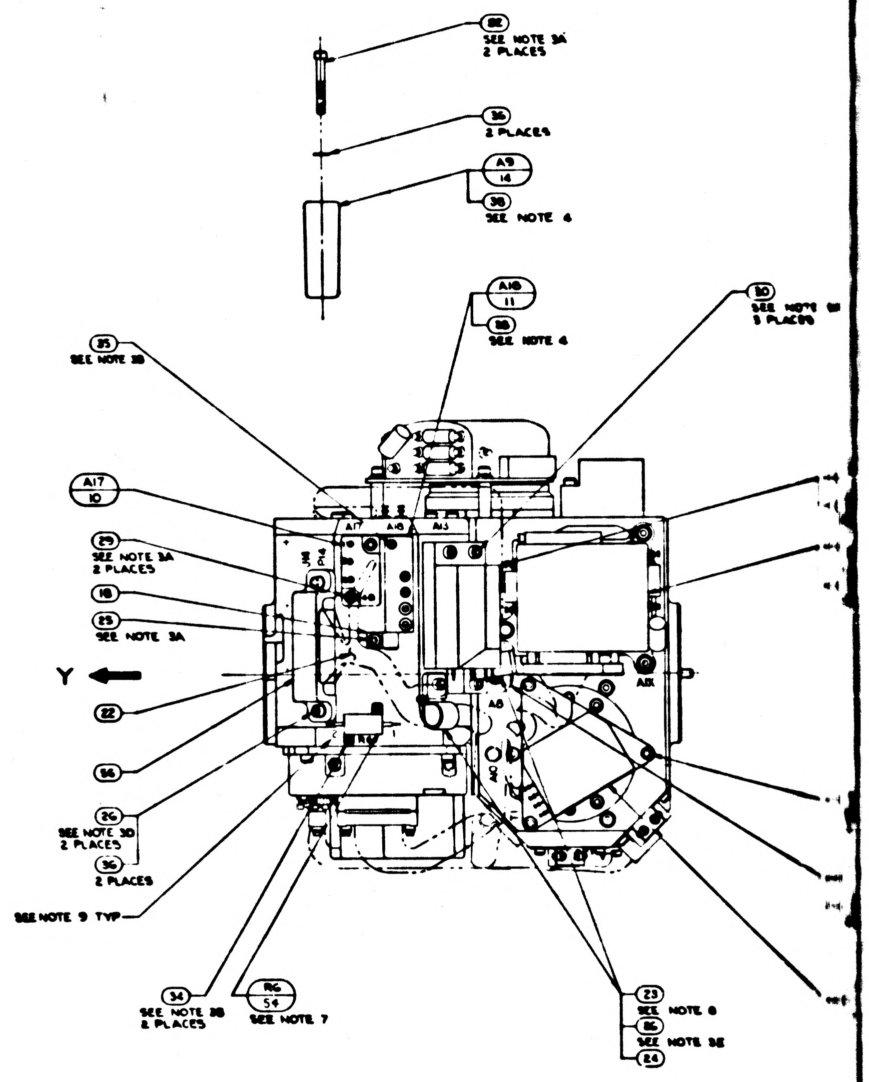
CODE IDENT NO 80230
SIZE J_3
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 BL

2018605 REV BL SHEET 1

3/4 2018605

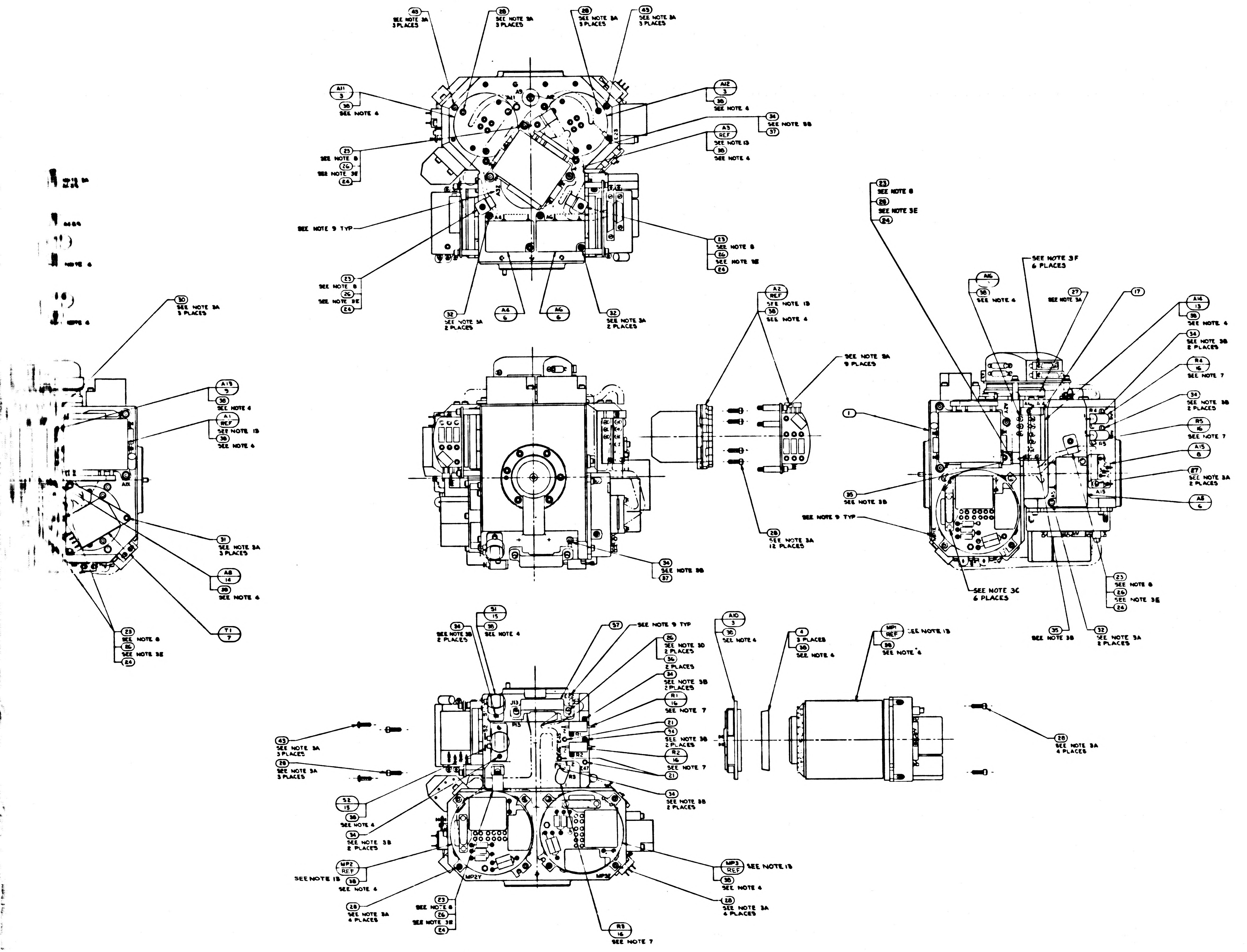



82
SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
38
SEE NOTE 4
A10
11
38
SEE NOTE 4
30
SEE NOTE 3B
3 PLACES
35
SEE NOTE 3B
A17
10
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
22
56
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
34
SEE NOTE 3B
2 PLACES
R6
54
SEE NOTE 7
23
SEE NOTE 8
86
SEE NOTE 3E
24
A17
A18
A13
A8
A1X

NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

2018605 SH 2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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3E
24
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A9
A11
A2
A32
A4
A6
E23
30 SEE NOTE 3A 3 PLACES
A13 9
38 SEE NOTE 4
A1 REF SEE NOTE 13
38 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
T1 7
23 SEE NOTE 8
26 SEE NOTE 3E
24
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
28 SEE NOTE 3E
24
SEE NOTE 3F 6 PLACES
A16
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
R4
R5
A15
A2Y
S1 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
S2
E22
R1
R2
R3
E47
MP2Y
MP3Z
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

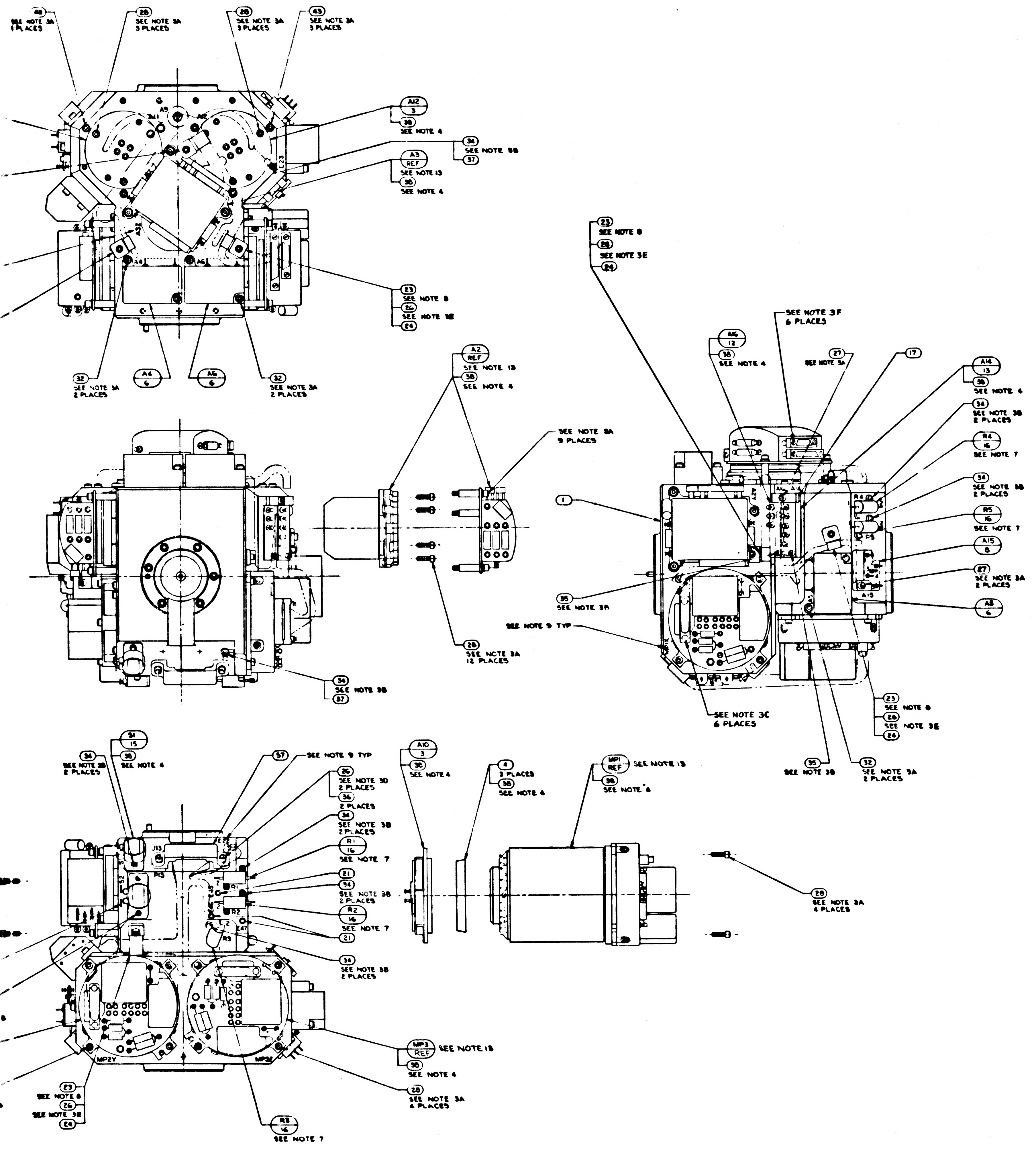
-011 CONF

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	UL 2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

	REV	SHEET
2018605	BL	C

2/2018605

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	5 MAY 67	
	AY	REVISION STATUS CHANGED	AUG 67	
	AZ	REVISION STATUS CHANGED	8 AUG 67	JAC
	BA	REVISION STATUS CHANGED	9 AUG 67	JJJ
	BB	REVISION STATUS CHANGED	2 OCT 67	GP
	BC	REVISED PER TDRR 34725	17 OCT 67	JSM
	BD	REVISION STATUS CHANGED	26 OCT 67	JRK
	BE	REVISION STATUS CHANGED	19 NOV 67	JRK
	BF	REVISION STATUS CHANGED	[illegible]	
	BG	REVISION STATUS CHANGED	23 [illegible] 68	
	BH	REVISED PER TDRR 36007	3 FEB 68	
	BJ	REVISION STATUS CHANGED	22 [illegible] 68	
	BK	REVISION STATUS CHANGED	12 [illegible] 68	
	BL	REVISION STATUS CHANGED	5 NOV 68	



4
3
2
1
D
C
B
A
48 SEE NOTE 3A 1 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A12 3
38 SEE NOTE 4
36 SEE NOTE 3B
37
A3 REF SEE NOTE 13
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3E
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 REF SEE NOTE 13
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
37
23 SEE NOTE 8
26 SEE NOTE 3E
24
SEE NOTE 3F 6 PLACES
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A8 6
1
35 SEE NOTE 3A
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
31 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
R3 16 SEE NOTE 7
MP2Y
MP3X
J13
P13

-011 CONFIGURATION

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL APPROVAL	STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO 80230 · SIZE J3 · NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	SCALE 1/1 · WT · SHEET 2 OF 2
APPLICATION				

2018605 BL

	REV	SHEET
2018605	BL	2

3/2018605

WIRING LEGEND

COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2	↑	↑
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3	↓	↓
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

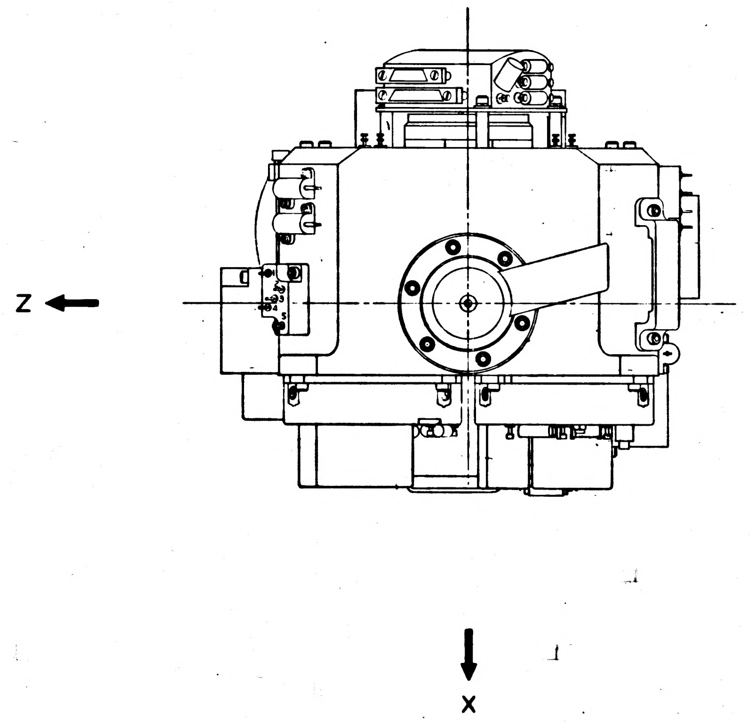
CABLE CLAMP ㉓

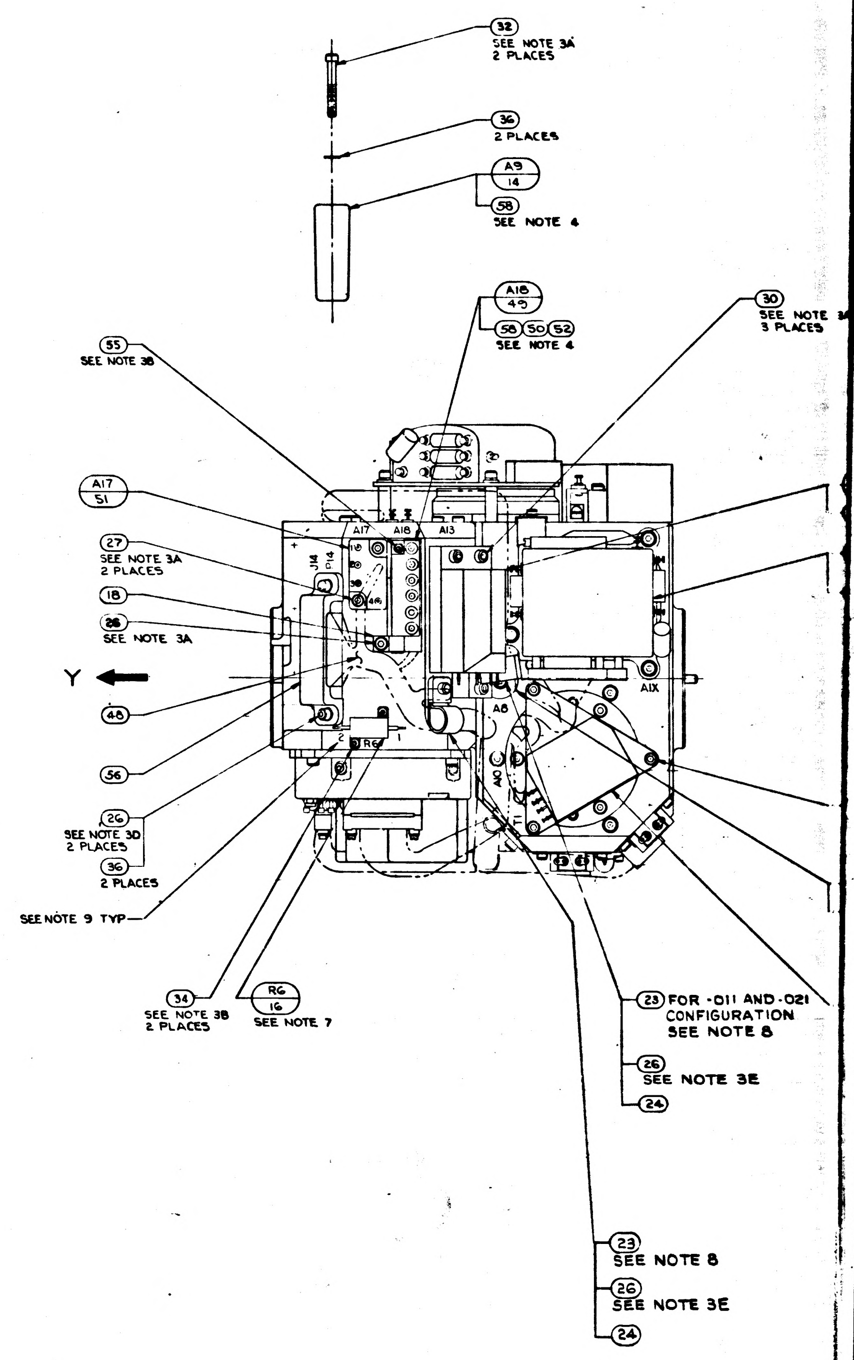
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1,R2,R3,R4,R5,R6,R9,&R10

PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-386	1020
-248	37.4	1010928 -400	1430
1010928 -251	40.2	1010928 -354	475
		1010928 -358	523
		1010928 -365	619





㉜ SEE NOTE 3A 2 PLACES
㊱ 2 PLACES
A9 14
(58) SEE NOTE 4
A18 ㊾
(58) ㊿ (52) SEE NOTE 4
㉚ SEE NOTE 3A 3 PLACES
(55) SEE NOTE 3B
A17 (51)
㉗ SEE NOTE 3A 2 PLACES
⑱
㉘ SEE NOTE 3A
Y
㊽
(56)
㉖ SEE NOTE 3D 2 PLACES
㊱ 2 PLACES
SEE NOTE 9 TYP
㉞ SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
A17
A18
A13
J14
P14
A8
A10
A1X
R6
㉓ FOR -011 AND -021 CONFIGURATION SEE NOTE 8
㉖ SEE NOTE 3E
㉔
㉓ SEE NOTE 8
㉖ SEE NOTE 3E
㉔

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3. SCREW TQROUE REQUIREMENTS ±7%
   - A. 6.5 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
   - F. 1.5 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
4. APPLY A THIN FILM OF ITEM ㊳ OR (58) TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ②,③,⑤,⑨,⑪,⑫,⑬,⑭,⑮,㊺,㊻,㊼ AND ㊿, BETWEEN ITEM ② AND ITEM ③. BETWEEN ITEM ③ AND ITEM ④ AND BETWEEN ITEM ㊾ AND ITEM ㊿
5. SOLDER PER ND1002071, EXCEPT SEE NOTE 16.
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\substack{.10\\.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM (54) FOR-011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.

15. FOR -031 ASSY, PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021. FOR -041 &-051 ASSY(S), PIP PREAMP P/N 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021. *IN THE A4 OR A5 POSITION ONLY. PIP PREAMP P/N 2021269-031 MAY BE USED IN PLACE OF P/N 2007060-021 IN THE A6 POSITION ONLY.*
16. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.
17. REMOVE .24-.26 FROM ALL UNTERMINATED LEADS OF ITEM (63); RESTRIP AND TIN PER 2021397; SOLDER PER ND 1002071.
18. REPLACE CAPTIVE SCREWS IN CONNECTORS P18, P19 AND P20 OF ITEM 63 WITH ITEM 65 PRIOR TO PIP INSTALLATION.

2018605 REV BM SHEET 1

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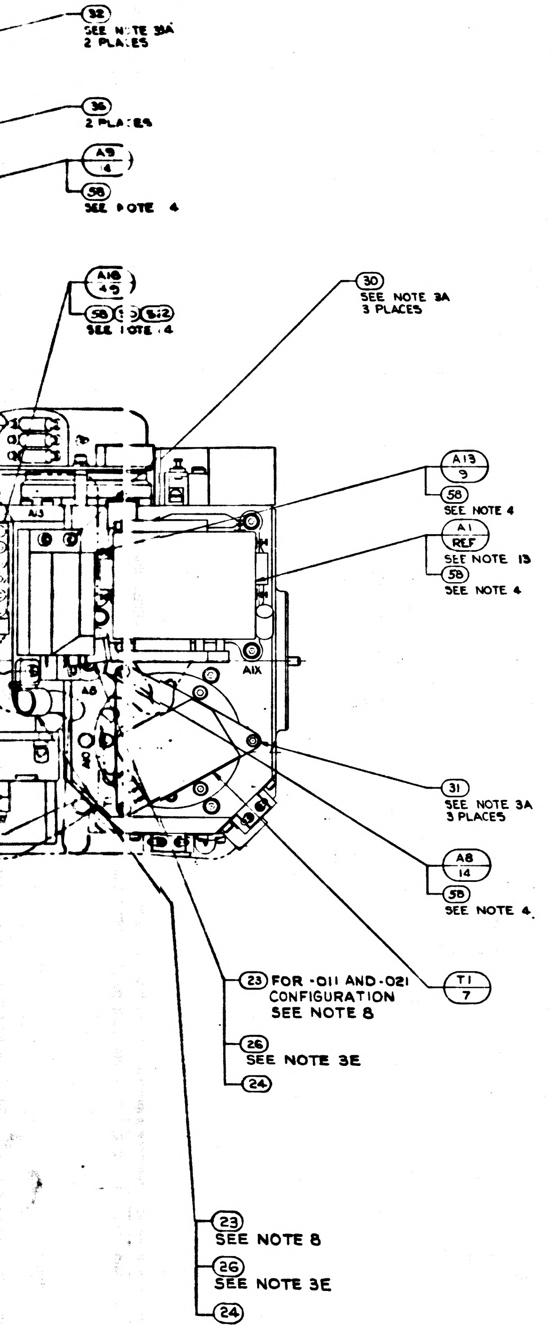
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3 PLACES
A13
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SEE NOTE 4
A1
REF
SEE NOTE 13
58
SEE NOTE 4
A3
A8
A1X
31
SEE NOTE 3A
3 PLACES
A8
14
58
SEE NOTE 4
T1
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23 FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
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SEE NOTE 3E
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SEE NOTE 8
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SEE NOTE 3E
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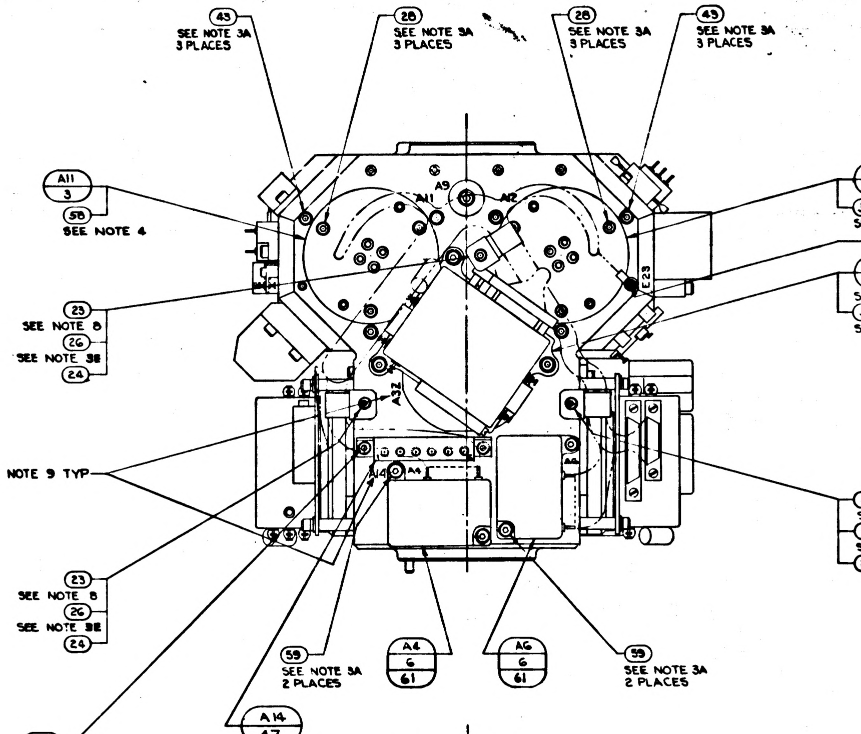
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3
58
SEE NOTE 4
A12
3
58
SEE NOTE 4
34
SEE NOTE 3B
37
A3
REF
SEE NOTE 13
58
SEE NOTE 4
A9
A11
A12
E23
A12
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SEE NOTE 8
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SEE NOTE 3E
24
SEE NOTE 9 TYP
A4
23
SEE NOTE 8
26
SEE NOTE 3E
24
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SEE NOTE 8
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SEE NOTE 3E
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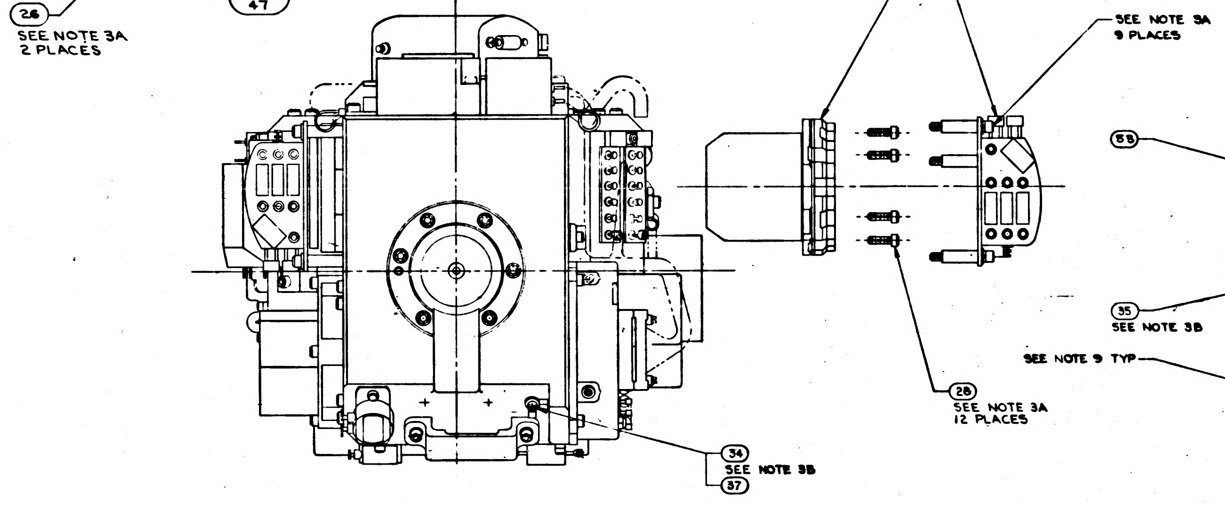
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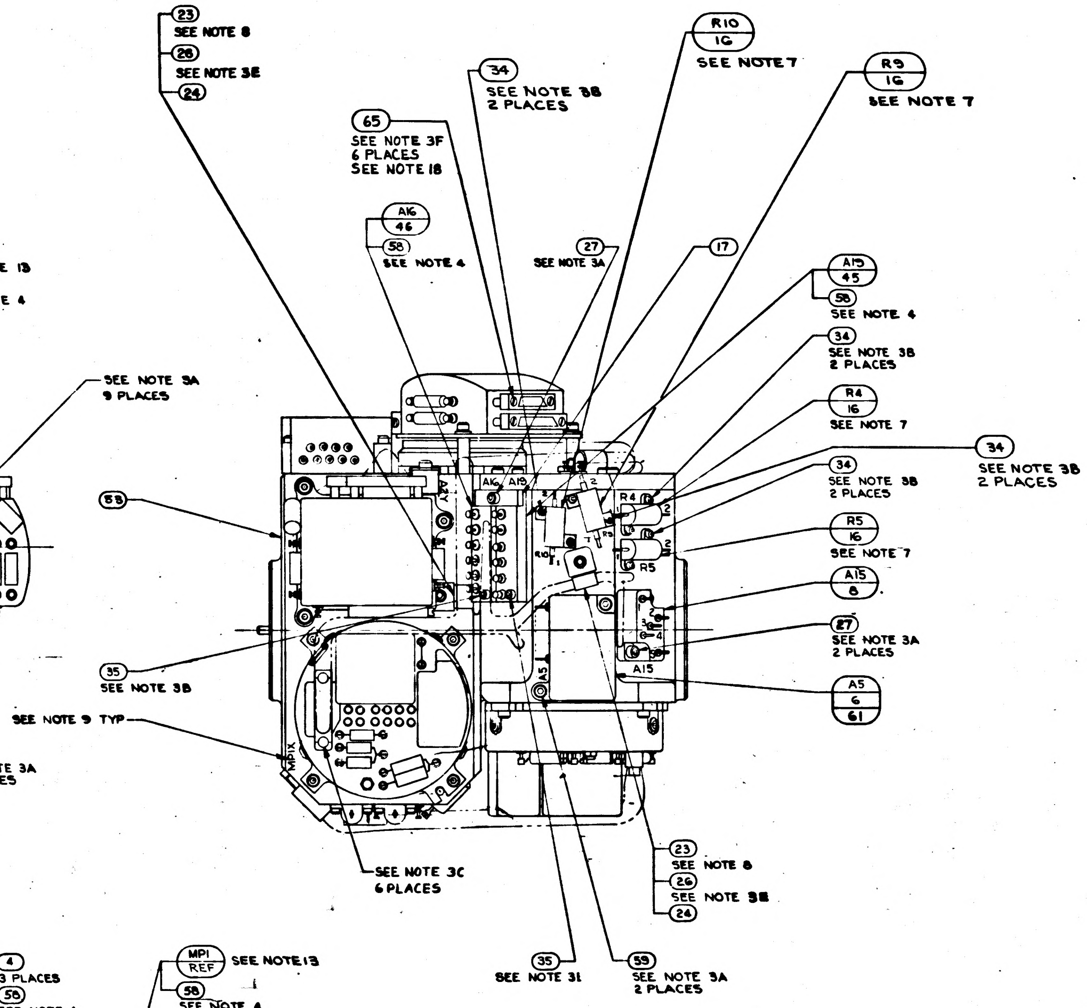
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R9
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SEE NOTE 3F
6 PLACES
SEE NOTE 18
A16
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SEE NOTE 4
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SEE NOTE 3A
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A19
45
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SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
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SEE NOTE 3B
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SEE NOTE 7
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A2Y
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A19
R4
R5
R9
R10
A15
A5
MP1X
35
SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C
6 PLACES
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SEE NOTE 8
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SEE NOTE 3E
24
35
SEE NOTE 31
59
SEE NOTE 3A
2 PLACES

SEE NOTE 17

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–	–	6	–	–	–	NAS135
1	–	–	–	–	–	20214
–	1	1	–	–	–	20213
–	–	1	1	1	–	101092
–	–	3	3	3	–	20070
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1	1	1	1	1	1	201883
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–	1	1	1	1	1	20188
–	1	1	1	1	1	20077
–	1	1	1	1	1	20188
–	1	1	1	1	1	20188
–	–	–	1	1	1	20188
–	1	1	1	1	1	20191
–	1	1	1	1	1	20182
–	1	1	1	1	1	20182
9	9	9	9	9	9	101089
AR	AR	AR	A/R	A/R	A/R	MIL-T
–	–	–	–	–	–	10064
2	2	2	2	2	2	MS157
6	6	6	6	6	6	MS157
3	2	2	2	2	2	101162
18	22	22	22	22	22	101162
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3	3	3	3	3	3	100144
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8	8	7	7	7	8	10000
–	–	–	–	–	–	2016
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2	2	2	2	2	2	10010
2	2	2	2	2	2	20184
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1	–	–	–	–	–	20186
1	–	–	–	–	–	2018
1	–	–	–	–	–	2007
1				1	1	2007
	1	1		1	1	2007
			1	1	1	2007
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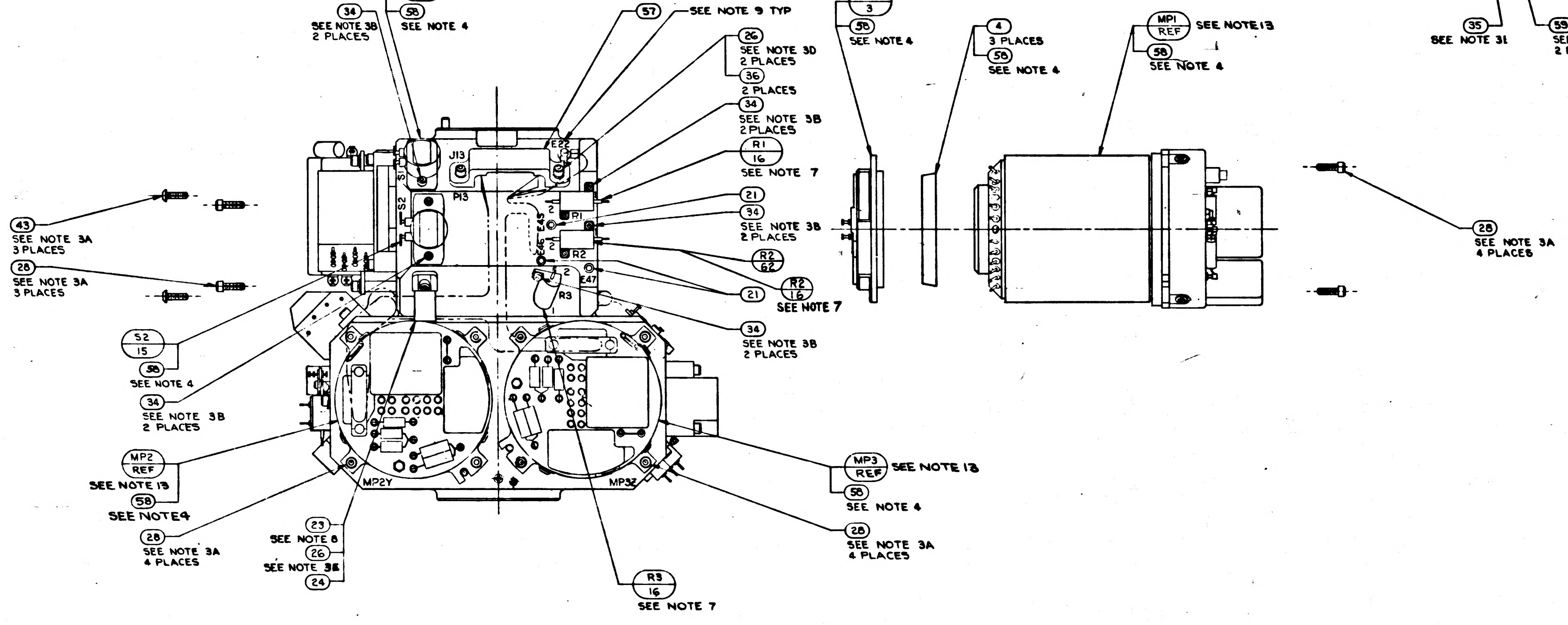
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SEE NOTE 3B
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SEE NOTE 3B
2 PLACES
R1
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
R2
62
R2
16
SEE NOTE 7
21
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SEE NOTE 3B
2 PLACES
J13
S1
S2
P13
E22
R1
R2
R3
E47
MP2Y
MP3Z
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SEE NOTE 3A
3 PLACES
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3 PLACES
S2
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SEE NOTE 4
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MP2
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SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 8
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SEE NOTE 3E
24
R3
16
SEE NOTE 7
MP3
REF
SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
A10
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58
SEE NOTE 4
4
3 PLACES
58
SEE NOTE 4
MP1
REF
SEE NOTE 13
58
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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NEXT ASSY	USED ON
2018604	DL2018601

APPLICATION

2018605 REV BM SHEET 1

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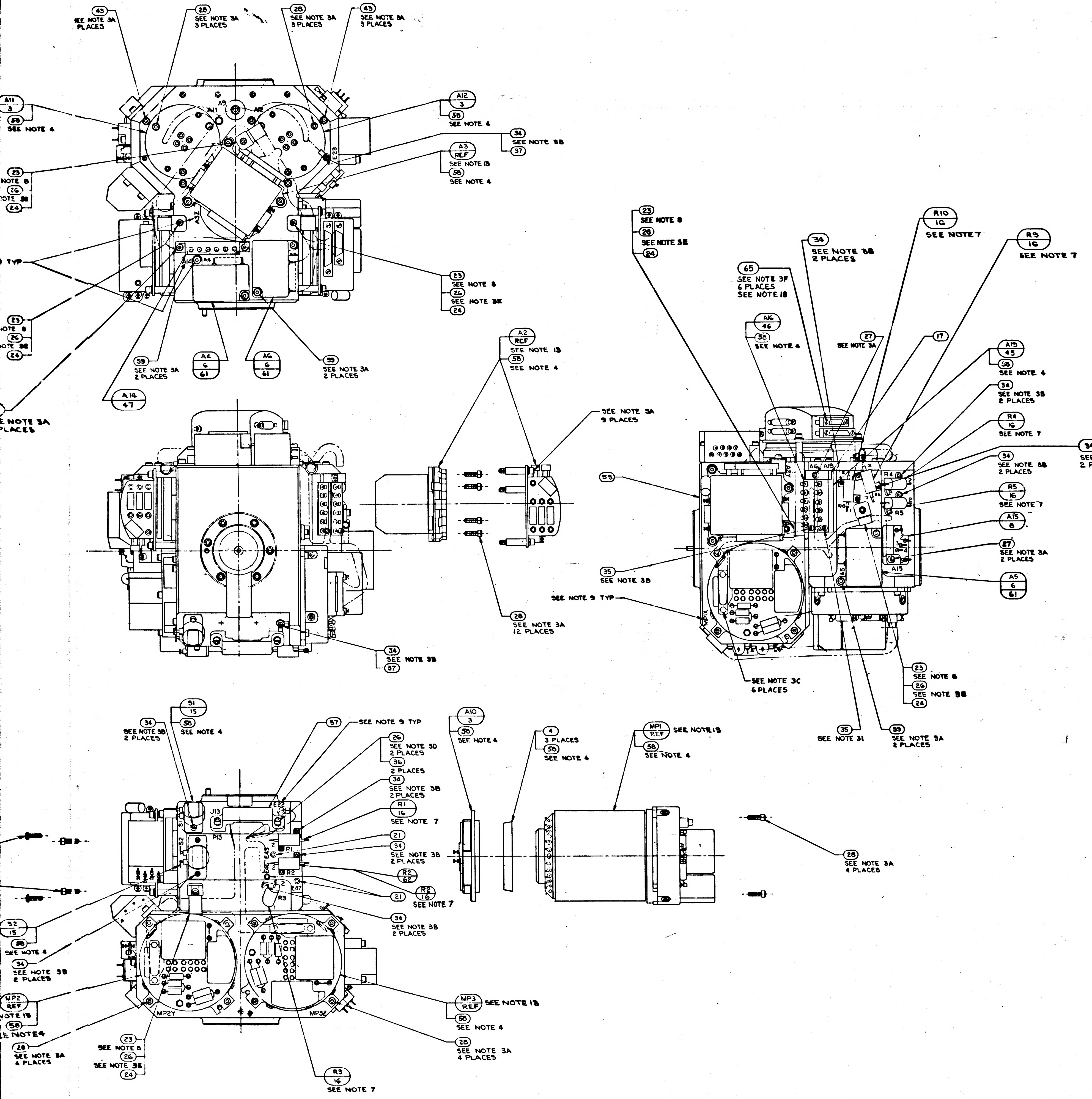
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58 SEE NOTE 13
58 SEE NOTE 4
23 NOTE 8
26 NOTE 3E
24
9 TYP
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26 SEE NOTE 3E
24
59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
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A14 47
SEE NOTE 3A PLACES
A2 REF
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35 SEE NOTE 3B
28 SEE NOTE 3A 12 PLACES
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23 SEE NOTE 8
26 SEE NOTE 3E
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R10 16 SEE NOTE 7
R9 16 SEE NOTE 7
65 SEE NOTE 3F 6 PLACES SEE NOTE 18
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R4 16 SEE NOTE 7
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R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6 61
SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
35 SEE NOTE 31
59 SEE NOTE 3A 2 PLACES
SEE NOTE 17
51 15
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
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R1 16 SEE NOTE 7
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R2 62
R2 16 SEE NOTE 7
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58 SEE NOTE 4
4 3 PLACES
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MP1 REF SEE NOTE 13
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28 SEE NOTE 3A 4 PLACES
52 15
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MP2 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
24
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
R3 16 SEE NOTE 7
MP2Y
MP3Z
J13
P13
R1
R2
R3
A9
A11
A12
A14
A15
A5
A16
R4
R5

REVISIONS TDRR 17755			
SYM	DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	EF
AY	REVISED PER TDRR 33712	1 AUG 67	4H.
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ JAC
BA	REVISED PER TDRR 34021	9 AUG 67	JJJ
BB	REVISED PER TDRR 34724	12 OCT 67	GD RWH
BC	REVISED PER TDRR 34725	17 OCT 67	JSM RWH
BD	REVISED PER TDRR 34726	26 OCT 67	JRK
BE	REVISED PER TDRR 34727	13 NOV 67	JRK RWH
BF	REVISED PER TDRR 34791	21 NOV 67	DL
BG	REVISED PER TDRR 35724	29 FEB 68	
BH	REVISED PER TDRR 36007	13 APR 68	LK
BJ	REVISED PER TDRR 36230	20 MAY 68	LK RWH
BK	REVISED PER TDRR 36355	17 JUL 68	
BL	REVISED PER TDRR 36973	6 NOV 68	
BM	REVISED PER TDRR 37140	26 DEC 68	LK

SEE NOTE 17

QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
071	061	051	041	031	021	011	LIST OF MATERIALS		
–	–	6	–	–	–	–	NAS1352 C02LL4	SCREW HEX SOC HD, SELF LOCKING	65
1	–	–	–	–	–	–	2021401	WIRING HARNESS "A", STABLE MEM	64
–	1	1	–	–	–	–	2021397	WIRING HARNESS "A, STABLE MEM	63
–	–	1	1	1	–	–	1010928-184	RESISTOR, R2	62
–	–	3	3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
–	6	6	6	6	6	–	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
AR	AR	AR	A/R	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	1	1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	1	1	1	1	1	2018837	BRACKET, CONN. 44 PIN	56
–	1	1	1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
1	–	–	–	–	–	1	1010928-295	RESISTOR FIXED	54
–	1	1	1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
–	1	1	1	1	1	–	2018830	SHIELD THERMOSTAT	52
–	1	1	1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
–	1	1	1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
–	1	1	1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
–	–	–	1	1	1	–	2018828	WIRING HARNESS "A" STABLE MEMBER	48
–	1	1	1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
–	1	1	1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
–	1	1	1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	9	9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
–	–	–	–	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	2	2	2	2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
18	22	22	22	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
8	2	2	2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	7	7	7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	15	14	14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	–	–	–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	7	7	7	8	8	1000223	WASHER, CABLE CLAMP	24
8	8	7	7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	1	1	1	2018776	CLAMP, THERMOSTAT	17
5	8	7	7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
1	–	–	–	–	–	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
1	–	–	–	–	–	1	2018636	THERMO. ASS'Y TEMP. ALARM	12
1	–	–	–	–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	–	–	–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	–	–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
1	–	–	–	–	–	1	2018750	HOUSING STABLE MEMBER	1

BM 2018605

2018604	DL 2018601
NEXT ASSY	USED ON
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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO. 80230
SIZE J3
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605	REV BL	SHEET 1

3/ 2018605

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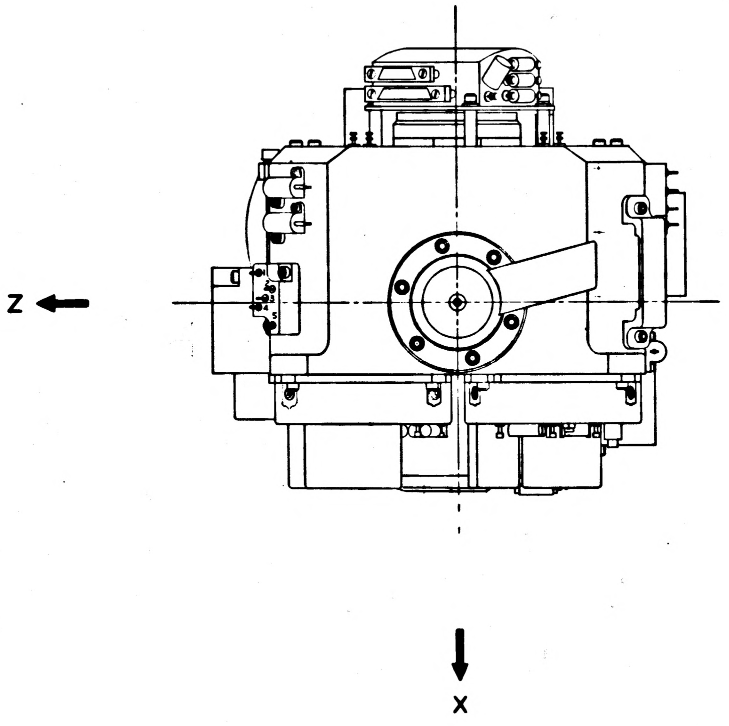

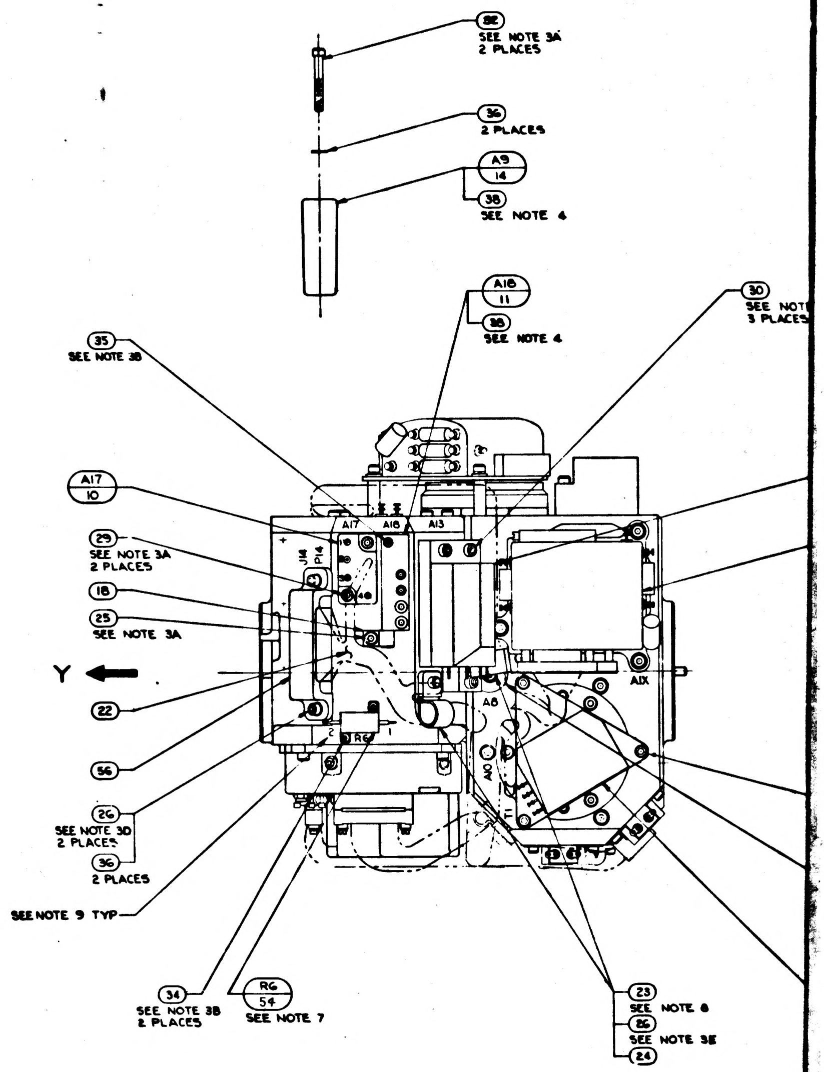

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NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

	REV	SHEET
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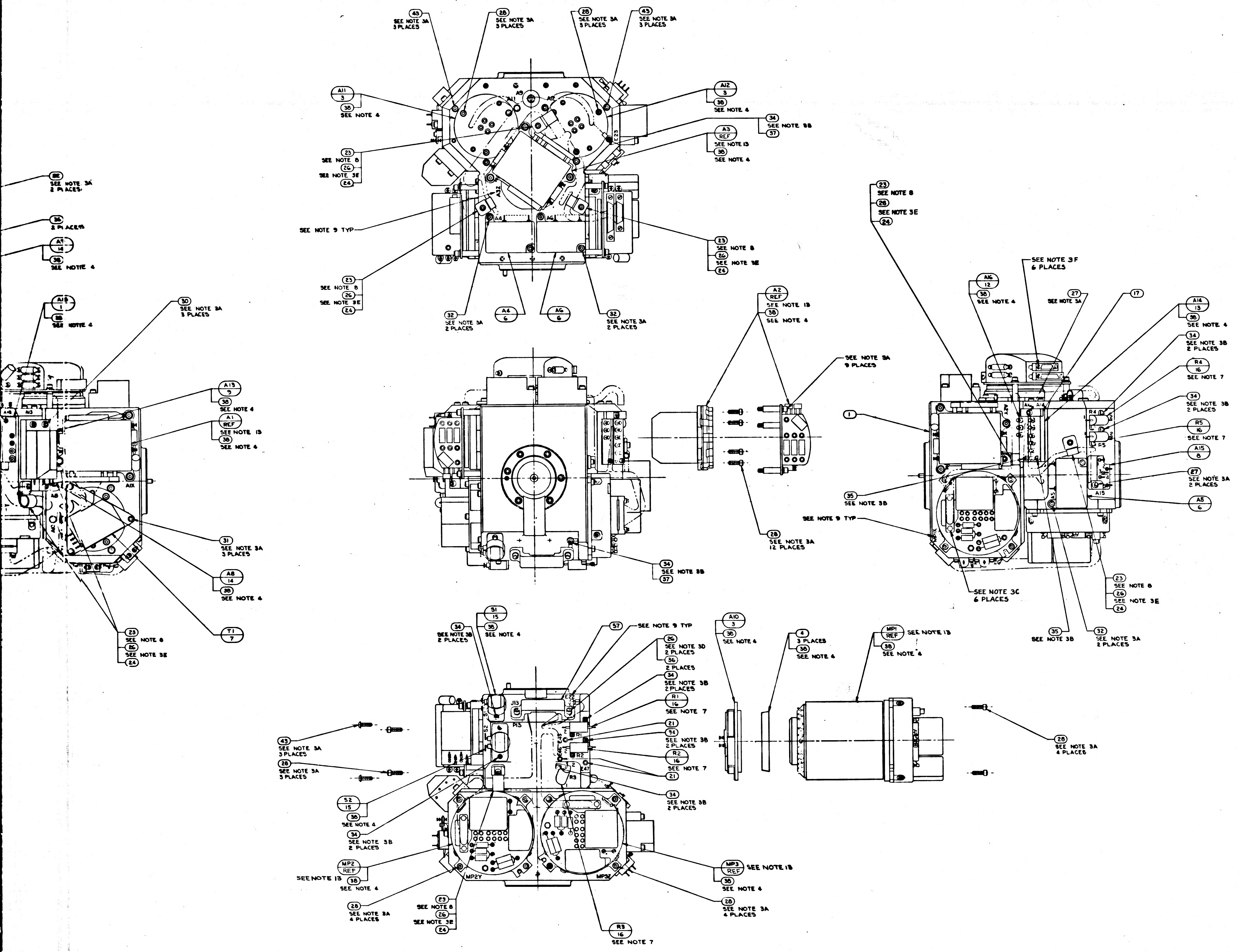
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A2
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SEE NOTE 13
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SEE NOTE 4
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9 PLACES
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SEE NOTE 3C
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SEE NOTE 3B
2 PLACES
MP2
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SEE NOTE 13
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SEE NOTE 3A
4 PLACES
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SEE NOTE 8
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SEE NOTE 7
MP3
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SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
J13
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S1
S2
R1
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E47
MP2Y
MP3Z
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SEE NOTE 4
4
3 PLACES
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SEE NOTE 4
MP1
REF
SEE NOTE 13
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SEE NOTE 4
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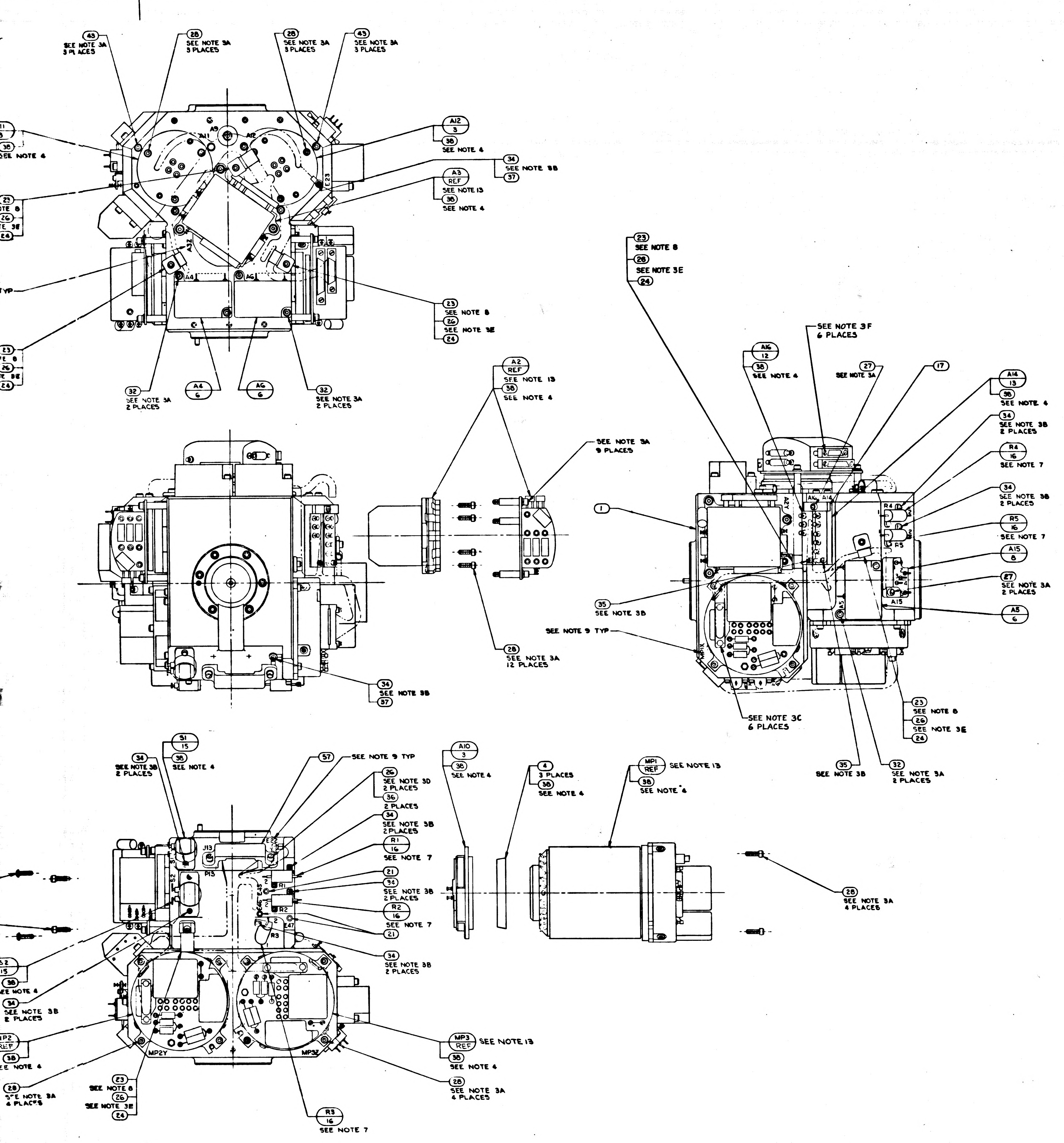
SEE NOTE 3A
4 PLACES

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANG ± DO NOT SCALE THIS DRAWING
		MATERIAL
2018604	DL2018601	HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

2018605 REV BM SHEET 2

2/2018605

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	6 MAY 67	JJJ
	AY	REVISION STATUS CHANGED	1 AUG 67	A.N.
	AZ	REVISION STATUS CHANGED	8 AUG 67	JJJ JAC
	BA	REVISION STATUS CHANGED	9 AUG 67	JJJ
	BB	REVISION STATUS CHANGED	12 OCT 67	GD RWH
	BC	REVISED PER TDRR 34725	17 OCT 67	JSM RWH
	BD	REVISION STATUS CHANGED	26 OCT 67	JRK
	BE	REVISION STATUS CHANGED	19 NOV 67	JRK RWH
	BF	REVISION STATUS CHANGED	21 NOV 67	
	BG	REVISION STATUS CHANGED	29 FEB 68	B.
	BH	REVISED PER TDRR 36007	3 APR 68	
	BJ	REVISION STATUS CHANGED	20 MAY 68	RWH
	BK	REVISION STATUS CHANGED	17 JUN 68	
	BL	REVISION STATUS CHANGED	5 NOV 68	
	BM	REVISION STATUS CHANGED	20 DEC 68	LK



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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
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SEE NOTE 7
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SEE NOTE 3A
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SEE NOTE 3B
SEE NOTE 9 TYP
SEE NOTE 3C
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
MP2
REF
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SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

-011 CONFIGURATION

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN R.G.S. DATE
CHECKED
APPROVAL 19 Oct 65
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 24 Nov 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO	SIZE	NASA DRAWING NO
80230	J_3	2018605
SCALE 1/1	WT	SHEET 2 OF 2

2018605 BM

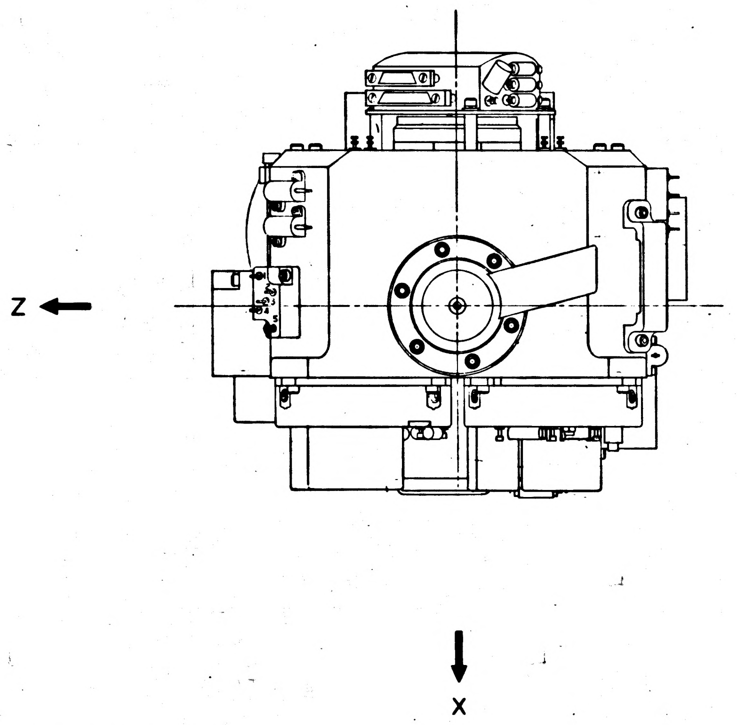
2018605 REV BM SHEET 2

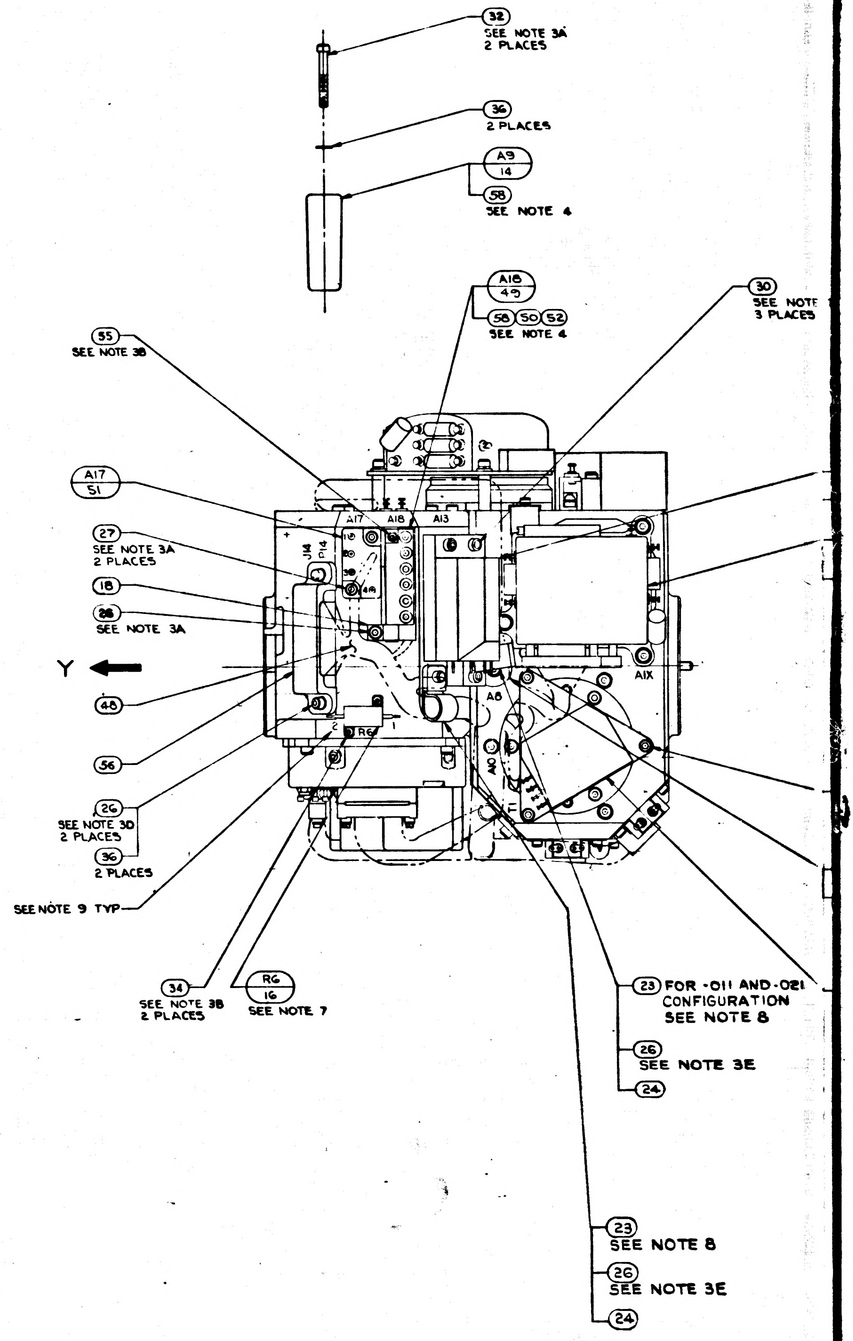
37 2018605

WIRING LEGEND				
COND. NO.	FROM	TC	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I	
CABLE CLAMP (23)	
PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II			
RESISTORS R1,R2,R3,R4,R5,R6,R9,& R10			
PART NO.	VALUE Ω	PART NO.	VALUE Ω
1010928-097	1.0	1010928-254	43.2
-114	1.5	-256	45.3
-126	2.0	-258	47.5
-136	2.55	-260	49.9
-143	3.01	-263	53.6
-149	3.48	-265	56.2
-155	4.02	-268	60.4
-159	4.42	-271	64.9
-164	4.99	-273	68.1
-168	5.49	-274	69.8
-172	6.04	-277	75.0
-178	6.98	-280	80.6
-184	8.06	-282	84.5
-189	9.09	-285	90.9
-193	10.0	-287	95.3
-197	11.0	-289	100
-201	12.1	-292	107
-204	13.0	-295	115
-207	14.0	-297	121
-210	15.0	-300	130
-213	16.2	-303	140
-215	16.9	-309	162
-218	18.2	-312	174
-220	19.1	-316	191
-222	20.0	-320	210
-226	22.1	-326	243
-229	23.7	-332	280
-231	24.9	-336	309
-233	26.1	-340	340
-236	28.0	-344	374
-238	29.4	-349	422
-240	30.9	-362	576
-242	32.4	-369	681
-244	34.0	-386	1020
-248	37.4	1010928-400	1430
1010928-251	40.2	1010928-354	475
		1010928-358	523
		1010928-365	619




32
SEE NOTE 3A
2 PLACES
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2 PLACES
A9
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SEE NOTE 4
A18
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58 50 52
SEE NOTE 4
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SEE NOTE
3 PLACES
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SEE NOTE 3B
A17
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27
SEE NOTE 3A
2 PLACES
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SEE NOTE 3D
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SEE NOTE 9 TYP
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2 PLACES
R6
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SEE NOTE 7
A17
A18
A13
J14
P14
R6
A8
A10
A1X
T1
23 FOR -011 AND -021
CONFIGURATION
SEE NOTE 8
26
SEE NOTE 3E
24
23
SEE NOTE 8
26
SEE NOTE 3E
24

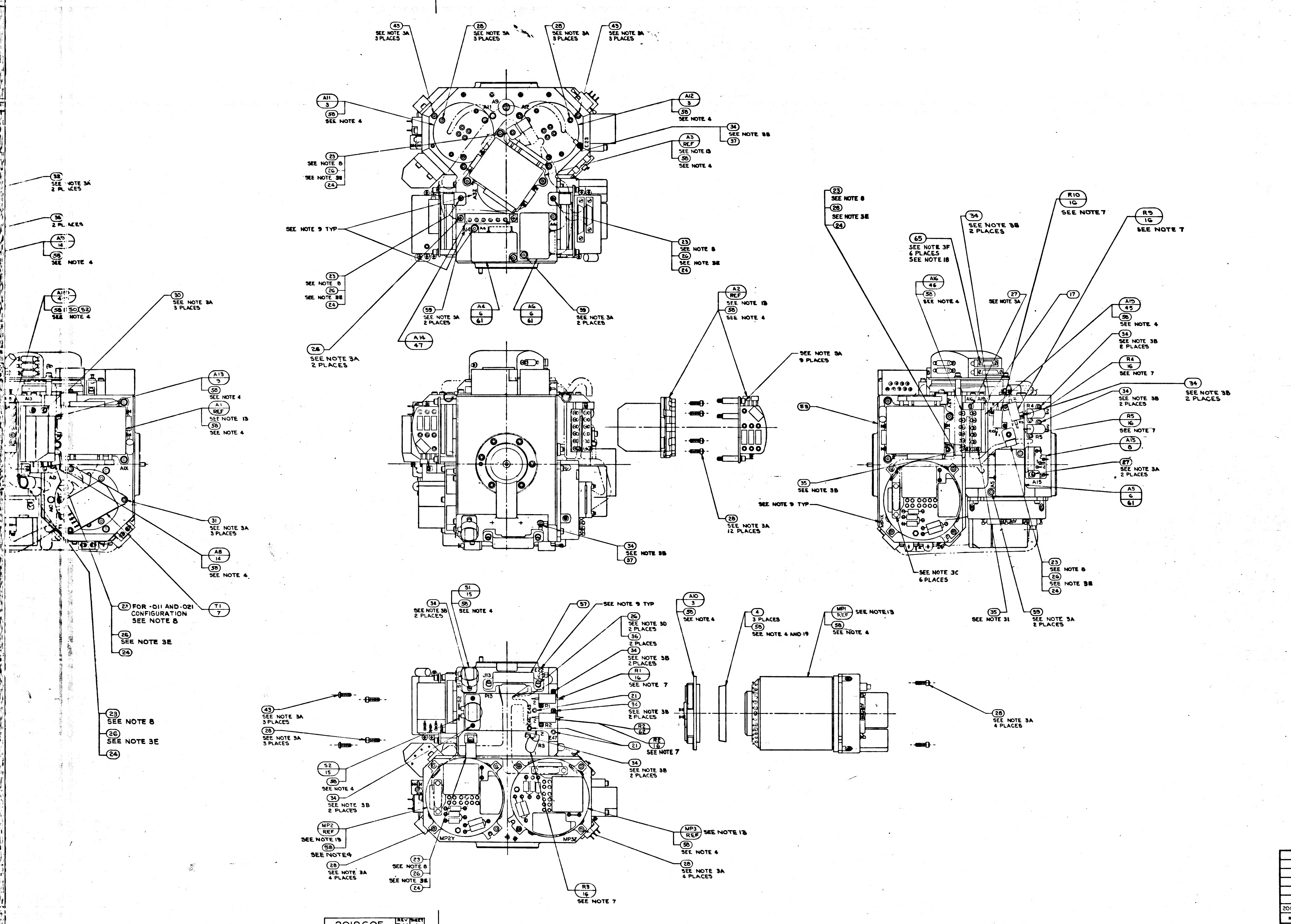
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2.
3 SCREW TQROUE REQUIREMENTS ±7%
   - A. 6.5 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
   - D. INSTALL FINGER TIGHT
   - E. 6.5 IN-LB
   - F. 1.5 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS.
4. APPLY A THIN FILM OF ITEM (38) OR (58) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14),(15),(45),(46),(47) AND (50), BETWEEN ITEM (2) AND ITEM (3). BETWEEN ITEM (3) AND ITEM (4) AND BETWEEN ITEM (49) AND ITEM (50)
5. SOLDER PER ND1002071, EXCEPT SEE NOTE 16.
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLE II FOR APPLICABLE SPECIFICATION PER NASA DWG 2018601 EXCEPT R6 (SEE NOTE 12)
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10.

12. R6 SHALL BE ITEM (54) FOR-011 CONFIGURATION OF THIS ASSY.
13. SHOWN FOR INSTALLATION INFORMATION ONLY. SEE NASA DWG 2018601 FOR APPLICABLE PART NO. & QUANTITY.
14. TAPE (60) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT OF THE HARNESS IN THE CABLE CLAMP.
15. FOR -031 ASSY, PIP PREAMP PN 2021269-011 MAY BE USED IN PLACE OF PN 2007060-021. FOR -041 & -051 ASSY(S), PIP PREAMP P/N 2021269-021 MAY BE USED IN PLACE OF PN 2007060-021. *IN THE A4 OR A5 POSITION ONLY. PIP PREAMP P/N 2021269-031 MAY BE USED IN PLACE OF P/N 2007060-021 IN THE A6 POSITION ONLY.*
16. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.
17. REMOVE .24-.26 FROM ALL UNTERMINATED LEADS OF ITEM (63); RESTRIP AND TIN PER 2021397; SOLDER PER ND1002071.
18. REPLACE CAPTIVE SCREWS IN CONNECTORS P18, P19 AND P20 OF ITEM 63 WITH ITEM 65 PRIOR TO PIP INSTALLATION.

NOTES (CONTINUED):

19. INSPECT TO INSURE THAT ITEM (4) HAS A "SLIP FIT" CONDITION, i.e., CAN BE ROTATED BY HAND, WHEN INSTALLED ON THE IRIG TRUNNION WITH ITEM (58) OR (38) AS APPLICABLE. ITEM (4) SHALL BE POSITIONED TO AVOID INTERFERENCE OF THE MTG. SCREWS ITEM (28) IN THE CLEARANCE HOLES OF ITEM (5) DURING INSTALLATION.



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43 SEE NOTE 3A 3 PLACES
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28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A11 3
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A12 3
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A3 REF SEE NOTE 13
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SEE NOTE 9 TYP
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23 SEE NOTE 8
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59 SEE NOTE 3A 2 PLACES
A4 6 61
A6 6 61
59 SEE NOTE 3A 2 PLACES
A14 47
26 SEE NOTE 3A 2 PLACES
32 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
58 SEE NOTE 4
A16 4
58 30 52 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
A13 9
58 SEE NOTE 4
A1 REF SEE NOTE 13
58 SEE NOTE 4
A1X
31 SEE NOTE 3A 3 PLACES
A8 14
58 SEE NOTE 4
T1 7
21 FOR -011 AND -021 CONFIGURATION SEE NOTE 8
26 SEE NOTE 3E
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23 SEE NOTE 8
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A2 REF SEE NOTE 13
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SEE NOTE 3A 9 PLACES
34 SEE NOTE 3B 37
28 SEE NOTE 3A 12 PLACES
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R10 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R9 16 SEE NOTE 7
65 SEE NOTE 3F 6 PLACES SEE NOTE 18
A16 46
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A15 45
58 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
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57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
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R2 62
R2 16 SEE NOTE 7
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43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 5 PLACES
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MP2 REF SEE NOTE 13
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R3 16 SEE NOTE 7
MP2Y
MP3Z
MP3 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
58 SEE NOTE 4
4 3 PLACES
58 SEE NOTE 4 AND 19
MP1 REF SEE NOTE 13
58 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

–	–	6	–	–	–	NAS1352
1	–	–	–	–	–	[illegible]
–	1	1	–	–	–	2021397
–	–	1	1	1	–	1010928
–	–	3	3	3	–	2007040
AR	AR	AR	A/R	A/R	A/R	MIL-I-1512
–	6	6	6	6	6	1001488-9
AR	AR	AR	A/R	A/R	A/R	MIL-I-8660
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				1	1	[illegible]
			1	1	1	[illegible]
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	–	–	–	–	–	[illegible]
QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	
07	06	05	04	031	021	

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

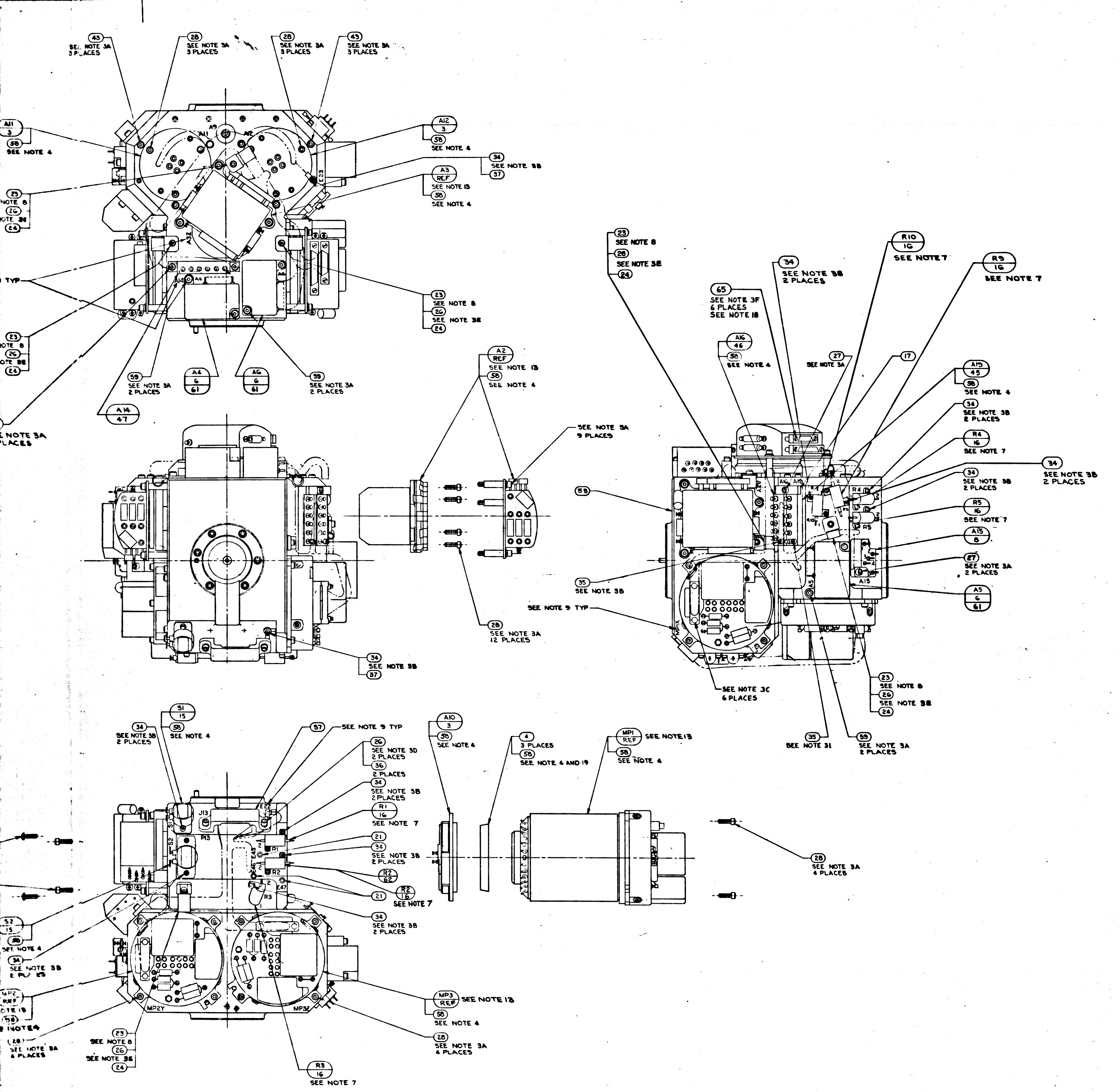
HEAT TREATMENT

FINAL FINISH

R.G.F.

	REV	SHEET
2018605	BN	1

27 2018605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MP1
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SEE NOTE 3A
4 PLACES
MP3
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SEE NOTE 13
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SEE NOTE 4
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SEE NOTE 3A
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SEE NOTE 8
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SEE NOTE 3E
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R3
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SEE NOTE 7
J13
P13
MP2Y
MP3Z
SEE NOTE 3B
SEE NOTE 3A
4 PLACES

SYM	DESCRIPTION	DATE	APPROVAL
AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	6 MAY 67	EF
AY	REVISED PER TDRR 33712	1 AUG 67	
AZ	REVISED PER TDRR 33857	8 AUG 67	JJJ JAC
BA	REVISED PER TDRR 34021	9 AUG 67	JJJ
BB	REVISED PER TDRR 34724	12 OCT 67	GD RWH
BC	REVISED PER TDRR 34725	17 OCT 67	JSM RWH
BD	REVISED PER TDRR 34726	26 OCT 67	JRK
BE	REVISED PER TDRR 34727	13 NOV 67	JRK RWH
BF	REVISED PER TDRR 34791	21 NOV 67	DL
BG	REVISED PER TDRR 35724	29 FEB 68	JB
BH	REVISED PER TDRR 36007	13 APR 68	LK
BJ	REVISED PER TDRR 36230	20 MAY 68	LK RWH
BK	REVISED PER TDRR 36385	7 JUN 68	
BL	REVISED PER TDRR 36973	5 NOV 68	JJJ
BM	REVISED PER TDRR 37140	26 DEC 68	LK
BN	REVISED PER TDRR 37861	14 OCT 69	CF

REVISIONS TDRR 17755

SEE NOTE 17

QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
071	061	051	041	031	021	011	LIST OF MATERIALS		
–	–	6	–	–	–	–	NAS1352 C02LL4	SCREW HEX SOC HD, SELF LOCKING	65
1	–	–	–	–	–	–	2021401	WIRING HARNESS "A", STABLE MEM	64
–	1	1	–	–	–	–	2021397	WIRING HARNESS "A, STABLE MEM	63
–	–	1	1	1	–	–	1010928-184	RESISTOR, R2	62
–	–	3	3	3	–	–	2007060-021	PIP PREAMP ASSEMBLY	61
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH. ELEC. PRESS SENSITIVE	60
–	6	6	6	6	6	–	1001488-9	SCREW, HEX, SOC. HD. SELF-LOCKING	59
AR	AR	AR	A/R	A/R	A/R	–	MIL-I-8660 SEE NOTE 4	GREASE, SILICONE DOWCORNING NO.4	58
1	1	1	1	1	1	1	2018838	BRACKET, CONN. 34 PIN	57
1	1	1	1	1	1	1	2018837	BRACKET, CONN. 44 PIN	56
–	1	1	1	1	1	–	1011625-15	SCREW HEX SOC HD SELF LOCKING	55
1	–	–	–	–	–	1	1010928-295	RESISTOR FIXED	54
–	1	1	1	1	1	–	2018750-011	HOUSING STABLE MEMBER	53
–	1	1	1	1	1	–	2018830	SHIELD THERMOSTAT	52
–	1	1	1	1	1	–	2007172-011	BLOWER CONTROL MOD ASSY	51
–	1	1	1	1	1	–	2018829-2	SHIM BLOWER CONT THERMO	50
–	1	1	1	1	1	–	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
–	–	–	1	1	1	–	2018828	WIRING HARNESS "A" STABLE MEMBER	48
–	1	1	1	1	1	–	2018826-011	THERMO & HTR ASSY TEMP CONT	47
–	1	1	1	1	1	–	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
–	1	1	1	1	1	–	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
9	9	9	9	9	9	9	1010891-15	SCREW, BUT. HD, SPL. SOC., SELF-LOCKING	43
AR	AR	AR	A/R	A/R	A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
–	–	–	–	–	–	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	2	2	2	2	2	MS15795-802	WASHER, FLAT, METAL, ROUND	37
6	6	6	6	6	6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	2	2	2	2	2	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
18	22	22	22	22	22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
8	2	2	2	2	2	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	3	3	3	3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
3	3	3	3	3	3	3	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
33	33	33	33	33	33	33	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	7	7	7	7	7	5	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
12	15	14	14	14	15	12	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	–	–	–	–	–	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	7	7	7	8	8	1000223	WASHER, CABLE CLAMP	24
8	8	7	7	7	8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
–	–	–	–	–	–	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	3	3	3	3	3	1001600-1	TERMINAL, INSULATED	21
1	1	1	1	1	1	1	2018778	CLAMP, THERMOSTAT	18
1	1	1	1	1	1	1	2018776	CLAMP, THERMOSTAT	17
5	8	7	7	7	8	5	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	2	2	2	2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2	2	2	2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
1	–	–	–	–	–	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
1	–	–	–	–	–	1	2018636	THERMO. ASS'Y TEMP. ALARM	12
1	–	–	–	–	–	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	–	–	–	–	–	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	1	1	1	1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	1	1	1	1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	1	1	1	1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	–	–	–	3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	3	3	3	3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	3	3	3	3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
1	–	–	–	–	–	1	2018750	HOUSING STABLE MEMBER	1

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MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
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SIZE J3
NASA DRAWING NO. 2018605
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WT
SHEET 1 OF 2

2018605 BN

2018605 REV BN SHEET 1

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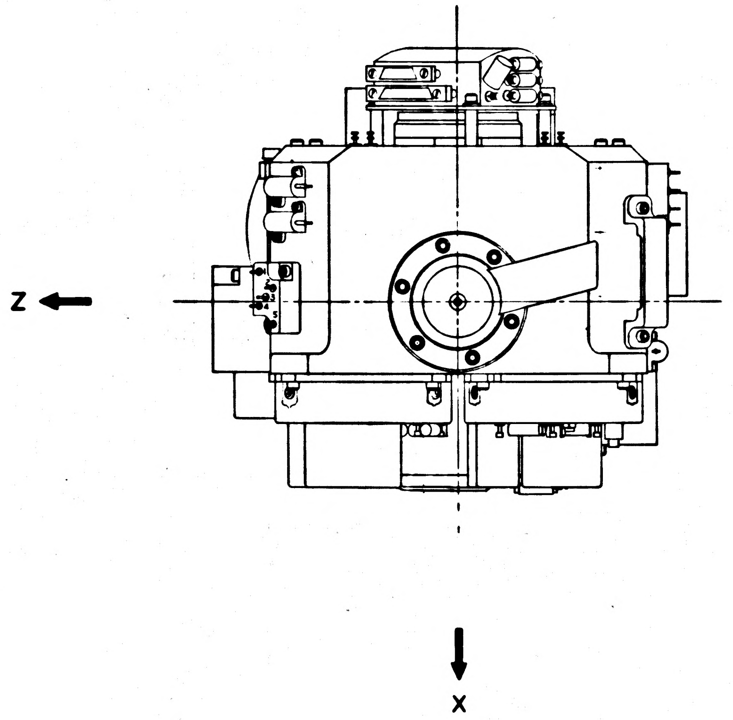

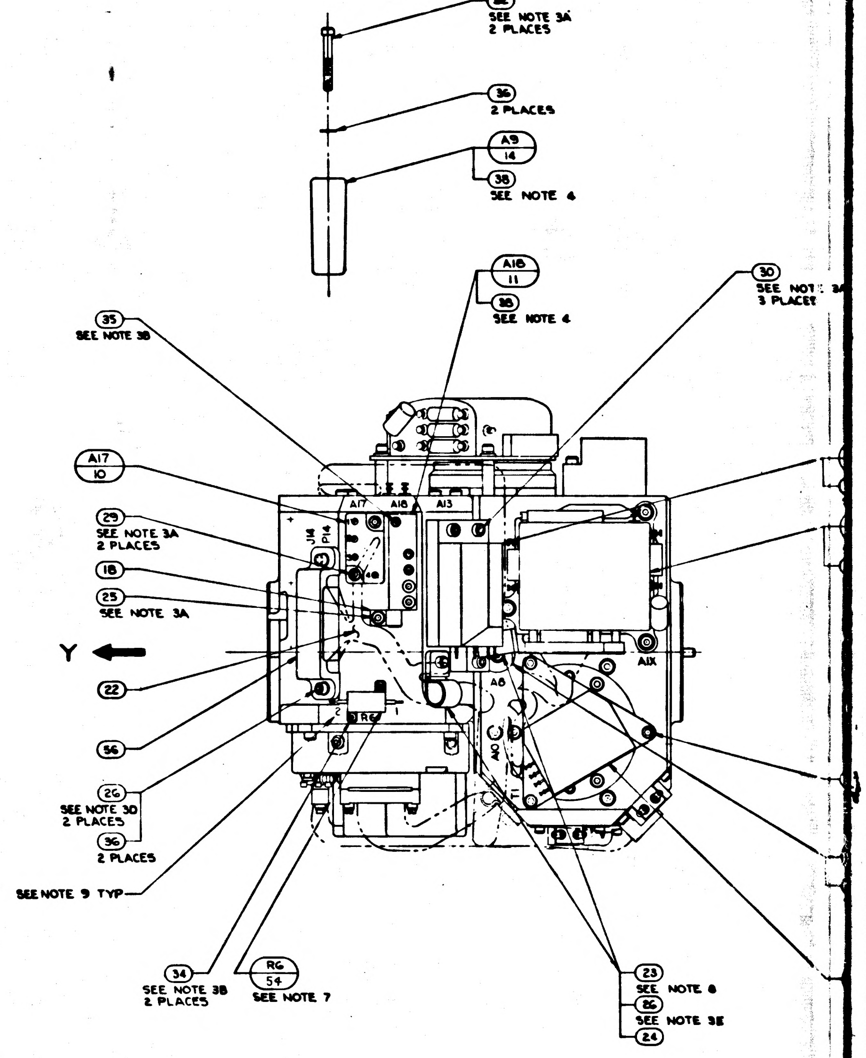
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2 PLACES
36
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A9
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SEE NOTE 4
A18
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NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

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2018605 REV BN SHEET 2

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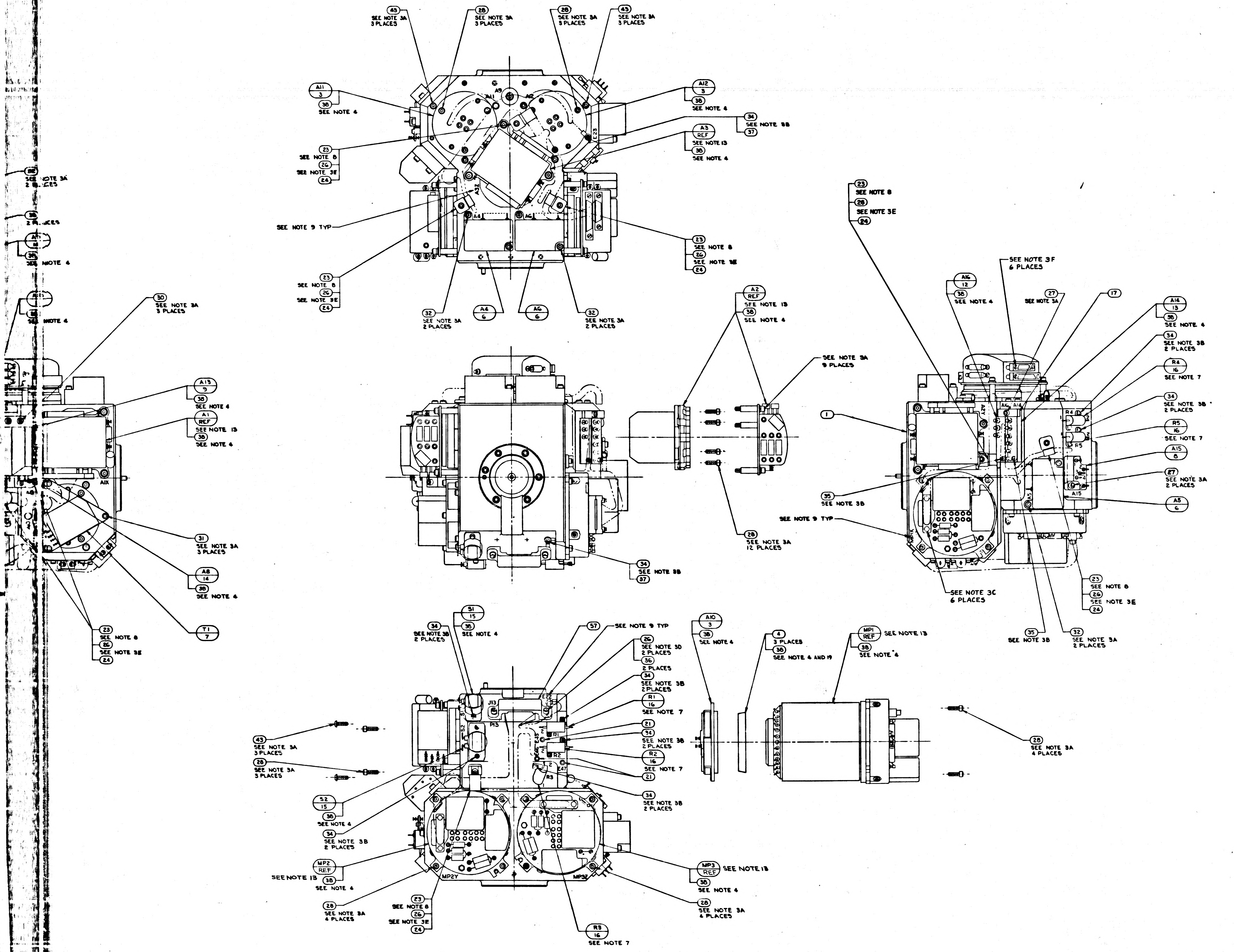
1/2018605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28 SEE NOTE 3A 3 PLACES
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A11 3
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32 SEE NOTE 3A 2 PLACES
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28 SEE NOTE 3A 12 PLACES
23 SEE NOTE 8
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SEE NOTE 3F 6 PLACES
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
27 SEE NOTE 3A 2 PLACES
A5 6
1
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SEE NOTE 9 TYP
SEE NOTE 3C 6 PLACES
23 SEE NOTE 8
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A4 A16 R4 R5 F5 A15 A5
51 15
34 SEE NOTE 3B 2 PLACES
38 SEE NOTE 4
57 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
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28 SEE NOTE 3A 3 PLACES
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34 SEE NOTE 3B 2 PLACES
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28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3E
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MP3 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4 AND 19
MP1 REF SEE NOTE 13
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

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		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING
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2018604	DL 2018601	HEAT TREATMENT
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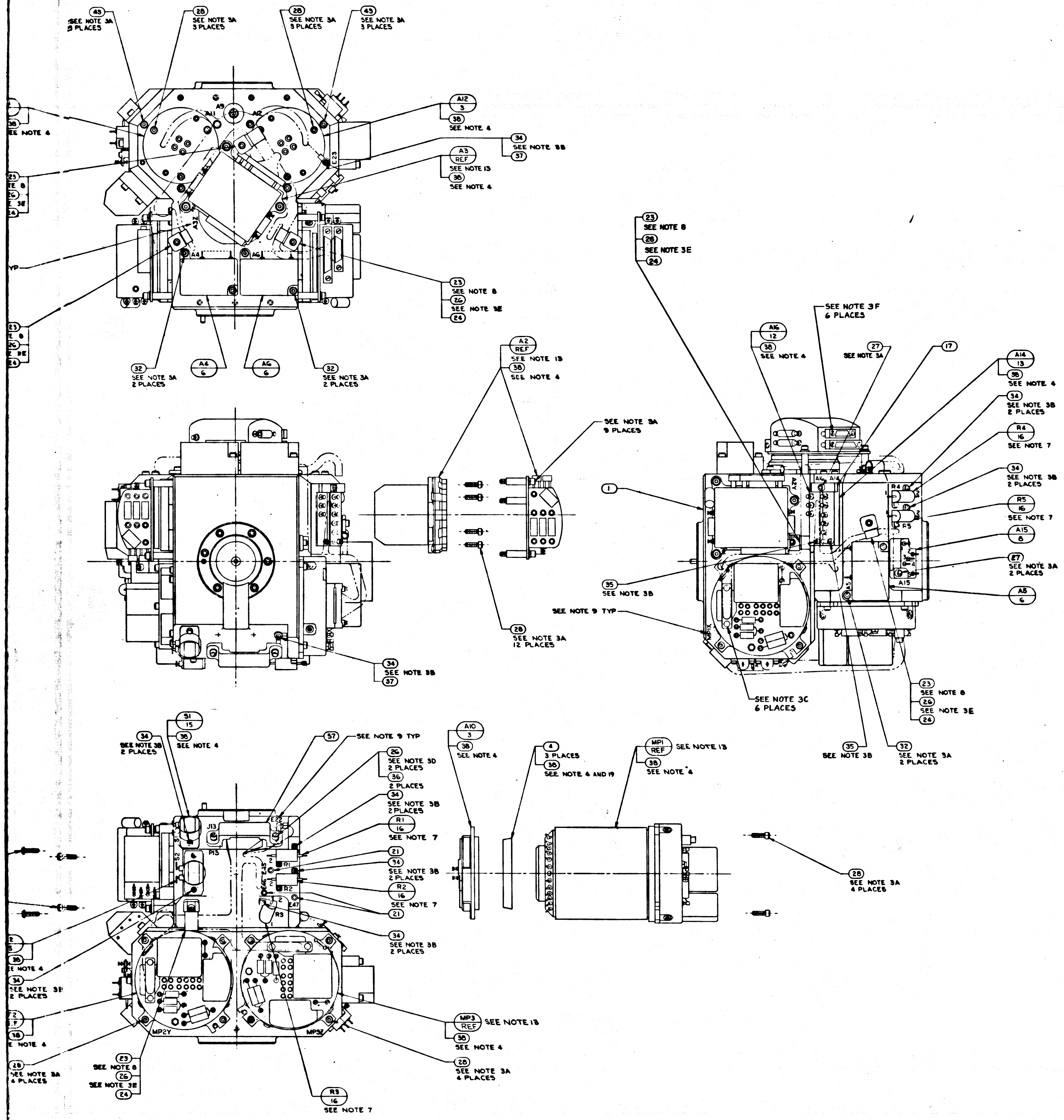

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R1
R2
R3
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MP2Y
MP3Z
A15
R4
R5

-011 CONFIGURATION

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	AW	REPLACES REV AV WITHOUT CHANGE PER TDRR 33582	8 MAY 67	J J J
	AY	REVISION STATUS CHANGED	1 AUG 67	A.N.
	AZ	REVISION STATUS CHANGED	8 AUG 67	J J J JAC
	BA	REVISION STATUS CHANGED	9 AUG 67	J J J
	BB	REVISION STATUS CHANGED	12 OCT 67	GD RWH
	BC	REVISED PER TDRR 34725	17 OCT 67	JSM RWH
	BD	REVISION STATUS CHANGED	26 OCT 67	JRK
	BE	REVISION STATUS CHANGED	13 NOV 67	JRK RWH
	BF	REVISION STATUS CHANGED	21 NOV 67	DL
	BG	REVISION STATUS CHANGED	29 FEB 68	B.
	BH	REVISED PER TDRR 36007	3 APR 68	LK
	BJ	REVISION STATUS CHANGED	20 MAY 68	LK RWH
	BK	REVISION STATUS CHANGED	17 JUN 68	
	BL	REVISION STATUS CHANGED	5 NOV 68	J J J
	BM	REVISION STATUS CHANGED	20 DEC 68	LK
	BN	REVISED PER TDRR 37861	16 OCT 69	CP

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NASA APPROVAL
MIT APPROVAL W. Kupfer 24 Nov 65

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SIZE J3
NASA DRAWING NO 2018605
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WT
SHEET 2 OF 2

2018605 REV BN SHEET 2

2018605 BN

PART NO.	NOMENCLATURE	QTY REQ'D
1000138	CLAMP, GYRO	3
1001485	THERMOSTAT, SAFETY	2
1006879	SILICONE COMPOUND	A/R
1000121	CONNECTOR	3
~~1000120~~	~~CONNECTOR~~	~~2~~
2021500	GYRO, PREALIGN ASSY	3

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
r	—	RELEASE TDRR 10806	7 JUL 64	W/K	
	A	TDRR 12640	10 SEP 64		DW

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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NAS 9-153

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APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE 7/7/64

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SCALE

UNIT WT.

CODE IDENT.

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SHEET 1 OF 1

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PART NO.	NOMENCLATURE	QTY REQ'D
1000138	CLAMP, GYRO	3
1001485	THERMOSTAT, SAFETY	2
1006879	SILICONE COMPOUND	A/R
1000121	CONNECTOR	3
~~1000120~~	~~CONNECTOR~~	~~2~~
2021500	GYRO, PREALIGN ASSY	3
2018750	HSG, STABLE MEMBER	1
1001497-2	CONNECTOR ELECT	3

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 12640	10 SEP 64		DW
	B	TDRR 12692	21 SEP 64		WR.

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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SCALE	UNIT WT.	CODE IDENT.

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SHEET 1 OF 1

INCHES
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PHOTOGRAPHING SCALE ONLY

PART NO.	NOMENCLATURE	QTY REQ'D
000138	CLAMP, GYRO	3
001485	THERMOSTAT, SAFETY	2
006879	SILICONE COMPOUND	A/R
000121	CONNECTOR	3
~~000120~~	~~CONNECTOR~~	~~2~~
021500	GYRO, PREALIGN ASSY	3
018750	HSG, STABLE MEMBER	1
001497-2	CONNECTOR ELECT	3
000120-001	CONNECTOR	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	W/K	
	A	TDRR 12640	10 SEP 64		
	B	TDRR 12692	21 SEP 64		WR
	C	TDRR 13165	6 OCT 64		WK

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QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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MIT/IL APPROVAL		7/7/64

STABLE
MEMBER
ASS'Y

SCALE	UNIT WT.	CODE IDENT.

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0 1 2
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PART NO.	NOMENCLATURE	QTY REQ'D
1000138	CLAMP, GYRO	3
1001485	THERMOSTAT, SAFETY	2
1006879	SILICONE COMPOUND	A/R
1000121	CONNECTOR	3
~~1000120~~	~~CONNECTOR~~	~~2~~
2021500	GYRO, PREALIGN ASSY	3
2018750	HSG, STABLE MEMBER	1
1001497-2	CONNECTOR ELECT	3
1000120-001	CONNECTOR	1
2018776	CLAMP THERMOSTAT	1
2018778	CLAMP THERMOSTAT	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	W/K	
	A	TDRR 12640	10 SEP 64		DV
	B	TDRR 12692	21 SEP 64		WK
	C	TDRR 13165	6 OCT 64		WK
	D	TDRR 13655	20 OCT 64		

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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CONTRACT
NAS 9-153

		DATE
APPROVED		
CHECKED		
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APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		7/7/64

STABLE MEMBER ASS'Y

SCALE | UNIT WT. | CODE IDENT.

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DWG. NO.

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PHOTOGRAPHIC SCALE ONLY

PART NO.	NOMENCLATURE	QTY REQ'D
1000138	CLAMP, GYRO	3
1001485	THERMOSTAT, SAFETY	2
1006879	SILICONE COMPOUND	A/R
1000121	CONNECTOR	3
~~1000120~~	~~CONNECTOR~~	~~2~~
2021500	GYRO, PREALIGN ASSY	3
2018750	HSG, STABLE MEMBER	1
1001497-2	CONNECTOR ELECT	3
1000120-001	CONNECTOR	1
2018776	CLAMP, THERMOSTAT	1
2018778	CLAMP, THERMOSTAT	1
2018779	BRACKET CONN 44 PIN	1
2018780	BRACKET CONN 34 PIN	1
1010813-4	CONNECTOR	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 12640	10 SEP 64		
	B	TDRR 12692	21 SEP 64		WK
	C	TDRR 13165	6 OCT 64		WK
	D	TDRR 13655	20 Oct 64		
	E	TDRR 14112	10 NOV 64		WK

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CONTRACT NAS 9-153
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CHECKED
DRAWN J C F
APPROVED FOR MSC 7/7/64
MIT/IL APPROVAL — DATE 7/7/64

STABLE
MEMBER
ASS'Y

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO.
2018605

SHEET 1 OF 1

2018605

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

PART NO.	NOMENCLATURE	-011 QTY REQ'D
1000138	CLAMP, GYRO	3
1001485	THERMOSTAT, SAFETY	2
1006879	SILICONE COMPOUND	A/R
1000121	CONNECTOR	3
~~1000120~~	~~CONNECTOR~~	~~2~~
2021500	GYRO, PREALIGN ASSY	3
2018750	HSG, STABLE MEMBER	1
1001497-2	CONNECTOR ELECT	3
1000120-001	CONNECTOR	1
2018776	CLAMP, THERMOSTAT	1
2018778	CLAMP, THERMOSTAT	1
2018779	BRACKET CONN 44 PIN	1
2018780	BRACKET CONN 34 PIN	1
1010813-4	CONNECTOR	1
2018741	HEATER & TAPER MT ASSY	3

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7JUL64	WK	
	A	TDRR 12640	10SEP64		
	B	TDRR 12692	21SEP64		WK
	C	TDRR 13165	6OCT64		WK
	D	TDRR 13655	20OCT64		
	E	TDRR 14112	10NOV64		WK
	F	TDRR 14787	14DEC64		WK

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018604	DL2018601

APPLICATION

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DIMENSIONS ARE IN INCHES
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FRACTIONS DECIMALS ANGLES

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MATERIAL:

MIT
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CONTRACT
NAS 9-153

		DATE
APPROVED		7Jul64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE
		7/7/64

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MEMBER
ASS'Y

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SHEET 1 OF 1

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INCHES
0 1 2
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2021500	GYRO, PREALIGN ASSY	3
2018750	HSG, STABLE MEMBER	1
1001497-2	CONNECTOR ELECT	3
1000120-001	CONNECTOR	1
2018776	CLAMP. THERMOSTAT	1
2018778	CLAMP. THERMOSTAT	1
2018779	BRACKET CONN 44 PIN	1
2018780	BRACKET CONN 34 PIN	1
1010813-4	CONNECTOR	1
2018741	HEATER & TAPER MT ASSY	3
2018635	THERMO & HTR ASSY	1
2018636	THERMO & HTR ASSY	1
2018637	THERMO & HTR ASSY	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	RELEASE TDRR 10806	7JUL64	W/K
	A	TDRR 12640	10SEP64	
	B	TDRR 12692	21SEP64	WK
	C	TDRR 13165	6OCT64	WK
	D	TDRR 13655	20OCT64	
	E	TDRR 14112	10NOV64	W/K
	F	TDRR 14787	14DEC64	WK
	G	TDRR 15341	4JAN65	W/K

MASTER

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INSTRUMENTATION LAB
CONTRACT
NAS 9-153

APPROVED — DATE 7 July 64
CHECKED
DRAWN J C F
APPROVED FOR MSC 7/7/64
MIT/IL APPROVAL — DATE 7/7/64

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SHEET 1 OF 1

2018605

PART NO.	NOMENCLATURE	-011 QTY REQ'D
1000138	CLAMP, GYRO	3
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2018776	CLAMP. THERMOSTAT	1
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2018779	BRACKET CONN 44 PIN	1
2018780	BRACKET CONN 34 PIN	1
1010813-4	CONNECTOR	1
2018741	HEATER & TAPER MT ASSY	3
2018635	THERMO & HTR ASSY	1
2018636	THERMO & HTR ASSY	1
2018637	THERMO & HTR ASSY	1
2018641	HEATER, S/M	2

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7JUL64	WK	
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	F	TDRR 14787	14DEC64		WK
	G	TDRR 15341	4JAN65		WK
	H	TDRR 15488	13JAN65		WK

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LIST OF PARTS AND MATERIALS

MASTER

2018604	DL2018601
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APPROVED		
CHECKED		
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MIT/IL APPROVAL		DATE
		7/7/64

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SCALE	UNIT WT.	CODE IDENT.

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SHEET 1 OF 1

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2018780	BRACKET CONN 34 PIN	1
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2018741	HEATER & TAPER MT ASSY	3
2018635	THERMO & HTR ASSY	1
2018636	THERMO & HTR ASSY	1
2018637	THERMO & HTR ASSY	1
2018641	HEATER, S/M	2
2007060	PIP PREAMP ASSY	3
[illegible]	[illegible]	
2007064	TEMP CONT MOD	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 12640	10 SEP 64		
	B	TDRR 12692	21 SEP 64		WK
	C	TDRR 13165	6 OCT 64		WK
	D	TDRR 13655	20 OCT 64		
	E	TDRR 14112	10 NOV 64		WK
	F	TDRR 14787	14 DEC 64		WK
	G	TDRR 15341	4 JAN 65		WK
	H	TDRR 15488	13 JAN 65		WK
	J	TDRR 16809	17 FEB 65		

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

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NAS 9-153
APPROVED — DATE 7 July 64
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DWG. NO.
MANNED
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NASA DRAWING NO.
2018605
SHEET 1 OF 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
1000138	CLAMP, GYRO	3
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2018778	CLAMP, THERMOSTAT	1
2018779	BRACKET CONN 44 PIN	1
2018780	BRACKET CONN 34 PIN	1
1010813-4	CONNECTOR	1
2018741	HEATER & TAPER MT ASSY	3
2018635	THERMO & HTR ASSY	1
2018636	THERMO & HTR ASSY	1
2018637	THERMO & HTR ASSY	1
2018641	HEATER, S/M	2
2007060	PIP PREAMP ASSY	3
2018639	PIP & SUSP CAP MOD	3
2007064	TEMP CONT MOD	1
2018796	WIRING HARNESS 'A'	1

MASTER

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 12640	10 SEP 64		DY
	B	TDRR 12692	21 SEP 64		WK.
	C	TDRR 13165	6 OCT 64		WK
	D	TDRR 13655	20 OCT 64		
	E	TDRR 14112	10 NOV 64		WK
	F	TDRR 14787	14 DEC 64		WK.
	G	TDRR 15341	4 JAN 65		WK.
	H	TDRR 15488	13 JAN 65	GJB	WK
	J	TDRR 16809	17 FEB 65		DY
	K	TDRR 17166	8 MAR 65		WK.

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018604	DI.2018601

APPLICATION

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MATERIAL:

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CONTRACT
NAS 9-153

		DATE
APPROVED		7 July 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE 7/7/64

STABLE
MEMBER
ASS'Y

SCALE

UNIT WT.

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SHEET 1 OF 1

PART NO.	NOMENCLATURE	-011 QTY REQ'D
1000138	CLAMP, GYRO	3
1001485	THERMOSTAT, SAFETY	2
1006879	SILICONE COMPOUND	A/R
1000121	CONNECTOR	3
~~1000120~~	~~CONNECTOR~~	~~2~~
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2018750	HSG, STABLE MEMBER	1
1001497-2	CONNECTOR ELECT	3
1000120-001	CONNECTOR	1
2018776	CLAMP. THERMOSTAT	1
2018778	CLAMP THERMOSTAT	1
2018779	BRACKET CONN 44 PIN	1
2018780	BRACKET CONN 34 PIN	1
1010813-4	CONNECTOR	1
2018741	HEATER & TAPER MT ASSY	3
2018635	THERMO & HTR ASSY	1
2018636	THERMO & HTR ASSY	1
2018637	THERMO & HTR ASSY	1
2018641	HEATER, S/M	2
2007060	PIP PREAMP ASSY	3
2018639	PIP & SUSP CAP MOD	3
2007064	TEMP CONT MOD	1
2018796	WIRING HARNESS 'A'	1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	—	RELEASE TDRR 10806	7 JUL 64	WK	
	A	TDRR 12640	10 SEP 64		DV
	B	TDRR 12692	21 SEP 64		WK
	C	TDRR 13165	6 OCT 64		WK
	D	TDRR 13655	20 OCT 64		
	E	TDRR 14112	10 NOV 64		WK
	F	TDRR 14787	14 DEC 64		WK
	G	TDRR 15341	4 JAN 65		WK
	H	TDRR 15488	13 JAN 65		WK
	J	TDRR 16809	17 FEB 65		DV
	K	TDRR 17166	8 MAR 65		WK
	L	REPLACED BY REV M WITH CHANGES TDRR 17755	23 MAR 65		WK

REPLACED BY REV M WITH CHANGES

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

MASTER

2018604	DL2018601
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CONTRACT
NAS 9-153

		DATE
APPROVED		1 Jul 64
CHECKED		
DRAWN	JCF	
APPROVED FOR MSC		7/7/64
MIT/IL APPROVAL		DATE
		7/7/64

STABLE
MEMBER
ASS'Y

SCALE
UNIT WT.
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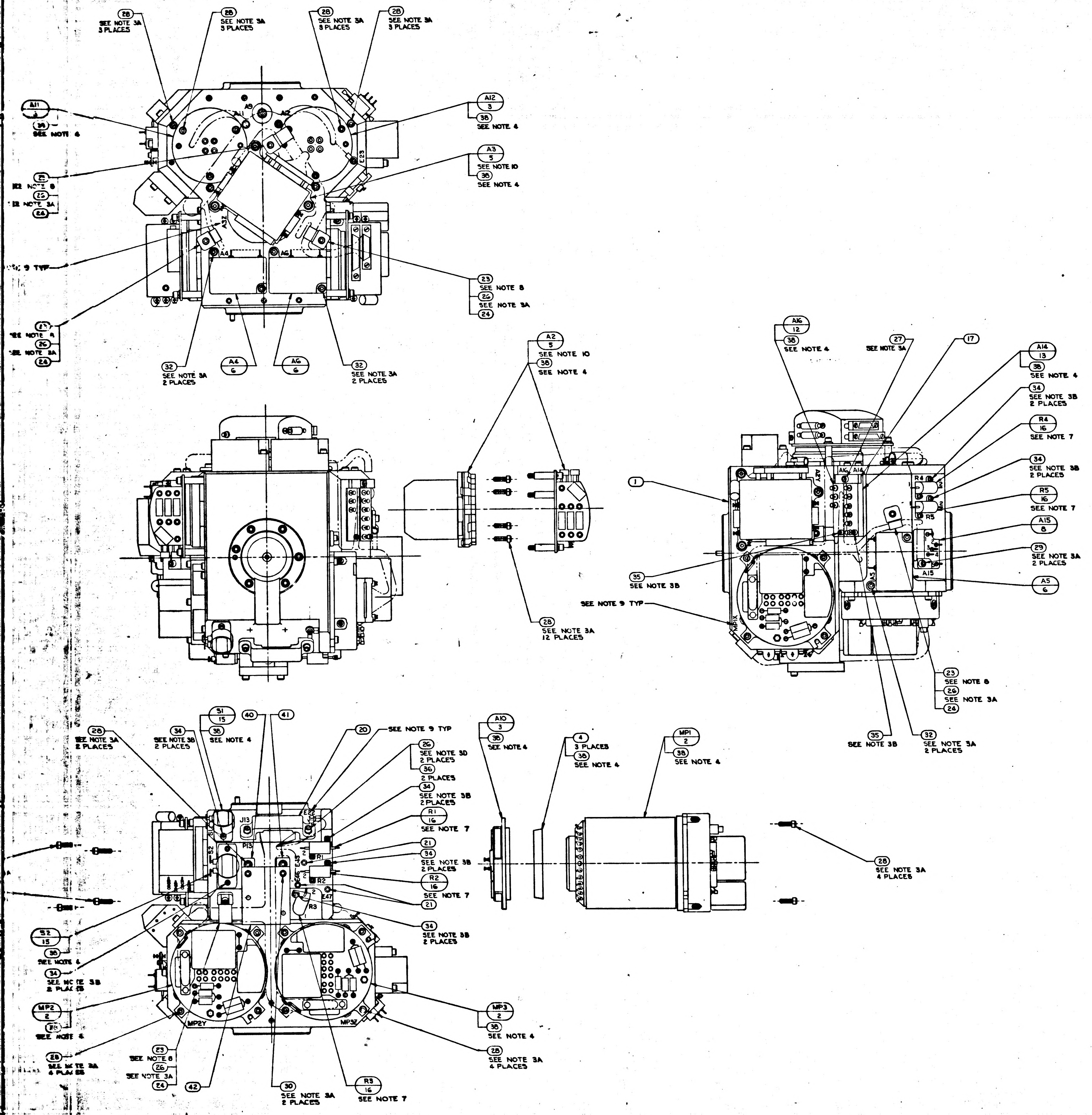
SHEET 1 OF 1

REVISIONS TDRR 17755			
SYM	DESCRIPTION	DATE	APPROVAL
M	REPLACES REV L WITH CHANGES TDRR 17755	23 Mar 65	W.R.



28
SEE NOTE 3A
3 PLACES
A11
3
38
SEE NOTE 4
A9
A12
A2
A3
5
SEE NOTE 10
A13
A4
A6
E23
23
SEE NOTE 8
26
SEE NOTE 3A
24
32
SEE NOTE 3A
2 PLACES
6
SEE NOTE 9 TYP
A2
5
SEE NOTE 10
38
SEE NOTE 4
1
35
SEE NOTE 3B
28
SEE NOTE 3A
12 PLACES
A16
12
27
17
A14
13
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
R5
A15
8
29
A5
6
31
15
40
41
20
36
SEE NOTE 3D
2 PLACES
R1
21
R2
R3
J13
P13
E47
E43
A10
4
3 PLACES
MP1
2
MP2
MP3
MP2Y
MP3Z
30
42
25

MASTER

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

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HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

CODE IDENT NO. SIZE NASA DRAWING NO. 2018605
SCALE 1/1 WT SHEET 1 OF 1

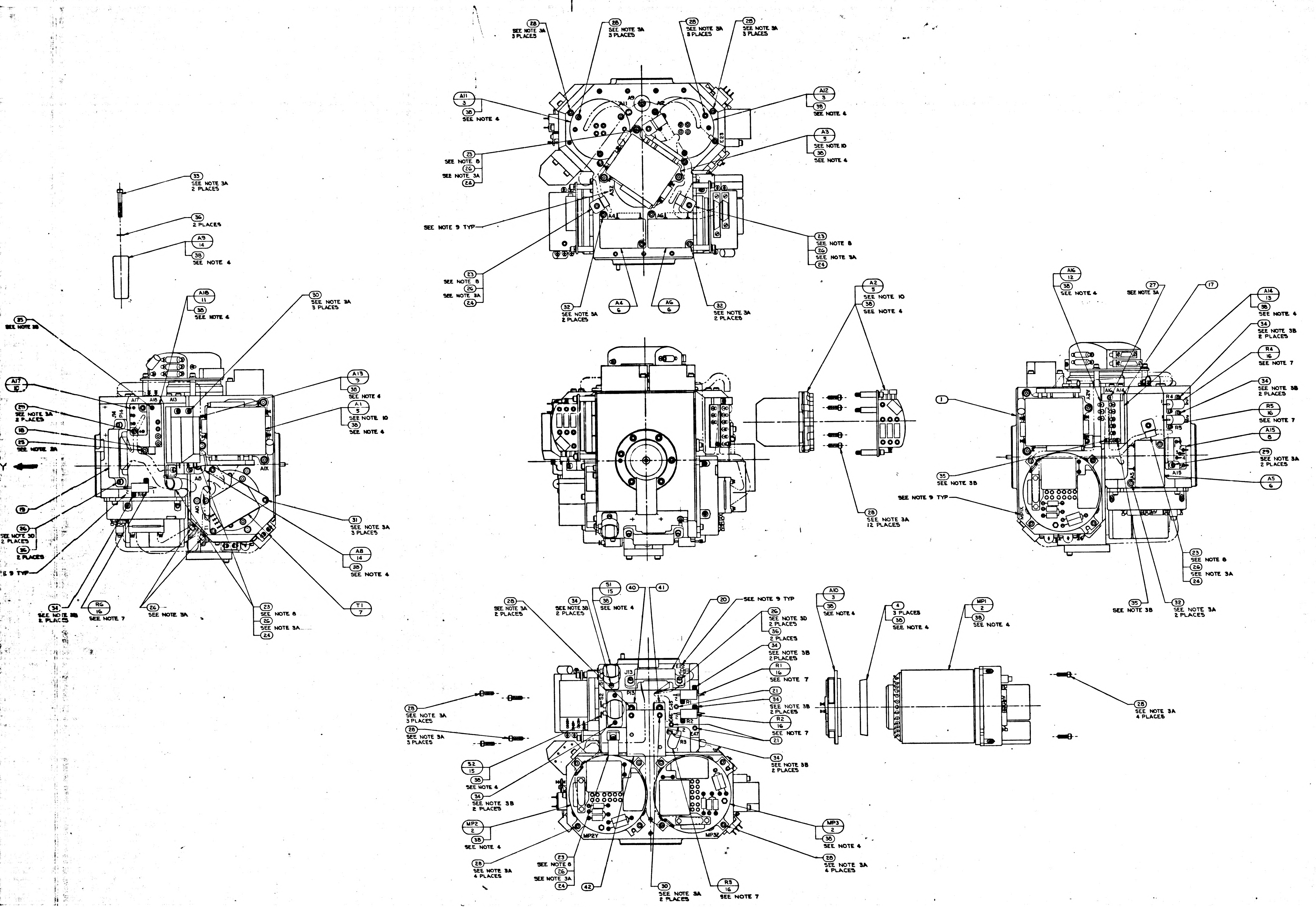
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	2018811	WEIGHT, BALANCE, S./M.	42
1	2018809	WEIGHT, BALANCE, S/M.	41
1	2018808	WEIGHT, BALANCE, S./M.	40
A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
A/R	1006875 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
2	1001488-12	SCREW, HEX., SOC. HD., SELF-LOCKING	33
6	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
5	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
4	1001488-5	SCREW, HEX., SOC. HD., SELF-LOCKING	29
44	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
1	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	1000223	WASHER, CABLE CLAMP	24
8	1000220-SEE NOTE 8	CLAMP, CABLE	23
1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	1001600-1	TERMINAL, INSULATED	21
1	2018780	BRACKET, CONN. 34 PIN	20
1	2018779	BRACKET, CONN. 44 PIN	19
1	2018778	CLAMP, THERMOSTAT	18
1	2018776	CLAMP, THERMOSTAT	17
6	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5 & R6	16
2	1001485	THERMOSTAT, SAFETY	15
2	2018641	HTR. ASS'Y. STABLE MEMBER	14
1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	2007060-011	PIP PREAMP ASS'Y.	6
3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	1000138	CLAMP, SPLIT, GYRO	4
3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	2021500	IRIG PREALIGNED ASS'Y.	2
1	2018750	HOUSING STABLE MEMBER	1
011	LIST OF MATERIALS		

2018605 M

3A

2018605 REV M SHEET 1

F-3



28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
A11 3
38 SEE NOTE 4
A12 3
38 SEE NOTE 4
A3 5 SEE NOTE 10
38 SEE NOTE 4
23 SEE NOTE 8
26 SEE NOTE 3A
24
A9
A11
A12
E23
A3
A4
A6
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3A
24
23 SEE NOTE 8
26 SEE NOTE 3A
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
33 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14
38 SEE NOTE 4
A18 11
38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
35 SEE NOTE 3B
A17 10
29 SEE NOTE 3A 2 PLACES
18
25 SEE NOTE 3A
Y
19
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
SEE NOTE 9 TYP
A17
A18
A13
J14
P14
A1X
A8
A10
T1
R6
1
2
A13 9
38 SEE NOTE 4
A1 5 SEE NOTE 10
38 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
26 SEE NOTE 3A
23 SEE NOTE 8
26 SEE NOTE 3A
24
T1 7
A2 5 SEE NOTE 10
38 SEE NOTE 4
28 SEE NOTE 3A 12 PLACES
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
29 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
A16
A14
R4
R5
A15
A5
MP1X
23 SEE NOTE 8
26 SEE NOTE 3A
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
28 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
38 SEE NOTE 4
40
41
20 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
S2 15
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 2
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
26 SEE NOTE 3A
24
42
30 SEE NOTE 3A 2 PLACES
R3 16 SEE NOTE 7
MP3 2
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
J13
P13
S2
R1
R2
R3
E47
MP2Y
MP3Z
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 2
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES

MASTER

2018605 REV M SHEET 1

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.13 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.13 ± .02	YES

TABLE I

CABLE CLAMP (23)

PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1 & R2

PART NO.	VALUE Ω
1010928-289	100
-287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-215	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
-126	2.0
1010928-097	1.0

TABLE III

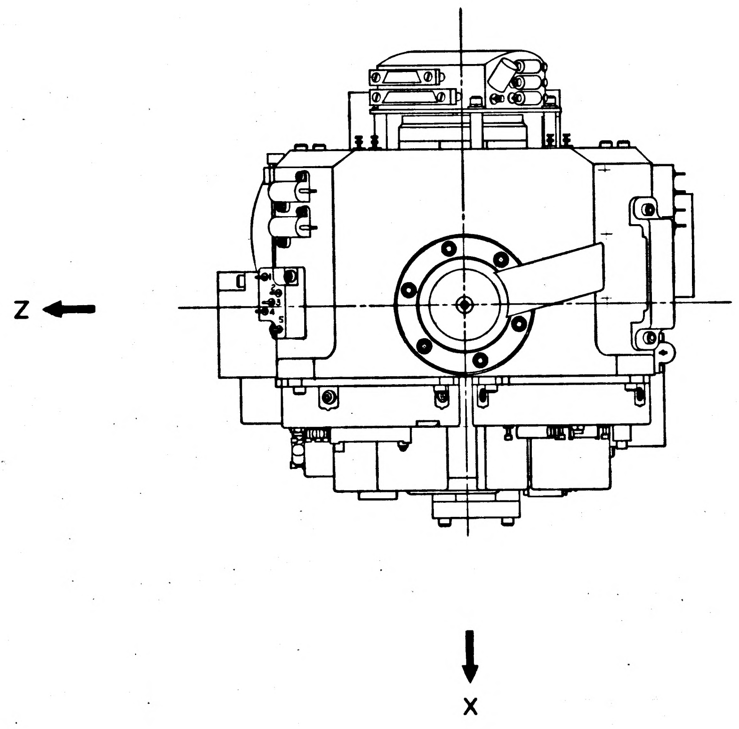
RESISTOR R3

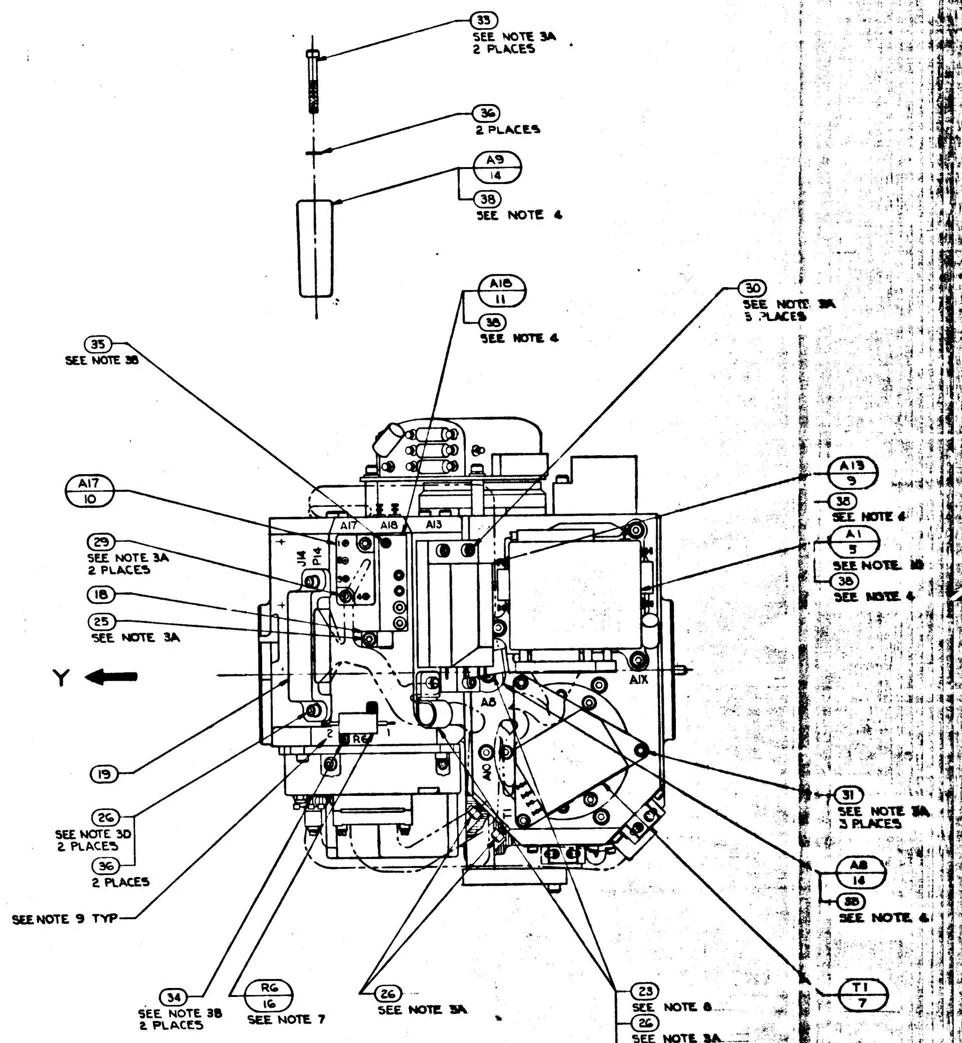
PART NO.	VALUE Ω
1010928-400	1430
-349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
-153	3.83
1010928-121	1.78

TABLE IV

RESISTORS R4, R5 & R6

PART NO.	VALUE Ω
1010928-386	1020
-369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
-215	16.9
-194	10.2
1010928-164	4.99

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SEE NOTE 3A
2 PLACES
36
2 PLACES
A9
14
38
SEE NOTE 4
A18
11
38
SEE NOTE 4
30
SEE NOTE 3A
3 PLACES
35
SEE NOTE 3B
A17
10
A17
A18
A13
J14
P14
29
SEE NOTE 3A
2 PLACES
18
25
SEE NOTE 3A
Y
A13
9
38
SEE NOTE 4
A1
5
SEE NOTE 10
38
SEE NOTE 4
A1X
A8
A10
R6
T1
19
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
SEE NOTE 9 TYP
31
SEE NOTE 3A
3 PLACES
A8
14
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R6
16
SEE NOTE 7
26
SEE NOTE 3A
23
SEE NOTE 8
26
SEE NOTE 3A
24
T1
7

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE AND TEST PER THE REQUIREMENTS OF PS2007203
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14) & (15), BETWEEN ITEM (2) AND ITEM (3) AND BETWEEN ITEM (3) AND ITEM (4)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS2007203
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. INERTIAL COMPONENT, PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639, TO BE ASSEMBLED TO STABLE MEMBER. PIP AND CALIBRATION MODULES NASA DRAWING NUMBERS 6007105-011 AND 2007105-011 TO BE SELECTED AND MATCHED TO PIP AND MAINTAINED IN CONJUCTION WITH THIS ASSEMBLY. MODULES TO BE ASSEMBLED IN PTA 6007000-011 OR PEA 2007201-011 RESPECTIVELY

3H

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17755			
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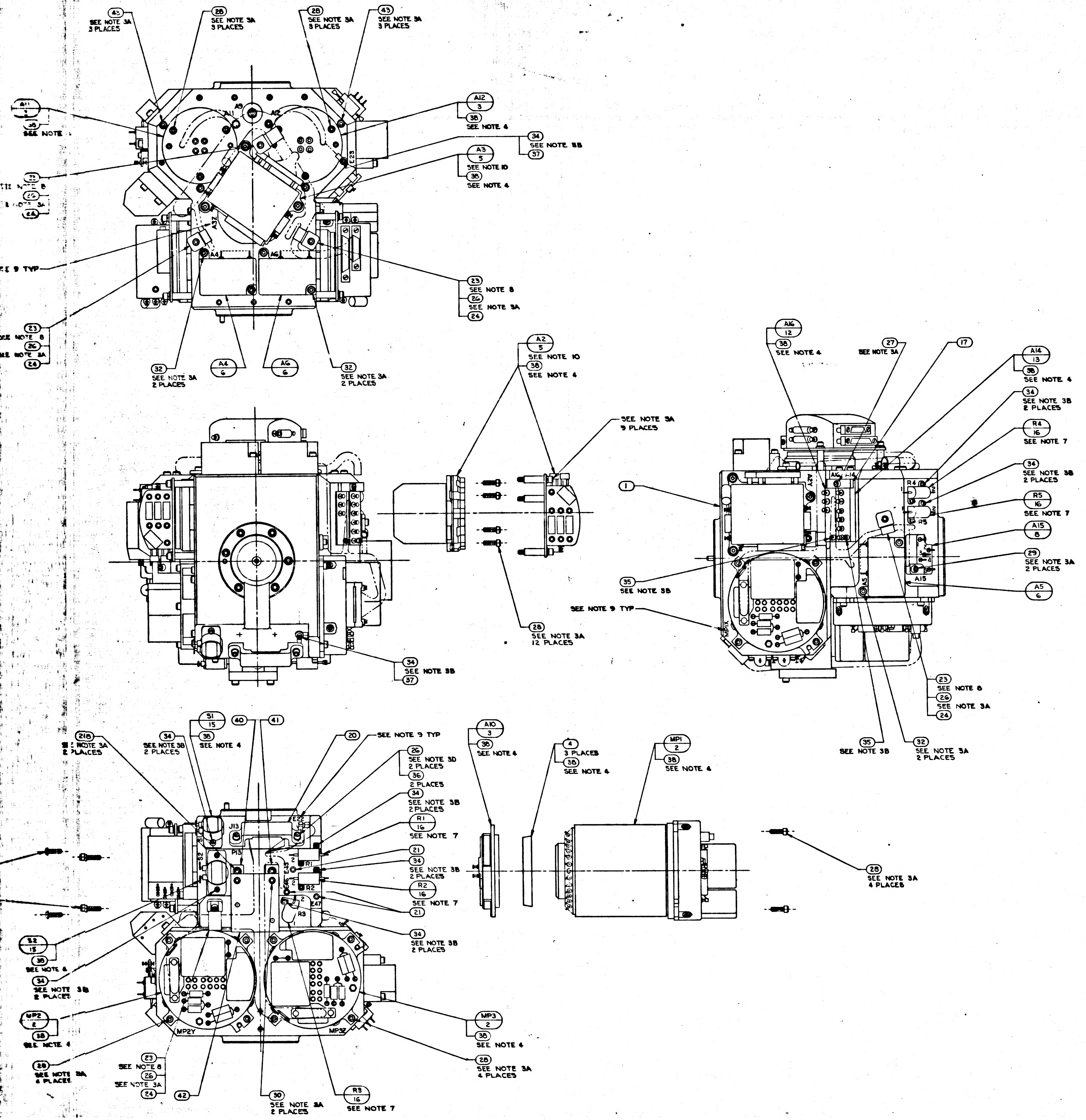
N	REVISED PER TDRR 18608	20 APR 65		WR



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SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
A11
38
SEE NOTE
A12
3
38
SEE NOTE 4
34
SEE NOTE 3B
37
A3
5
SEE NOTE 10
38
SEE NOTE 4
SEE NOTE 9 TYP
23
SEE NOTE 8
26
SEE NOTE 3A
24
A4
A6
32
SEE NOTE 3A
2 PLACES
A4
6
A6
6
32
SEE NOTE 3A
2 PLACES
A2
5
SEE NOTE 10
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
A16
12
38
SEE NOTE 4
27
SEE NOTE 3A
17
A14
13
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
R4
16
SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
8
29
SEE NOTE 3A
2 PLACES
A5
6
23
SEE NOTE 8
26
SEE NOTE 3A
24
35
SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
21B
SEE NOTE 3A
2 PLACES
34
SEE NOTE 3B
2 PLACES
51
15
38
SEE NOTE 4
40
41
20
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
J13
P13
R1
R2
R3
E47
52
15
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
MP2
2
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3A
24
42
30
SEE NOTE 3A
2 PLACES
R3
16
SEE NOTE 7
MP2Y
MP3Z
MP3
2
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
2
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

MASTER

9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
1	2018811	WEIGHT, BALANCE, S./M.	42
1	2018809	WEIGHT, BALANCE, S/M.	41
1	2018808	WEIGHT, BALANCE, S./M.	40
A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
2	1001488-12	SCREW, HEX., SOC. HD., SELF-LOCKING	33
6	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
5	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
4	1001488-5	SCREW, HEX., SOC. HD., SELF-LOCKING	29
35	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
1	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
13	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
7	1000223	WASHER, CABLE CLAMP	24
7	1000220-SEE NOTE 8	CLAMP, CABLE	23
1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	1001600-1	TERMINAL, INSULATED	21
1	2018780	BRACKET, CONN. 34 PIN	20
1	2018779	BRACKET, CONN. 44 PIN	19
1	2018778	CLAMP, THERMOSTAT	18
1	2018776	CLAMP, THERMOSTAT	17
6	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5 & R6	16
2	1001485	THERMOSTAT, SAFETY	15
2	2018641	HTR. ASS'Y. STABLE MEMBER	14
1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	2007060-011	PIP PREAMP ASS'Y.	6
3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	1000138	CLAMP, SPLIT, GYRO	4
3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	2021500-011	IRIG PREALIGNED ASS'Y.	2
1	2018750	HOUSING STABLE MEMBER	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
011	LIST OF MATERIALS		

2018604	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	
NEXT ASSY	USED ON		
APPLICATION			

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN R.G.S. DATE
CHECKED
APPROVAL [illegible] 23 Mar 65
APPROVAL
NASA APPROVAL [illegible] 3-23-65
MIT APPROVAL W. [illegible] 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

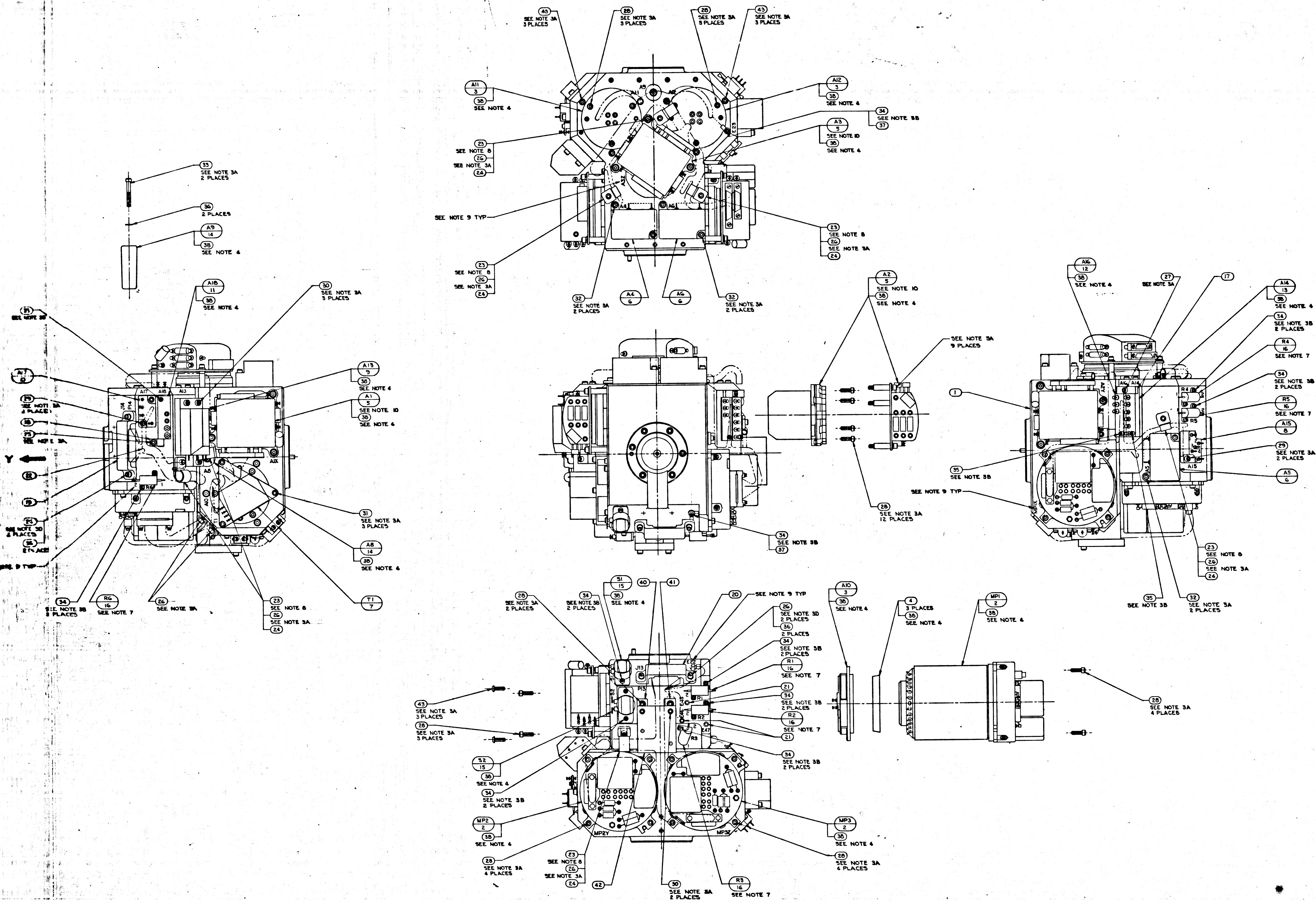
CODE IDENT NO. | SIZE | NASA DRAWING NO. 2018605
SCALE 1/1 | WT | SHEET 1 OF 1

2018605 N

3H

2018605	REV N	SHEET 1

F-3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A11 3 38 SEE NOTE 4
A12 3 38 SEE NOTE 4
34 SEE NOTE 3B 37
A3 5 SEE NOTE 10 38 SEE NOTE 4
23 SEE NOTE 8 26 SEE NOTE 3A 24
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
23 SEE NOTE 8 26 SEE NOTE 3A 24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
33 SEE NOTE 3A 2 PLACES
36 2 PLACES
A9 14 38 SEE NOTE 4
A18 11 38 SEE NOTE 4
30 SEE NOTE 3A 3 PLACES
35 SEE NOTE 3B
A17 10
29 SEE NOTE 3A 2 PLACES
18
29 SEE NOTE 3A
Y
22
19
24 SEE NOTE 3D 2 PLACES
36 2 PLACES
SEE NOTE 9 TYP
A13 9 38 SEE NOTE 4
A1 5 SEE NOTE 10 38 SEE NOTE 4
31 SEE NOTE 3A 3 PLACES
A8 14 38 SEE NOTE 4
T1 7
34 SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
26 SEE NOTE 3A
23 SEE NOTE 8 26 SEE NOTE 3A 24
A2 5 SEE NOTE 10 38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
34 SEE NOTE 3B 37
28 SEE NOTE 3A 12 PLACES
A16 12 38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
1
A15 8
29 SEE NOTE 3A 2 PLACES
A5 6
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8 26 SEE NOTE 3A 24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
28 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
51 15 38 SEE NOTE 4
40
41
20 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
43 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
52 15 38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
MP2 2 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8 26 SEE NOTE 3A 24
42
30 SEE NOTE 3A 2 PLACES
R3 16 SEE NOTE 7
MP3 2 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A10 3 38 SEE NOTE 4
4 3 PLACES 38 SEE NOTE 4
MP1 2 38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
A9 A11 A12 A7 A4 A6 E23
A17 A18 A13 J14 P14 A8 A1X
A7 A16 A14 R4 R5 A15 A5
J13 P13 R1 R2 R3 MP2Y MP3Z

MASTER

2018605 REV N SHEET 1

F-2

2018605

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.13 ± .02	YES
1-2	A8-RED	A10-2	↑	↑
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3	↓	↓
4-2	A9-BLU	A11-4	.13 ± .02	YES

TABLE I

CABLE CLAMP (23)

PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1 & R2

PART NO.	VALUE Ω
1010928-289	100
-287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-215	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
-126	2.0
1010928-097	1.0

TABLE III

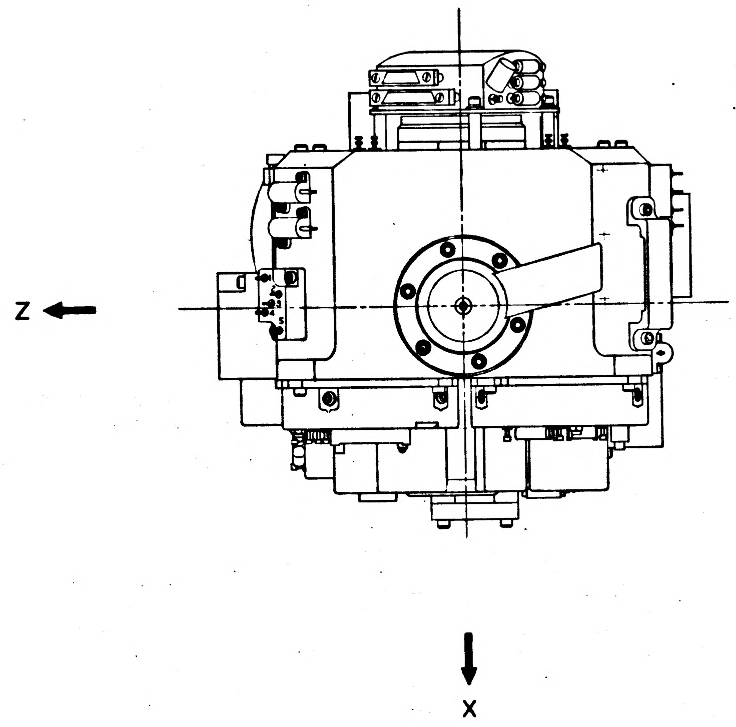
RESISTOR R3

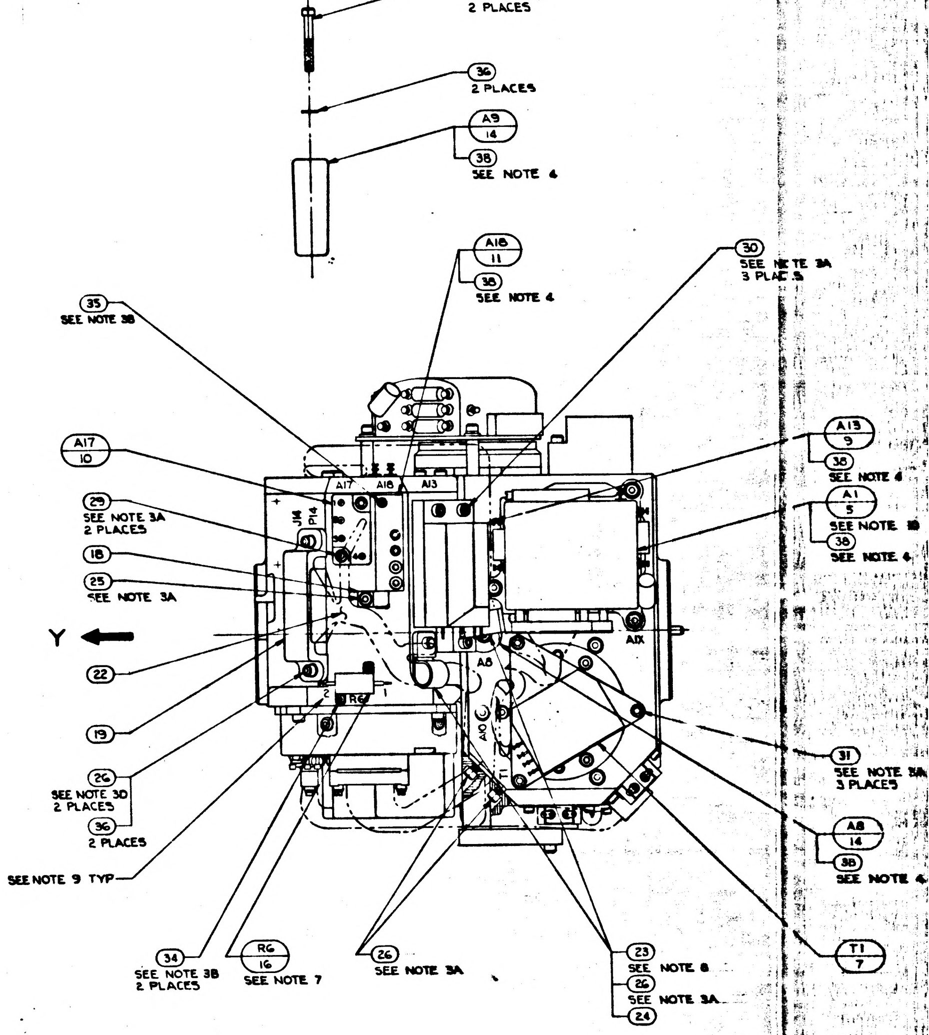
PART NO.	VALUE Ω
1010928-400	1430
-349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
-153	3.83
1010928-121	1.78

TABLE IV

RESISTORS R4, R5 & R6

PART NO.	VALUE Ω
1010928-386	1020
-369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
-215	16.9
-194	10.2
1010928-164	4.99





(33) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9 14
(38) SEE NOTE 4
A18 11
(38) SEE NOTE 4
(30) SEE NOTE 3A 3 PLACES
(35) SEE NOTE 3B
A17 10
(29) SEE NOTE 3A 2 PLACES
(18)
(25) SEE NOTE 3A
Y
(22)
(19)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
A17
A18
A13
J14
P14
A8
A10
T1
R6
AIX
A13 9
(38) SEE NOTE 4
A1 5
SEE NOTE 10
(38) SEE NOTE 4
(31) SEE NOTE 3A 3 PLACES
A8 14
(38) SEE NOTE 4
T1 7
(34) SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
(26) SEE NOTE 3A
(23) SEE NOTE 8
(26) SEE NOTE 3A
(24)

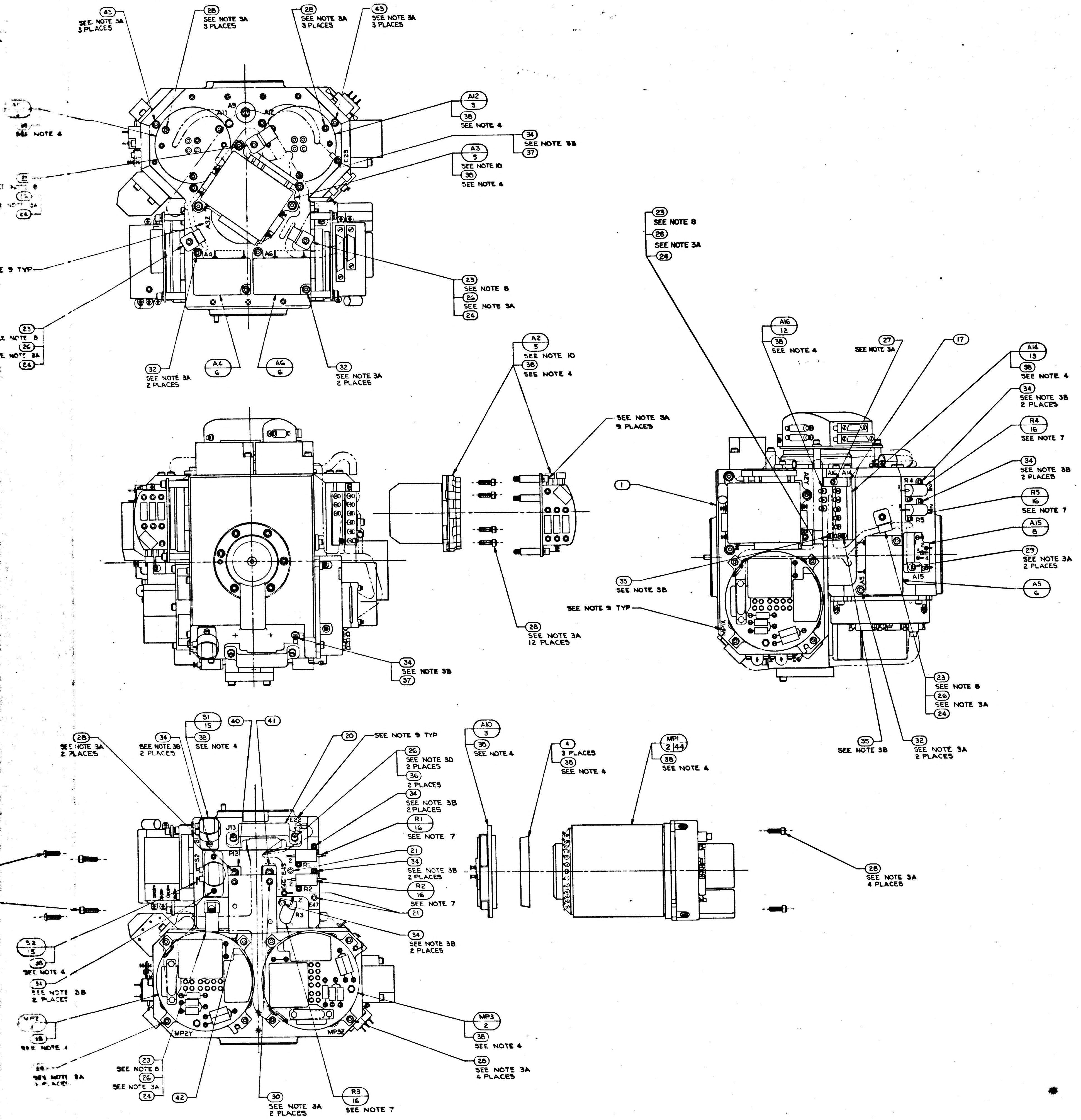
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE AND TEST PER THE REQUIREMENTS OF PS2007203
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14) & (15), BETWEEN ITEM (2) AND ITEM (3) AND BETWEEN ITEM (3) AND ITEM (4)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS2007203
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. INERTIAL COMPONENT, PIP PREALIGNED ASSEMBLY NASA DRAWING NO. 2018639, TO BE ASSEMBLED TO STABLE MEMBER. PIP AND CALIBRATION MODULES NASA DRAWING NUMBERS 6007105-011 AND 2007105-011 TO BE SELECTED AND MATCHED TO PIP AND MAINTAINED IN CONJUCTION WITH THIS ASSEMBLY. MODULES TO BE ASSEMBLED IN PTA 6007000-011 OR PEA 2007201-011 RESPECTIVELY

3H

	REV	SHEET
2018605	N	1

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17755			
M	REPLACES REV L WITH CHANGES TDRR 17755	23 [illegible]		WR.
N	REVISED PER TDRR 18608	20APR65		WR.
P	REVISED PER TDRR 19266	25May65		WR
R	REVISED PER TDRR 19267	25May65		WR



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28 SEE NOTE 3A 3 PLACES
28 SEE NOTE 3A 3 PLACES
43 SEE NOTE 3A 3 PLACES
A9
A11
A12
A12 3
38 SEE NOTE 4
34 SEE NOTE 3B 37
A3 5 SEE NOTE 10
38 SEE NOTE 4
A32
A4
A6
E23
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3A
24
32 SEE NOTE 3A 2 PLACES
A4 6
A6 6
32 SEE NOTE 3A 2 PLACES
A2 5 SEE NOTE 10
38 SEE NOTE 4
SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B 37
23 SEE NOTE 8
26 SEE NOTE 3A
24
A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
17
A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
29 SEE NOTE 3A 2 PLACES
A5 6
1
35 SEE NOTE 3B
SEE NOTE 9 TYP
23 SEE NOTE 8
26 SEE NOTE 3A
24
35 SEE NOTE 3B
32 SEE NOTE 3A 2 PLACES
28 SEE NOTE 3A 2 PLACES
34 SEE NOTE 3B 2 PLACES
S1 15
38 SEE NOTE 4
40
41
20 SEE NOTE 9 TYP
26 SEE NOTE 3D 2 PLACES
36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
21
34 SEE NOTE 3B 2 PLACES
J13
P13
E22
P1
P2
R3
E47
S2
MP2Y
MP3Z
A10 3
38 SEE NOTE 4
4 3 PLACES
38 SEE NOTE 4
MP1 2 44
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
MP3 2
38 SEE NOTE 4
28 SEE NOTE 3A 4 PLACES
23 SEE NOTE 8
SEE NOTE 3A
24
42
30 SEE NOTE 3A 2 PLACES
R3 16 SEE NOTE 7

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
—	3	2021500-021	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
1	1	2018811	WEIGHT, BALANCE, S./M.	42
1	1	2018809	WEIGHT, BALANCE, S/M.	41
1	1	2018808	WEIGHT, BALANCE, S./M.	40
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
A/R	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
18	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
2	2	1001488-12	SCREW, HEX., SOC. HD., SELF-LOCKING	33
6	6	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
5	5	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
4	4	1001488-5	SCREW, HEX., SOC. HD., SELF-LOCKING	29
35	35	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
1	1	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	14	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
1	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
1	1	2018780	BRACKET, CONN. 34 PIN	20
1	1	2018779	BRACKET, CONN. 44 PIN	19
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
6	6	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5 & R6	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
1	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
1	1	2018636	THERMO. ASS'Y, TEMP. ALARM	12
1	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	1000138	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-011	IRIG PREALIGNED ASS'Y.	2
1	1	2018750	HOUSING STABLE MEMBER	1
021	011	LIST OF MATERIALS		

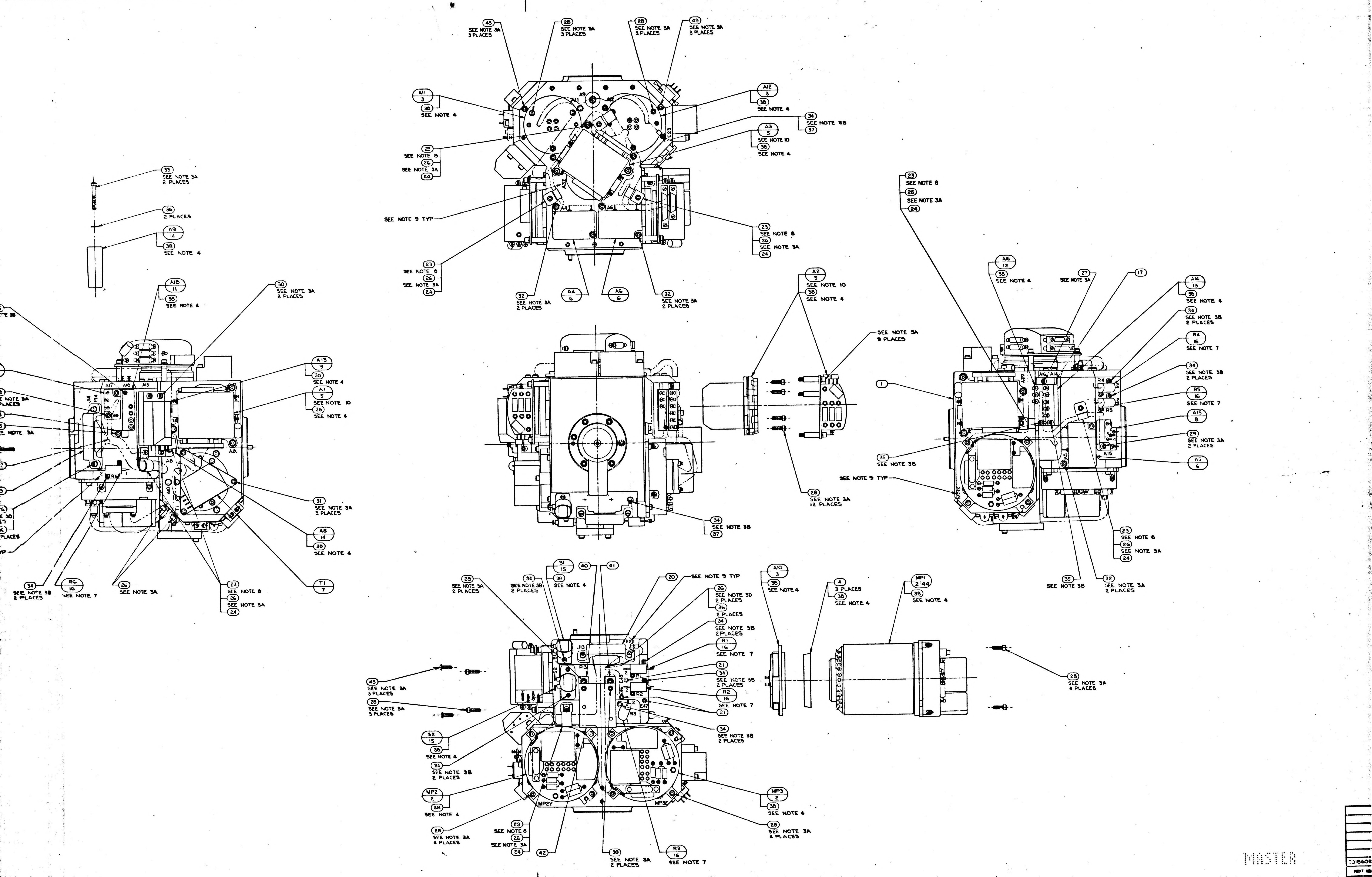
2018605 R

3H

2018604	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DRAWN R.G.S. DATE CHECKED APPROVAL 23Mar65 APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS STABLE MEMBER ASSEMBLY
NEXT ASSY	USED ON	MATERIAL		
APPLICATION		HEAT TREATMENT FINAL FINISH	NASA APPROVAL 3-23-65 MIT APPROVAL 23Mar65	CODE IDENT NO. 80230 SIZE NASA DRAWING NO. 2018605 SCALE 1/1 WT SHEET 1 OF 1

MASTER

2018605 REV R SHEET 1



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28 SEE NOTE 3A 3 PLACES
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43 SEE NOTE 3A 3 PLACES
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A12 3
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A13 9
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A1 5
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38 SEE NOTE 4
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A8 14
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T1 7
34 SEE NOTE 3B 2 PLACES
R6 16 SEE NOTE 7
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23 SEE NOTE 8
26 SEE NOTE 3A
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A2 5
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SEE NOTE 3A 9 PLACES
28 SEE NOTE 3A 12 PLACES
34 SEE NOTE 3B
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A16 12
38 SEE NOTE 4
27 SEE NOTE 3A
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A14 13
38 SEE NOTE 4
34 SEE NOTE 3B 2 PLACES
R4 16 SEE NOTE 7
34 SEE NOTE 3B 2 PLACES
R5 16 SEE NOTE 7
A15 8
29 SEE NOTE 3A 2 PLACES
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36 2 PLACES
34 SEE NOTE 3B 2 PLACES
R1 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
R2 16 SEE NOTE 7
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34 SEE NOTE 3B 2 PLACES
A10 3
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43 SEE NOTE 3A 3 PLACES
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MASTER

2018605 REV R SHEET 1

E-2

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A1C-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

CABLE CLAMP ㉓

PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1 & R2

PART NO.	VALUE Ω
1010928-289	100
-287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-215	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
-126	2.0
1010928-097	1.0

TABLE III

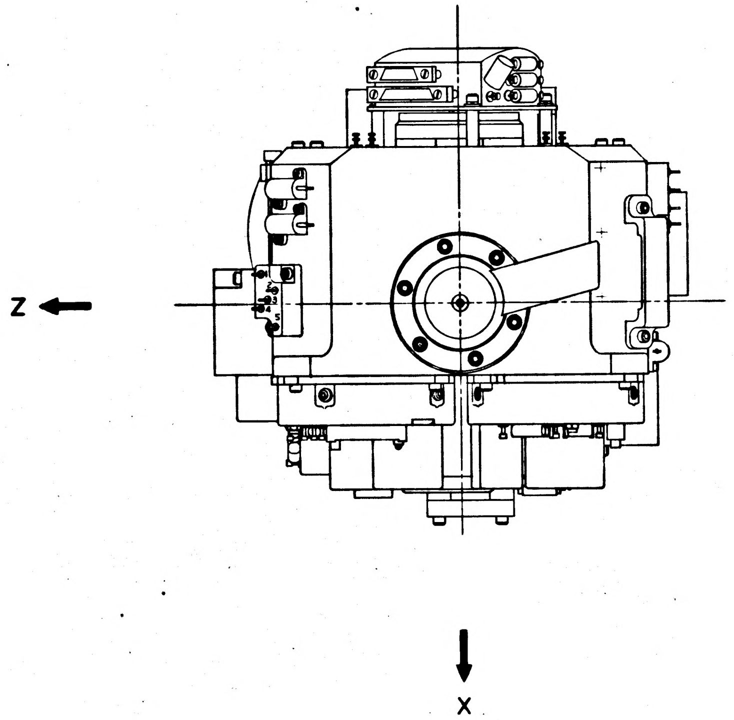
RESISTOR R3

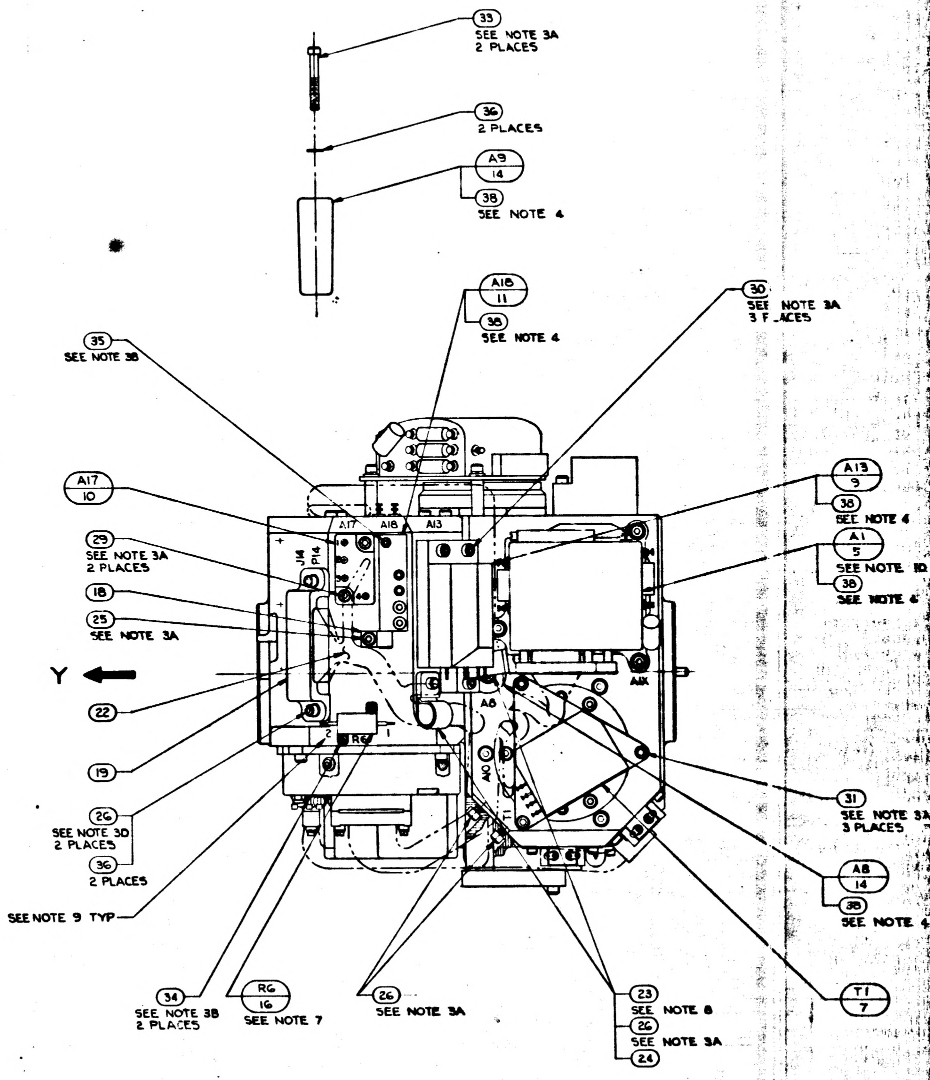
PART NO.	VALUE Ω
1010928-400	1430
-349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
-153	3.83
1010928-121	1.78

TABLE IV

RESISTORS R4, R5 & R6

PART NO.	VALUE Ω
1010928-386	1020
-369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
-215	16.9
-194	10.2
1010928-164	4.99




㉝ SEE NOTE 3A 2 PLACES
㊱ 2 PLACES
A9 / 14
㊳ SEE NOTE 4
A18 / 11
㊳ SEE NOTE 4
㉚ SEE NOTE 3A 3 PLACES
㉟ SEE NOTE 3B
A17 / 10
㉙ SEE NOTE 3A 2 PLACES
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㉖ SEE NOTE 3D 2 PLACES
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㊳ SEE NOTE 4
A1 / 5
SEE NOTE 10
㊳ SEE NOTE 4
㉛ SEE NOTE 3A 3 PLACES
A8 / 14
㊳ SEE NOTE 4
T1 / 7
㉞ SEE NOTE 3B 2 PLACES
R6 / 16 SEE NOTE 7
㉖ SEE NOTE 3A
㉓ SEE NOTE 8
㉖ SEE NOTE 3A
㉔

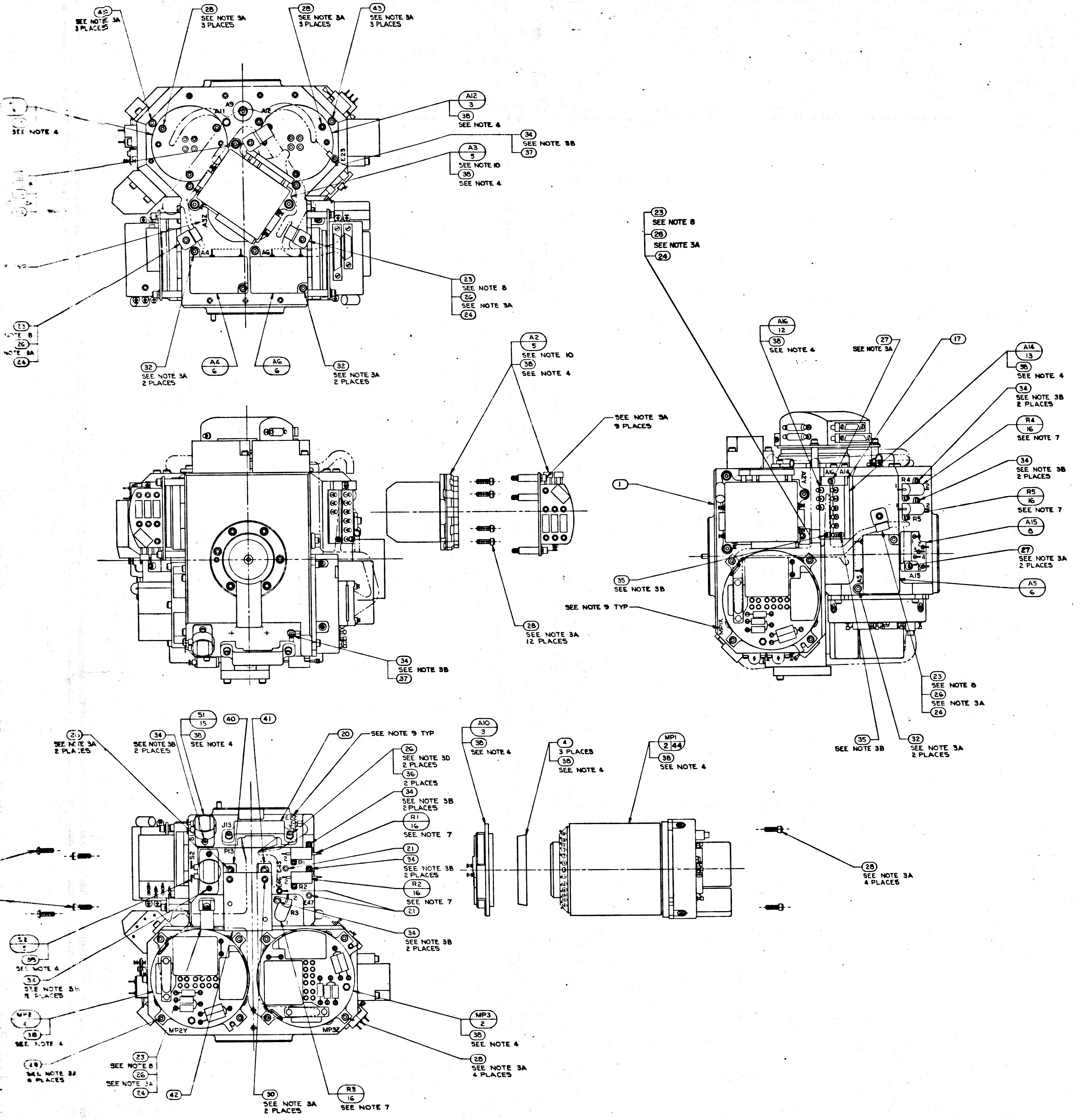
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 5.0 IN-LB
   B. 3.5 IN-LB
   C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM ㊳ TO CONTACT SURFACE BETWEEN ITEM ① AND ITEMS ②,③,⑤,⑨,⑪,⑫,⑬,⑭ & ⑮, BETWEEN ITEM ② AND ITEM ③ AND BETWEEN ITEM ③ AND ITEM ④
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS 2018601
8. ITEM ㉓ TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $^{.10}_{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF. AMP. NASA DWG. NO. 2007184-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 OR 6007105-011 PER PS 2010603 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSE TORQUE ASS'Y 6007000-011

3H

	REV	SHEET
2018605	R	1

REVISIONS TDRR 17755				
SYM	DESCRIPTION	DATE	APPROVAL	
M	REPLACES REV L WITH CHANGES TDRR 17755	23 Mar 65		WR
N	REVISED PER TDRR 18608	20 APR 65		WR
P	REVISED PER TDRR 19266	25 May 65		WR
R	REVISED PER TDRR 19267	25 May 65		WR
S	REVISED PER TDRR 20088	7/21/65	AJB	WR
T	REVISED PER TDRR 21190	7/23/65	AJB	WR



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SEE NOTE 3A
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3 PLACES
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SEE NOTE 3A
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SEE NOTE 4
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3 PLACES
38
SEE NOTE 4
MP1
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SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
—	3	2021500-021	IRIG PREALIGNED ASSY	44
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18	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
2	2	1001488-12	SCREW, HEX., SOC. HD., SELF-LOCKING	33
6	6	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
5	5	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
2	2	1001488-5	SCREW, HEX., SOC. HD., SELF-LOCKING	29
35	35	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
3	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	14	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
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1	1	2018636	THERMO. ASS'Y, TEMP. ALARM	12
1	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
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3	—	2021500-011 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
1	1	2018750	HOUSING STABLE MEMBER	1
021	011	LIST OF MATERIALS		

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN R.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL W.J. 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER ASSEMBLY

CODE IDENT NO. 80230
SIZE
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 1

2018605 T

2018605 REV SHEET 1

MASTER

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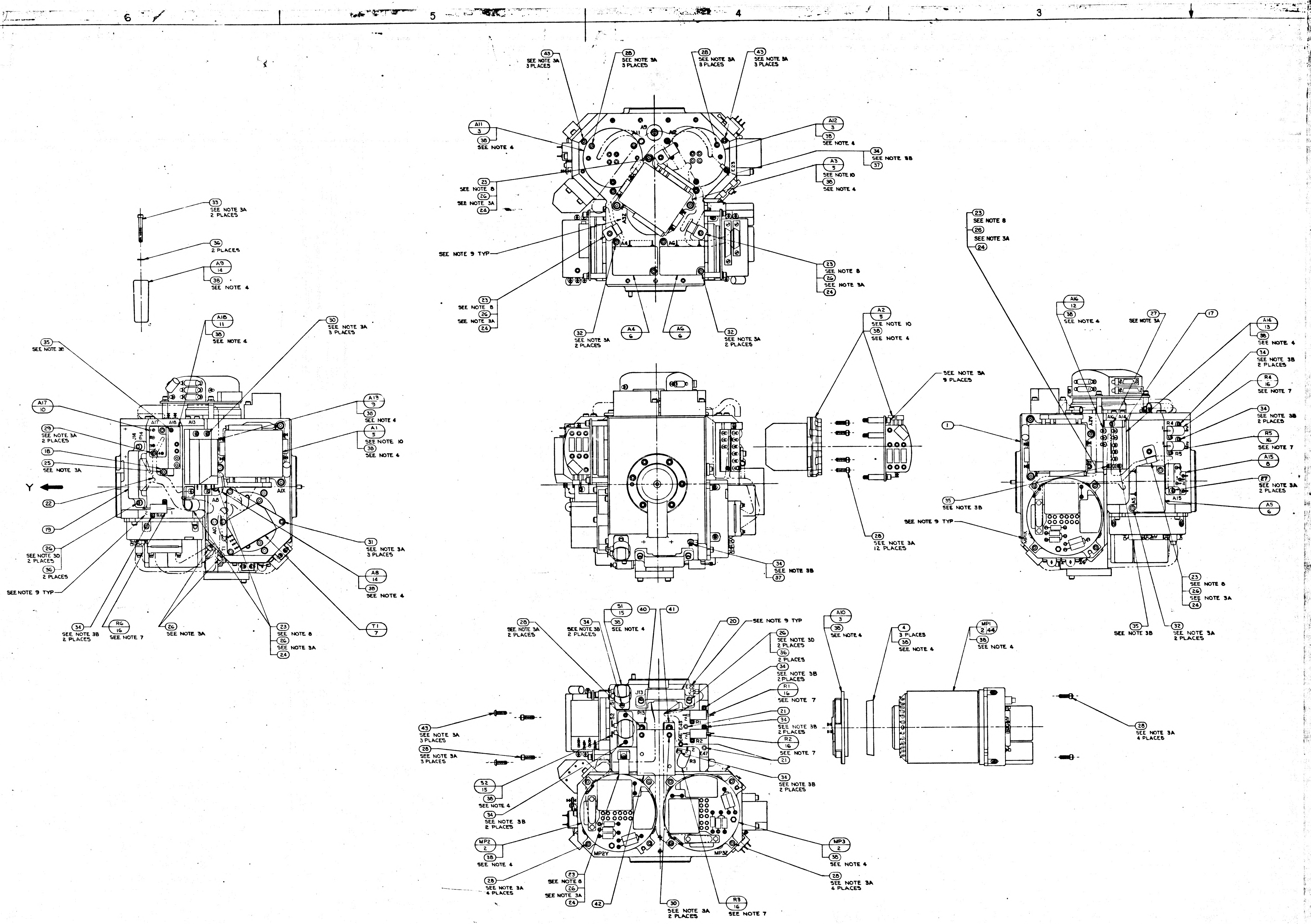
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2 PLACES
A5
6
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
A2Y
A16
A14
R4
R5
A15
A5
MP1X
23
SEE NOTE 8
26
SEE NOTE 3A
24
35
SEE NOTE 3B
32
SEE NOTE 3A
2 PLACES
28
SEE NOTE 3A
2 PLACES
34
SEE NOTE 3B
2 PLACES
S1
15
38
SEE NOTE 4
40
41
20
SEE NOTE 9 TYP
26
SEE NOTE 3D
2 PLACES
36
2 PLACES
34
SEE NOTE 3B
2 PLACES
R1
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
R2
16
SEE NOTE 7
21
34
SEE NOTE 3B
2 PLACES
43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
S2
15
38
SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
MP2
2
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3A
24
42
30
SEE NOTE 3A
2 PLACES
R3
16
SEE NOTE 7
MP3
2
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
J13
P13
S1
S2
R1
R2
R3
E47
MP2Y
MP3Z
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
2 44
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
6
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4
3
2

2018605	REV	SHEET
	T	1

F2

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

CABLE CLAMP (23)

PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1 & R2

PART NO.	VALUE Ω
1010928-289	100
-287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-215	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
-126	2.0
1010928-097	1.0

TABLE III

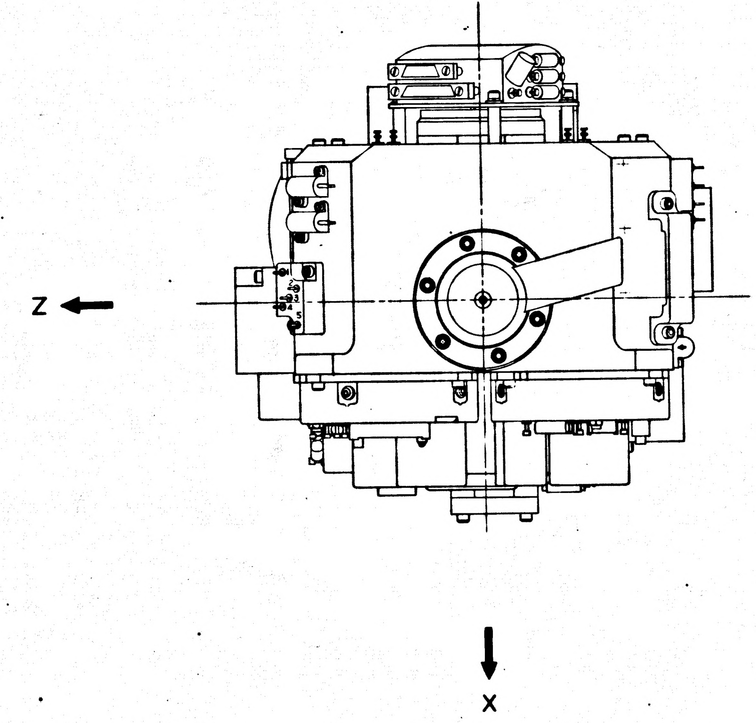
RESISTOR R3

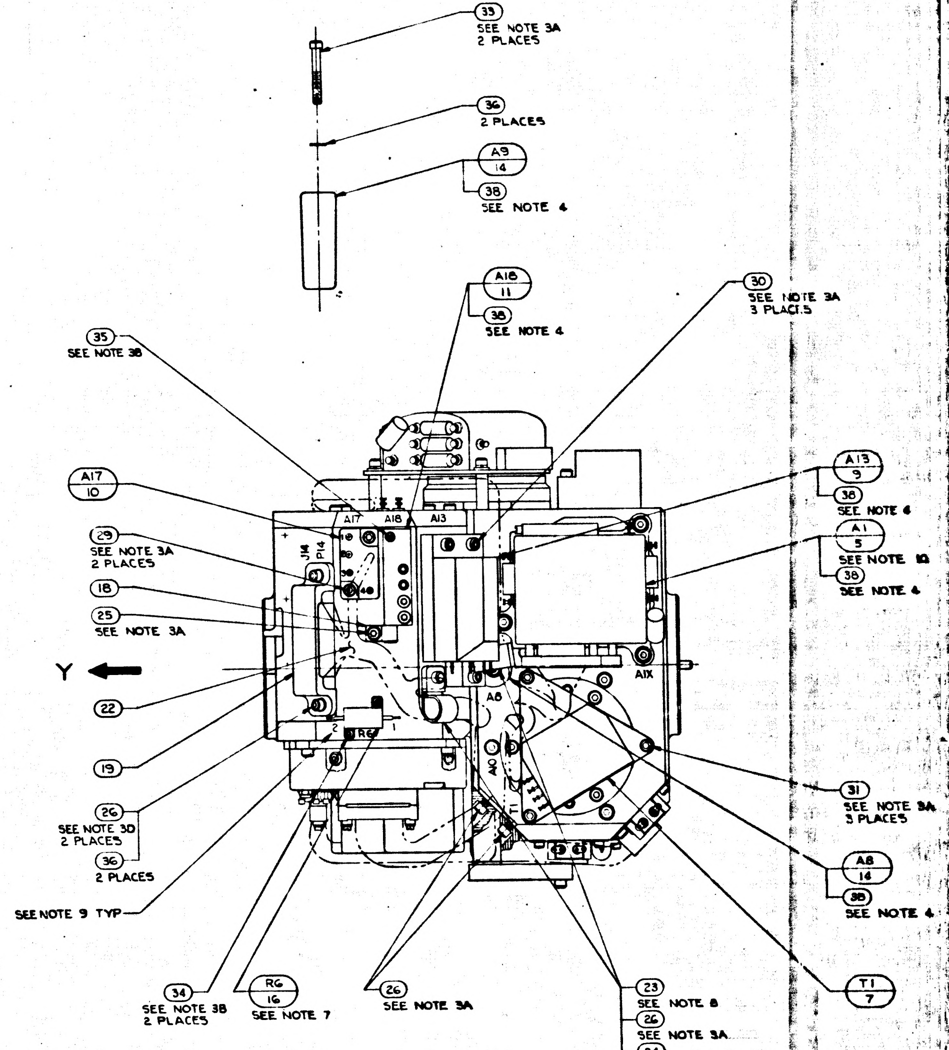
PART NO.	VALUE Ω
1010928-400	1430
-349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
-153	3.83
1010928-121	1.78

TABLE IV

RESISTORS R4, R5 & R6

PART NO.	VALUE Ω
1010928-386	1020
-369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
-215	16.9
-194	10.2
1010928-164	4.99

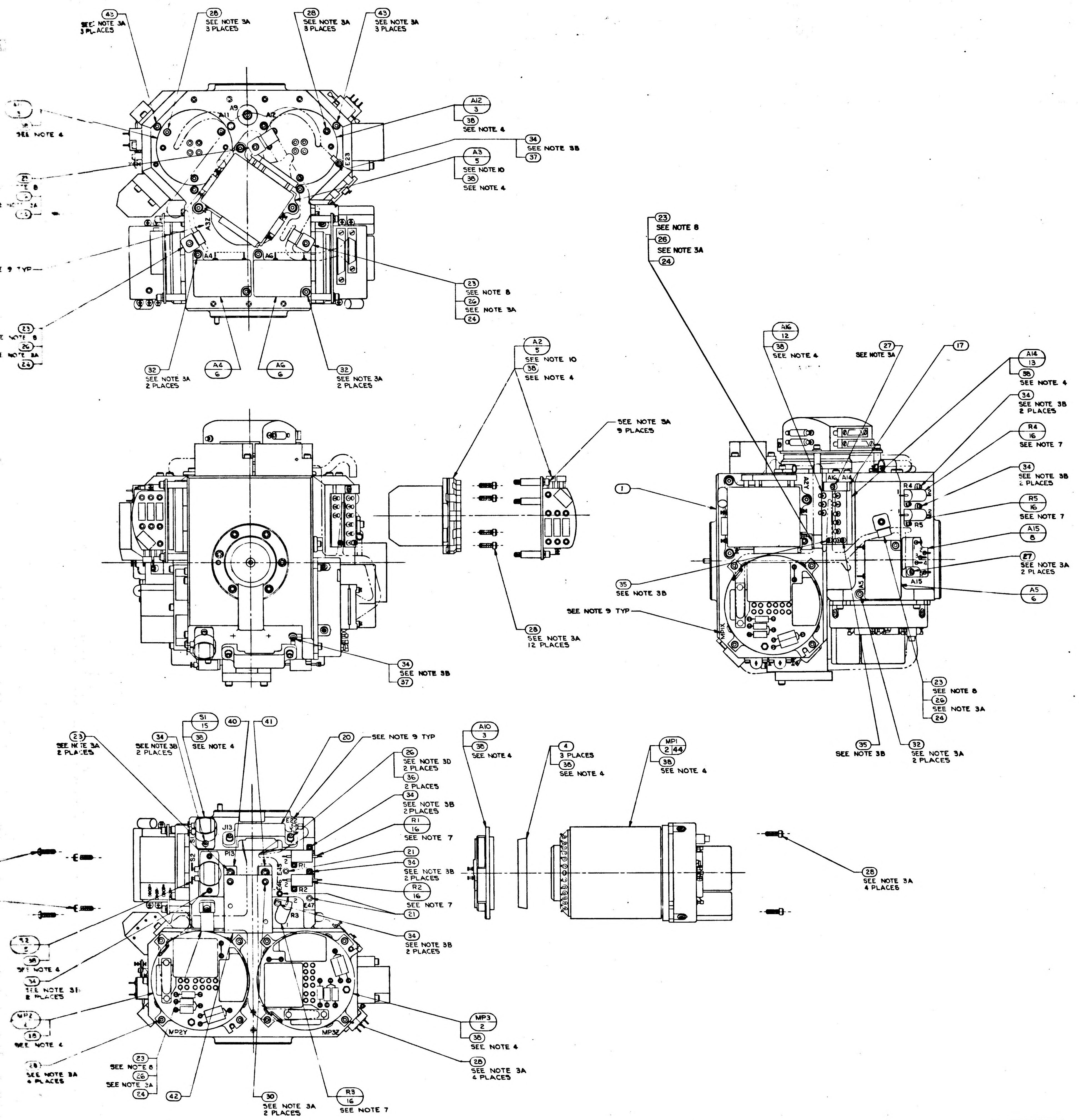



(33) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9 / 14
(38) SEE NOTE 4
A18 / 11
(38) SEE NOTE 4
(30) SEE NOTE 3A 3 PLACES
(35) SEE NOTE 3B
A17 / 10
(29) SEE NOTE 3A 2 PLACES
(18)
(25) SEE NOTE 3A
Y
(22)
(19)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
A13 / 9
(38) SEE NOTE 4
A1 / 5
SEE NOTE 10
(38) SEE NOTE 4
A17
A18
A13
J14
P14
AIX
A8
A10
R6
(31) SEE NOTE 3A 3 PLACES
A8 / 14
(38) SEE NOTE 4
T1 / 7
(34) SEE NOTE 3B 2 PLACES
R6 / 16 SEE NOTE 7
(26) SEE NOTE 3A
(23) SEE NOTE 8
(26) SEE NOTE 3A
(24)

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2), (3), (5), (9), (11), (12), (13), (14) & (15), BETWEEN ITEM (2) AND ITEM (3) AND BETWEEN ITEM (3) AND ITEM (4)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS 2018601
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF AMP NASA DWG. NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 OR 6007105-011 PER PS 2010603 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSE TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-011 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY.

REVISIONS TDRR 17755				
SYM	DESCRIPTION	DATE	APPROVAL	
M	REPLACES REV L WITH CHANGES TDRR 17755	23 Mar 65		W.L.
N	REVISED PER TDRR 18608	20 APR 65		WK
P	REVISED PER TDRR 19266	25 May 65		WK
R	REVISED PER TDRR 19267	25 May 65		WK
S	REVISED PER TDRR 20088	7/21/65	ajB	WK
T	REVISED PER TDRR 21190	7/23/65	ajB	WK
U	REVISED PER TDRR 21671	8-31-65		WK
V	REVISED PER TDRR 21686	8-3-65		WK



43
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
SEE NOTE 4
A9
A11
A12
E23
A3Z
A4
A6
A12
3
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SEE NOTE 4
34
SEE NOTE 3B
37
A3
5
SEE NOTE 10
38
SEE NOTE 4
9 TYP
23
SEE NOTE 8
26
SEE NOTE 3A
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SEE NOTE 3A
2 PLACES
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SEE NOTE 3A
2 PLACES
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9 PLACES
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SEE NOTE 3A
12 PLACES
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SEE NOTE 3B
SEE NOTE 9 TYP
A16
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SEE NOTE 4
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SEE NOTE 3A
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SEE NOTE 4
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2 PLACES
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2 PLACES
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SEE NOTE 7
A15
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SEE NOTE 3A
2 PLACES
A5
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A2Y
A16
A14
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SEE NOTE 8
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SEE NOTE 3A
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SEE NOTE 3B
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SEE NOTE 3A
2 PLACES
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SEE NOTE 3A
2 PLACES
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2 PLACES
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SEE NOTE 4
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SEE NOTE 9 TYP
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SEE NOTE 3D
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SEE NOTE 3A
4 PLACES
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SEE NOTE 4
SEE NOTE 3A
4 PLACES
23
SEE NOTE 8
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SEE NOTE 3A
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SEE NOTE 3A
2 PLACES
R3
16
SEE NOTE 7
MP3
2
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SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
—	3	2021500-021	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
1	1	2018811	WEIGHT, BALANCE, S./M.	42
1	1	2018809	WEIGHT, BALANCE, S./M.	41
1	1	2018808	WEIGHT, BALANCE, S./M.	40
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
A/R	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
18	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-12~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
8	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
5	5	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
2	2	1001488-5	SCREW, HEX., SOC. HD., SELF-LOCKING	29
35	35	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
3	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	14	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
1	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
1	1	2018780	BRACKET, CONN. 34 PIN	20
1	1	2018779	BRACKET, CONN. 44 PIN	19
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
6	6	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5 & R6	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018[illegible]41	HTR. ASS'Y. STABLE MEMBER	14
1	1	2018[illegible]7	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
1	1	2018636	THERMO. ASS'Y, TEMP. ALARM	12
1	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-011 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
1	1	2018750	HOUSING STABLE MEMBER	1
021	011	LIST OF MATERIALS		

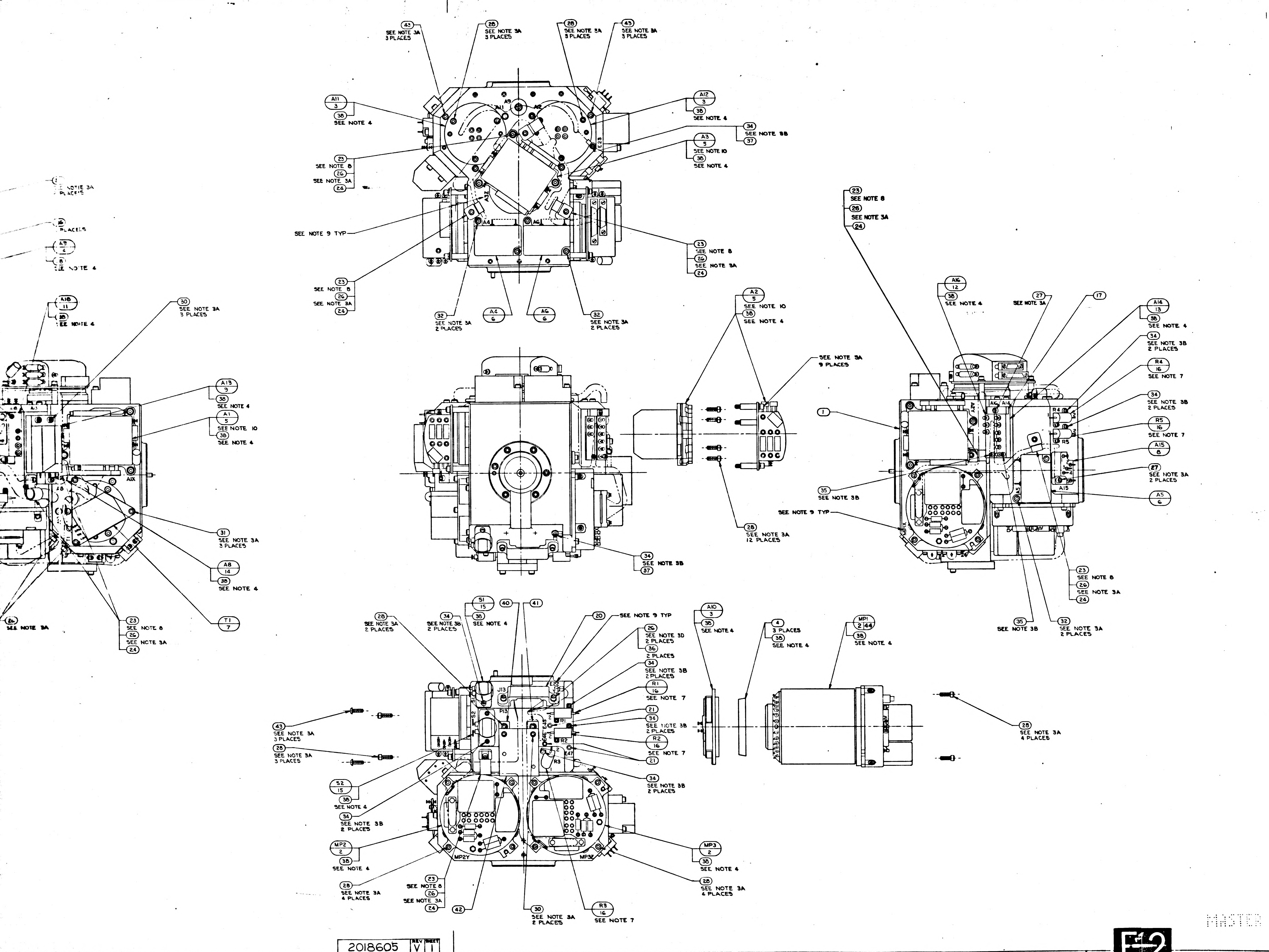
3H

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN R.G.S. DATE CHECKED APPROVAL 23 Mar 65 APPROVAL	STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL 3-23-65	CODE IDENT NO. 80230 · SIZE · NASA DRAWING NO. 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL 23 Mar 65	SCALE 1/1 · WT · SHEET 1 OF 1
APPLICATION				

2018605	REV V	SHEET 1

MASTER

F3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2 PLACES
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SEE NOTE 3A
4 PLACES
J13
P13
S2
R1
R2
R3
MP2Y
MP3Z
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2

—	3	2021500-021
9	9	1010891-15
1	1	2018811
1	1	2018809
1	1	2018808
A/R	A/R	MIL-T-713, TYPE
A/R	A/R	1006879 SEE
2	2	MS15795-302
6	6	MS15795-708
3	3	1011625-11
18	18	1011625-9
~~8~~	~~8~~	~~[illegible]~~
8	8	1001488-10
3	3	1001488-7
5	5	1001488-6
2	2	1001488-5
35	35	1001488-4
3	3	1001488-3
14	14	1001488-2
1	1	1001488-1
8	8	1000223
8	8	1000220-SEE
1	1	2018796
3	3	1001600-1
1	1	2018780
1	1	2018779
	1	2018778
	1	2018776
6	6	1010928-
2	2	1001485
2	2	2018641
1	1	2018637
1	1	2018636
1	1	2018635
1	1	2007171-011
1	1	2007064-011
1	1	2007170-011
1	1	2007019-011
3	3	2007060-011
3	3	2018639
3	3	[illegible]
3	3	2018741
3	—	2021500-011
1	1	2018750
	QTY REQD	
021	011	

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION
CAMBRIDGE

DRAWN R.S.S.
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MASTER

F2

2018605 REV V SHEET 1

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

CABLE CLAMP (23)

PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1 & R2

PART NO.	VALUE Ω
1010928-289	100
-287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-215	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
-126	2.0
1010928-097	1.0

TABLE III

RESISTOR R3

PART NO.	VALUE Ω
1010928-400	1430
-349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
-153	3.83
1010928-121	1.78

TABLE IV

RESISTORS R4, R5 & R6

PART NO.	VALUE Ω
1010928-386	1020
-369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
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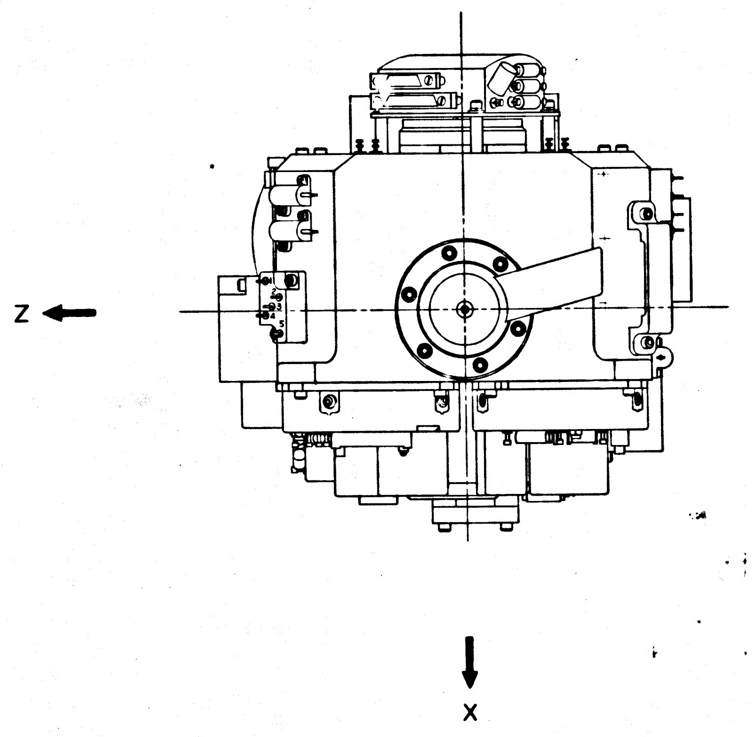
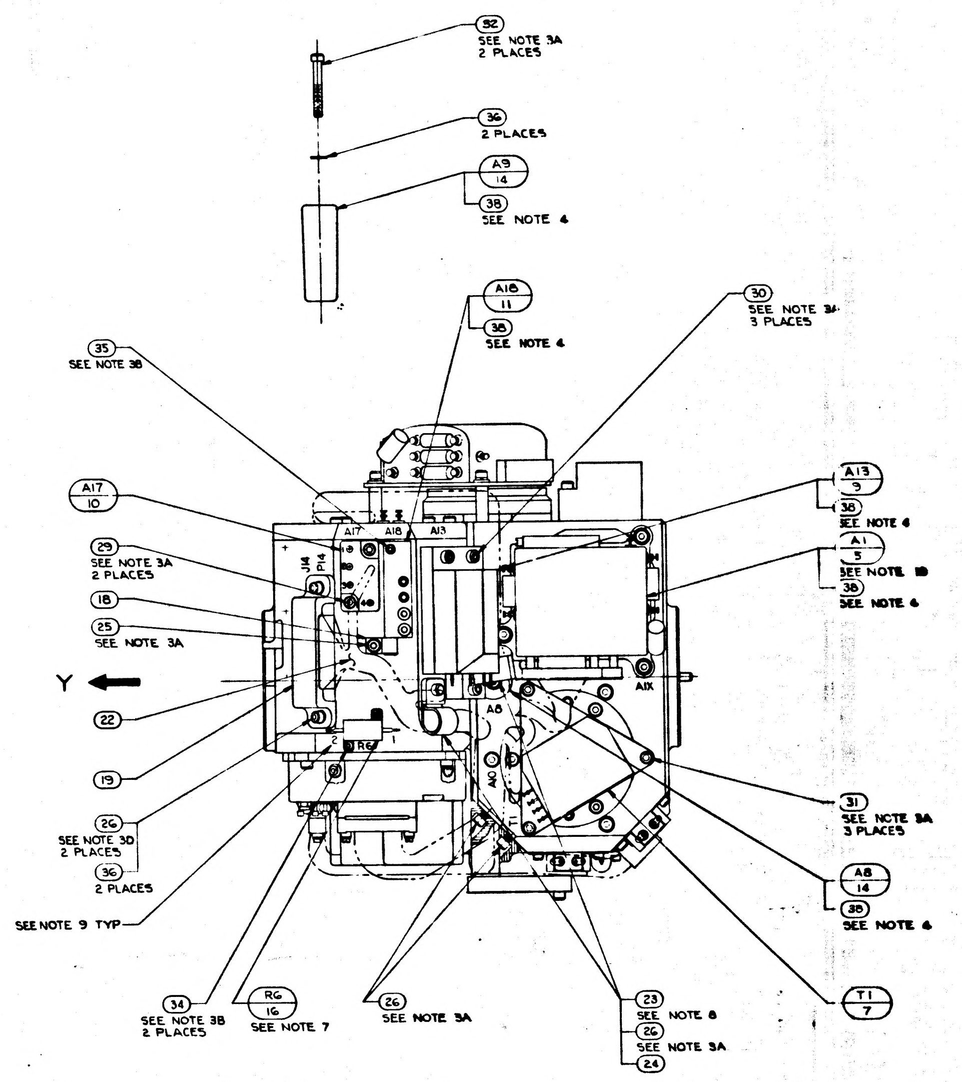
-194	10.2
1010928-164	4.99

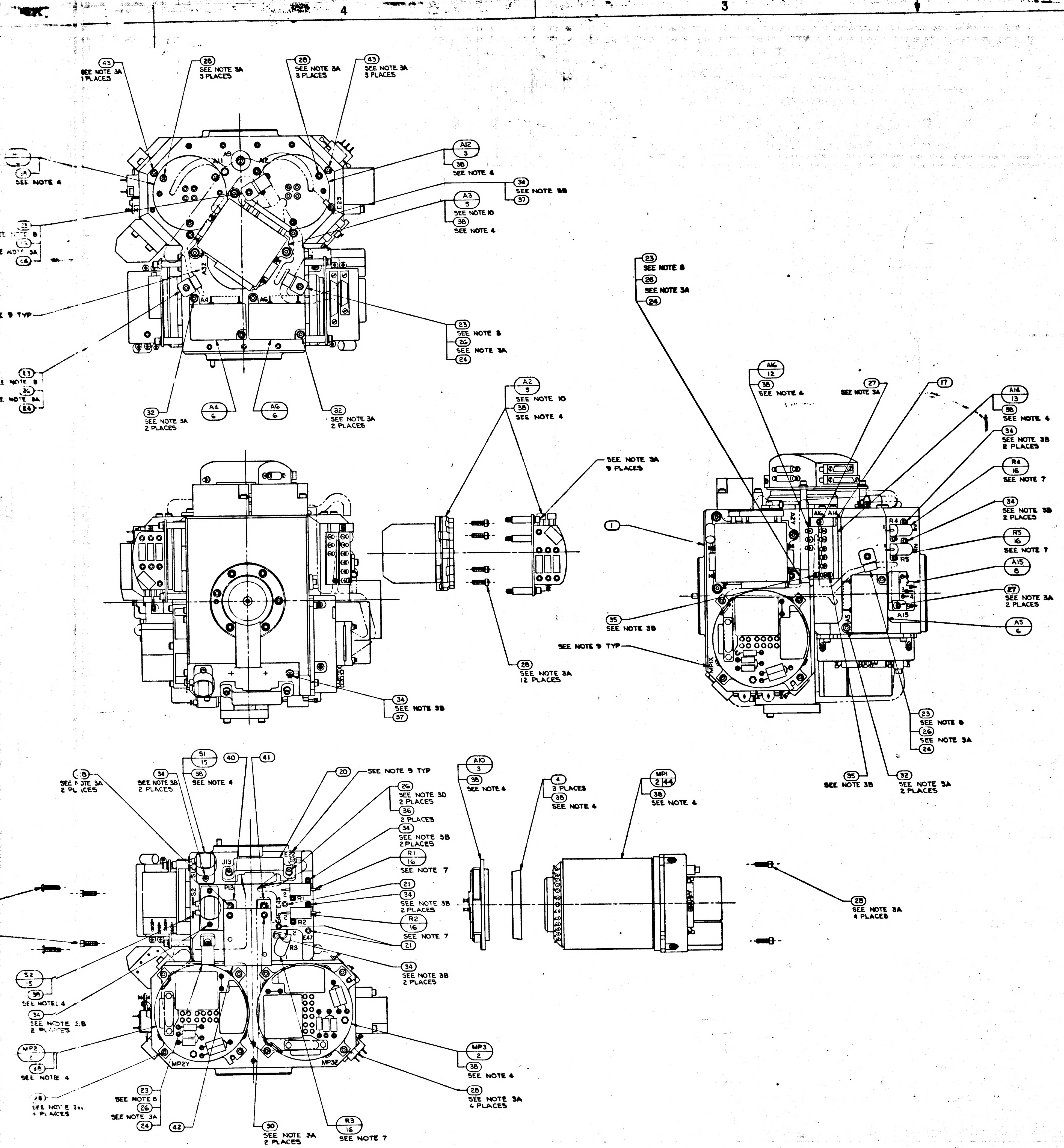



(32) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9 / 14
(38) SEE NOTE 4
A18 / 11
(38) SEE NOTE 4
(30) SEE NOTE 3A 3 PLACES
(35) SEE NOTE 3B
A17 / 10
(29) SEE NOTE 3A 2 PLACES
(18)
(25) SEE NOTE 3A
Y
(22)
(19)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
A17
A18
A13
J14
P14
R6
A8
A10
A1X
T1
A13 / 9
(38) SEE NOTE 4
A1 / 5 SEE NOTE 10
(38) SEE NOTE 4
(31) SEE NOTE 3A 3 PLACES
A8 / 14
(38) SEE NOTE 4
T1 / 7
(34) SEE NOTE 3B 2 PLACES
R6 / 16 SEE NOTE 7
(26) SEE NOTE 3A
(23) SEE NOTE 8
(26) SEE NOTE 3A
(24)

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14) & (15), BETWEEN ITEM (2) AND ITEM (3) AND BETWEEN ITEM (3) AND ITEM (4)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS 2018601
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF. AMP. NASA DWG. NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 OR 6007105-011 PER PS 2010603 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSE TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-011 MAY BE USED IN-011 CONFIGURATION OF THIS ASSY.

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17755			
M	REPLACES REV L WITH CHANGES TDRR 17755	23 Mar 65		WR
N	REVISED PER TDRR 18608	20 APR 65		WR
P	REVISED PER TDRR 19266	25 May 65		WR
R	REVISED PER TDRR 19267	25 May 65		WR
S	REVISED PER TDRR 20088	7/21/65	ajB	WR
T	REVISED PER TDRR 21190	7/23/65	ajB	WR
U	REVISED PER TDRR 21671	8-31-65		WR
V	REVISED PER TDRR 21686	8-31-65		WR
W	REVISED PER TDRR 22791	28 Sep 65		WR



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SEE NOTE 3A
1 PLACES
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SEE NOTE 3A
3 PLACES
28
SEE NOTE 3A
3 PLACES
43
SEE NOTE 3A
3 PLACES
A12
3
38
SEE NOTE 4
34
SEE NOTE 3B
37
A3
5
SEE NOTE 10
38
SEE NOTE 4
SEE NOTE 4
A9
A11
A12
A4
A6
23
SEE NOTE 8
26
SEE NOTE 3A
24
32
SEE NOTE 3A
2 PLACES
A4
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A6
6
32
SEE NOTE 3A
2 PLACES
A2
5
SEE NOTE 10
38
SEE NOTE 4
SEE NOTE 3A
9 PLACES
1
35
SEE NOTE 3B
SEE NOTE 9 TYP
28
SEE NOTE 3A
12 PLACES
34
SEE NOTE 3B
37
23
SEE NOTE 8
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SEE NOTE 3A
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A16
12
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SEE NOTE 4
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SEE NOTE 3A
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A14
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SEE NOTE 4
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SEE NOTE 3B
2 PLACES
R4
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SEE NOTE 7
34
SEE NOTE 3B
2 PLACES
R5
16
SEE NOTE 7
A15
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27
SEE NOTE 3A
2 PLACES
A5
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R5
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SEE NOTE 8
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SEE NOTE 3A
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SEE NOTE 3B
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SEE NOTE 3A
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SEE NOTE 3A
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SEE NOTE 3B
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SEE NOTE 4
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SEE NOTE 9 TYP
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SEE NOTE 3D
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2 PLACES
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SEE NOTE 3B
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R1
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
R2
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SEE NOTE 7
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SEE NOTE 3B
2 PLACES
J13
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R3
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15
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SEE NOTE 4
34
SEE NOTE 3B
2 PLACES
MP2
38
SEE NOTE 4
MP2Y
MP3Z
23
SEE NOTE 8
26
SEE NOTE 3A
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42
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SEE NOTE 3A
2 PLACES
R3
16
SEE NOTE 7
MP3
2
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES
A10
3
38
SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
2 44
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
—	3	2021500 SEE NOTE 11	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
1	1	2018811	WEIGHT, BALANCE, S./M.	42
1	1	2018809	WEIGHT, BALANCE, S/M.	41
1	1	2018808	WEIGHT, BALANCE, S./M.	40
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
A/R	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
18	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-[illegible]~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
8	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
5	5	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
2	2	1001488-5	SCREW, HEX., SOC. HD., SELF-LOCKING	29
35	35	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
3	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	14	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
1	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
1	1	2018780	BRACKET, CONN. 34 PIN	20
1	1	2018779	BRACKET, CONN. 44 PIN	19
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
6	6	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5 & R6	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
1	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
1	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
1	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
1	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-031 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
1	1	2018750	HOUSING STABLE MEMBER	1
021	011	LIST OF MATERIALS		

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN E.G.S. DATE
CHECKED
APPROVAL 23 Mar 65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

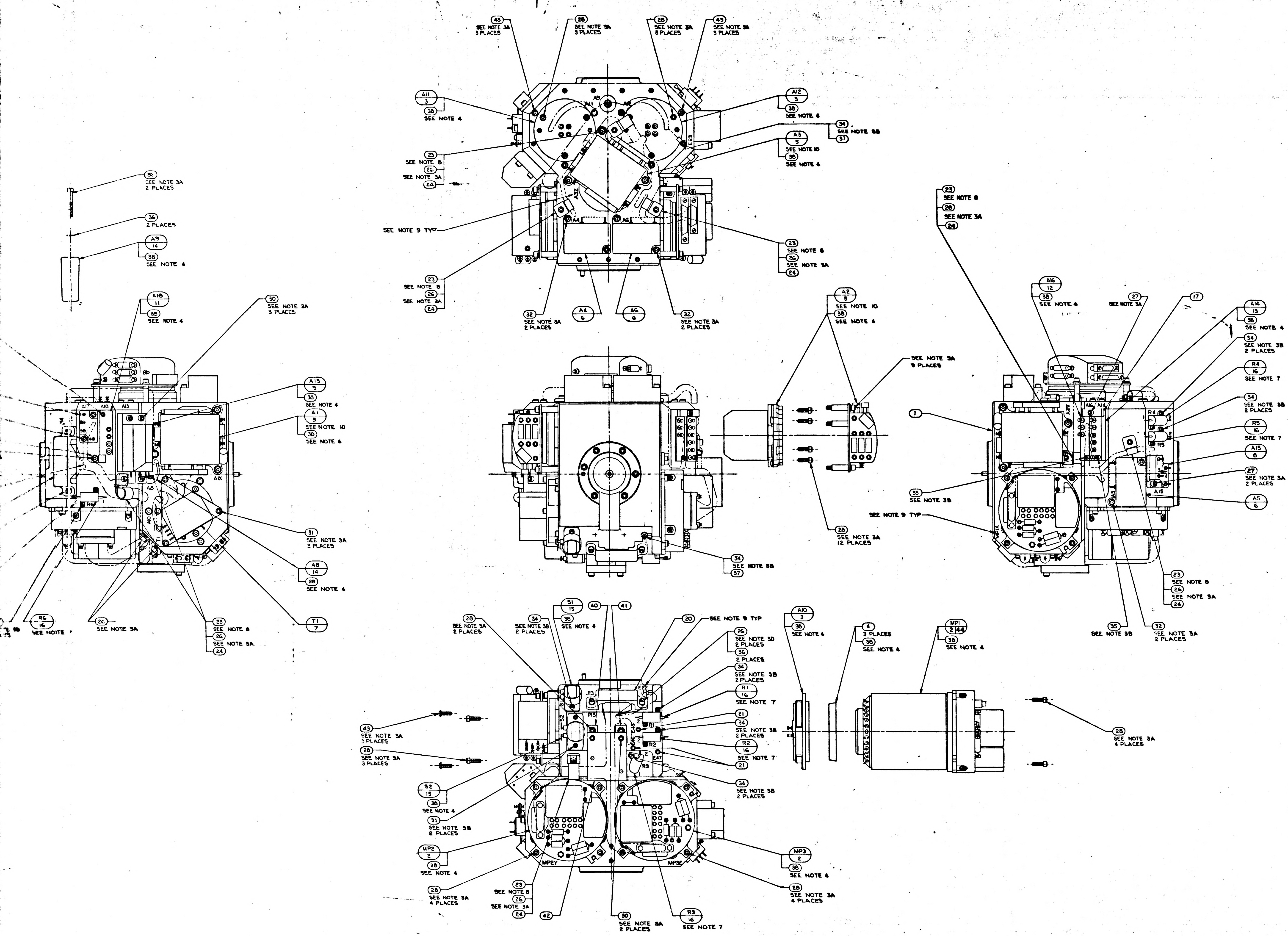
STABLE MEMBER ASSEMBLY

CODE IDENT NO. 80230
SIZE
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 1

D
C
B
A
2018605 W
3H

MASTER

2018605 REV W SHEET 1



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SEE NOTE 3A
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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
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A11
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SEE NOTE 4
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SEE NOTE 4
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SEE NOTE 3B
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A3
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SEE NOTE 9 TYP
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A4
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R6
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A8
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SEE NOTE 4
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R6
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SEE NOTE 3A
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A2
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SEE NOTE 9 TYP
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J13
R1
R2
R3
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SEE NOTE 3A
3 PLACES
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SEE NOTE 3A
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SEE NOTE 4
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SEE NOTE 3B
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SEE NOTE 4
MP2Y
MP3Z
MP3
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SEE NOTE 4
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SEE NOTE 3A
4 PLACES
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SEE NOTE 3A
4 PLACES
23
SEE NOTE 8
26
SEE NOTE 3A
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30
SEE NOTE 3A
2 PLACES
R3
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SEE NOTE 7
A10
3
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SEE NOTE 4
4
3 PLACES
38
SEE NOTE 4
MP1
2
44
38
SEE NOTE 4
28
SEE NOTE 3A
4 PLACES

MASTER

		UNLESS OTHERWISE SP[illegible] DIMENSIONS ARE IN IN[illegible] TOLERANCES ON FRACTIONS [illegible] ± ± DO NOT SCALE THIS [illegible]
		MATERIAL
2018604	DL 2018GCT	HEAT TREATMENT
NEXT ASSY	USED ON	
APPLICATION		FINAL FINISH

2018605	REV	SHEET
	W	1

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2	↑	↑
2-1	A8-BLU	A10-3	│	│
2-2	A8-BLU	AIC-4	│	│
3-1	A9-RED	A11-1	│	│
3-2	A9-RED	A11-2	│	│
4-1	A9-BLU	A11-3	↓	↓
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

CABLE CLAMP (23)

PART NO.	DIA REF
1000220-13	5/32
↑ -4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
↓ -11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1 & R2

PART NO.	VALUE Ω
1010928-289	100
↑ -287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-215	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
↓ -126	2.0
1010928-097	1.0

TABLE III

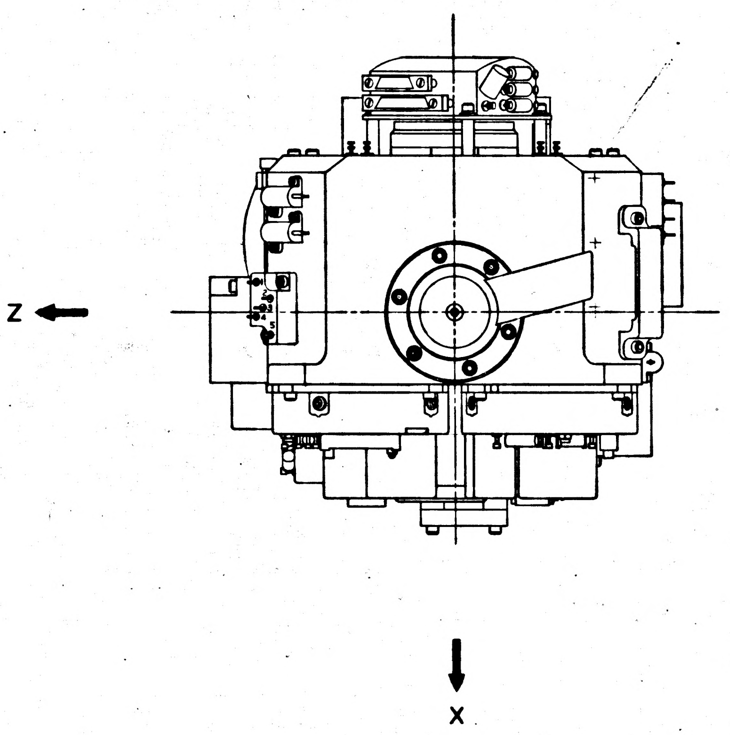
RESISTOR R3

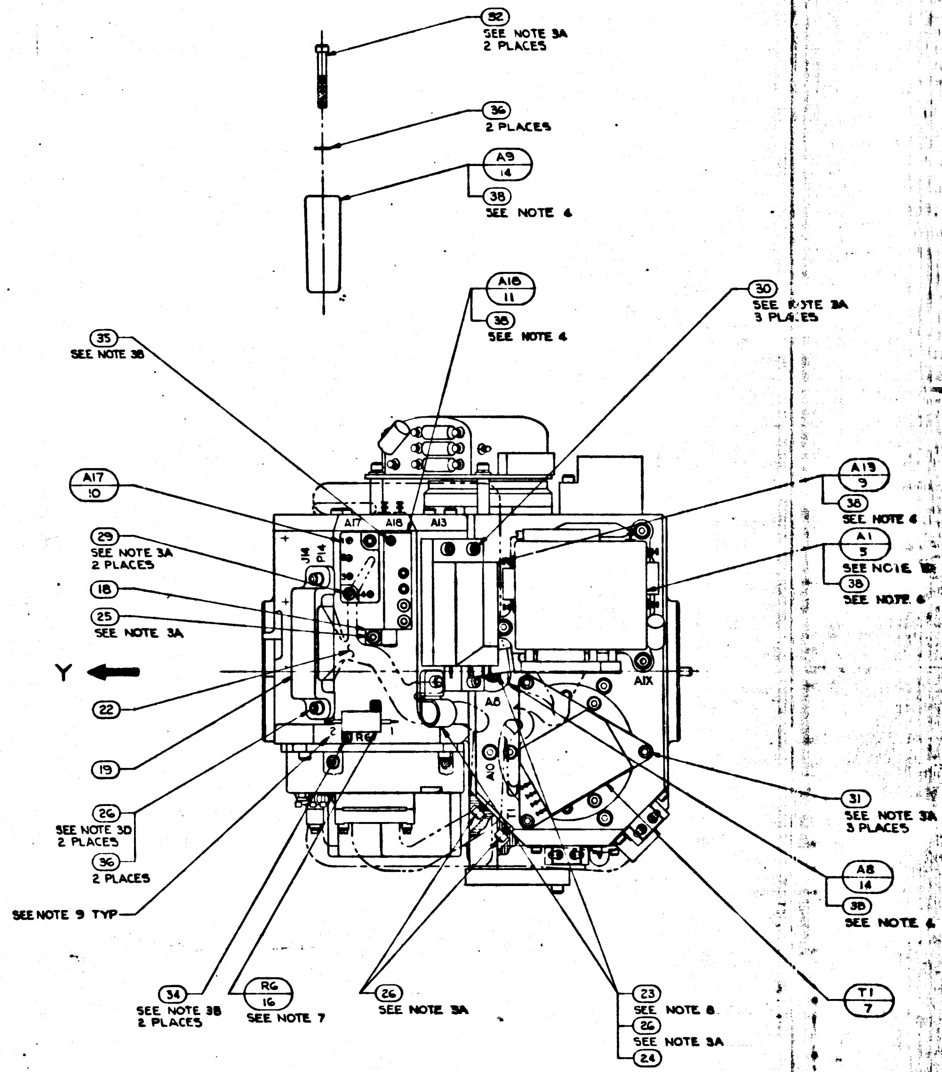
PART NO.	VALUE Ω
1010928-400	1430
↑ -349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
↓ -153	3.83
1010928-121	1.78

TABLE IV

RESISTORS R4, R5 & R6

PART NO.	VALUE Ω
1010928-386	1020
↑ -369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
-215	16.9
↓ -194	10.2
1010928-164	4.99

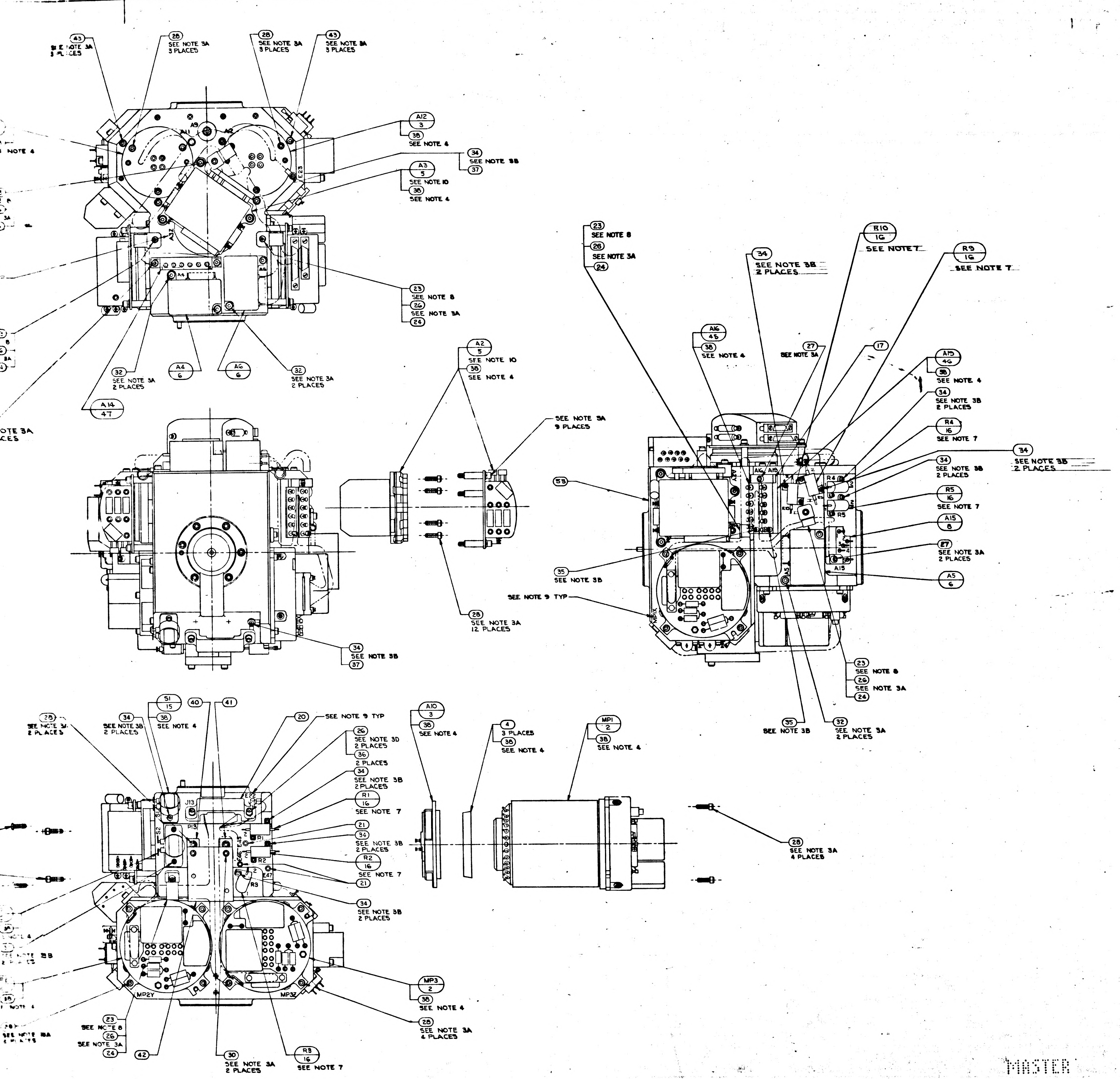



(32) SEE NOTE 3A 2 PLACES
(36) 2 PLACES
A9 / 14
(38) SEE NOTE 4
A18 / 11
(38) SEE NOTE 4
(30) SEE NOTE 3A 3 PLACES
(35) SEE NOTE 3B
A17 / 10
(29) SEE NOTE 3A 2 PLACES
(18)
(25) SEE NOTE 3A
Y
(22)
(19)
(26) SEE NOTE 3D 2 PLACES
(36) 2 PLACES
SEE NOTE 9 TYP
A17
A18
A13
J14
P14
A8
A10
AIX
T1
R6
A13 / 9
(38) SEE NOTE 4
A1 / 5
SEE NOTE
(38) SEE NOTE 4
(31) SEE NOTE 3A 3 PLACES
A8 / 14
(38) SEE NOTE 4
T1 / 7
(34) SEE NOTE 3B 2 PLACES
R6 / 16 SEE NOTE 7
(26) SEE NOTE 3A
(23) SEE NOTE 8
(26) SEE NOTE 3A
(24)

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14) & (15), BETWEEN ITEM (2) AND ITEM (3) AND BETWEEN ITEM (3) AND ITEM (4)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS 2018601
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF AMP NASA DWG. NO. 2007101-011, AC DIFF AMP DWG NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 OR 6007105-011 PER PS 2010603 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSF TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY

REV	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17755			
M	REPLACES REV L WITH CHANGES TDRR 17755	23Mar65		WK
N	REVISED PER TDRR 18608	20APR65		WK
P	REVISED PER TDRR 19266	25May65		WK
R	REVISED PER TDRR 19267	25May65		WK
S	REVISED PER TDRR 20088	7/21/65		WK
T	REVISED PER TDRR 21190	7/23/65		WK
U	REVISED PER TDRR 21671	8-31-65		WK
V	REVISED PER TDRR 21686	8-31-65		WK
W	REVISED PER TDRR 22791	28Sep65		WK
Y	REVISED PER TDRR 23046	19Oct65		WK
Z	SHEET TWO ADDED REVISED PER TDRR 23699	19Oct65		WK



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SEE NOTE 3A
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SEE NOTE 3A
3 PLACES
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SEE NOTE 4
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SEE NOTE 3B
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SEE NOTE 10
SEE NOTE 4
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SEE NOTE 8
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SEE NOTE 3A
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SEE NOTE 3A
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A6
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A14
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A2
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SEE NOTE 4
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SEE NOTE 9 TYP
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R9
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R5
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A15
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SEE NOTE 8
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SEE NOTE 3B
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SEE NOTE 7
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P13
S2
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E47
MP2Y
MP3Z
A15
A5
R4
R5

MASTER

1	—	2018750-011	HOUSING STABLE MEMBER	53
1	—	2018830	SHIELD THERMOSTAT	52
1	—	2007172-011	BLOWER CONTROL MOD ASSY	51
1	—	2018829-2	SHIM BLOWER CONT THERMO	50
1	—	2018825-011	THERMO & HTR ASSY BLOWER CONT	49
1	—	2018828	WIRING HARNESS "A" STABLE MEMBER	48
1	—	2018826-011	THERMO & HTR ASSY TEMP CONT	47
1	—	2018824-011	THERMO & HTR ASSY TEMP ALARM LO	46
1	—	2018823-011	THERMO & HTR ASSY TEMP ALARM HI	45
—	3	2021500 SEE NOTE 11	IRIG PREALIGNED ASSY	44
9	9	1010891-15	SCREW, BUT. HD., SPL. SOC., SELF-LOCKING	43
1	1	2018811	WEIGHT, BALANCE, S./M.	42
1	1	2018809	WEIGHT, BALANCE, S/M.	41
1	1	2018808	WEIGHT, BALANCE, S./M.	40
A/R	A/R	MIL-T-713, TYPE P, CLASS 2	TAPE, NYLON, WAXED	39
A/R	A/R	1006879 SEE NOTE 4	SILICONE COMPOUND THERMO.	38
2	2	MS15795-302	WASHER, FLAT, METAL, ROUND	37
6	6	MS15795-703	WASHER, FLAT, METAL, ROUND	36
3	3	1011625-11	SCREW, HEX., SOC. HD., SELF-LOCKING	35
22	18	1011625-9	SCREW, HEX., SOC. HD., SELF-LOCKING	34
~~8~~	~~8~~	~~1001488-[illegible]~~	~~SCREW, HEX., SOC. HD., SELF-LOCKING~~	33
8	8	1001488-10	SCREW, HEX., SOC. HD., SELF-LOCKING	32
3	3	1001488-7	SCREW, HEX., SOC. HD., SELF-LOCKING	31
5	5	1001488-6	SCREW, HEX., SOC. HD., SELF-LOCKING	30
2	2	1001488-5	SCREW, HEX., SOC. HD., SELF-LOCKING	29
35	35	1001488-4	SCREW, HEX., SOC. HD., SELF-LOCKING	28
5	3	1001488-3	SCREW, HEX., SOC. HD., SELF-LOCKING	27
14	14	1001488-2	SCREW, HEX., SOC. HD., SELF-LOCKING	26
1	1	1001488-1	SCREW, HEX., SOC. HD., SELF-LOCKING	25
8	8	1000223	WASHER, CABLE CLAMP	24
8	8	1000220-SEE NOTE 8	CLAMP, CABLE	23
—	1	2018796	WIRING HARNESS "A" STABLE MEMBER	22
3	3	1001600-1	TERMINAL, INSULATED	21
1	1	2018780	BRACKET, CONN. 34 PIN	20
1	1	2018779	BRACKET, CONN. 44 PIN	19
1	1	2018778	CLAMP, THERMOSTAT	18
1	1	2018776	CLAMP, THERMOSTAT	17
8	6	1010928 - SEE NOTE 7	RESISTOR, R1, R2, R3, R4, R5, R6, R9 & R10	16
2	2	1001485	THERMOSTAT, SAFETY	15
2	2	2018641	HTR. ASS'Y. STABLE MEMBER	14
—	1	2018637	THERMO. & HTR. ASS'Y. TEMP CONTROL	13
—	1	2018636	THERMO. ASS'Y. TEMP. ALARM	12
—	1	2018635	THERMO. & HTR. ASS'Y. BLO. CONTROL	11
—	1	2007171-011	BLO. CONTROL MODULE ASS'Y.	10
1	1	2007064-011	TEMP. CONTROL MODULE ASS'Y.	9
1	1	2007170-011	TEMP. ALARM MODULE ASS'Y.	8
1	1	2007019-011	DUCOSYN TRANSFORMER ASS'Y.	7
3	3	2007060-011	PIP PREAMP ASS'Y.	6
3	3	2018639	PIP & SUSPENSION CAP. MODULE	5
3	3	2018820	CLAMP, SPLIT, GYRO	4
3	3	2018741	HTR. & TAPERED MOUNT ASS'Y.	3
3	—	2021500-031 SEE NOTE 11	IRIG PREALIGNED ASS'Y.	2
—	1	2018750	HOUSING STABLE MEMBER	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
021	011		LIST OF MATERIALS	

2018605 Z

3H

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
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FINAL FINISH

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.G.S. DATE
CHECKED
APPROVAL 23Mar65
APPROVAL
NASA APPROVAL 3-23-65
MIT APPROVAL 23Mar65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

STABLE MEMBER
ASSEMBLY

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018605
SCALE 1/1
WT
SHEET 1 OF 2

2018605 Z 1

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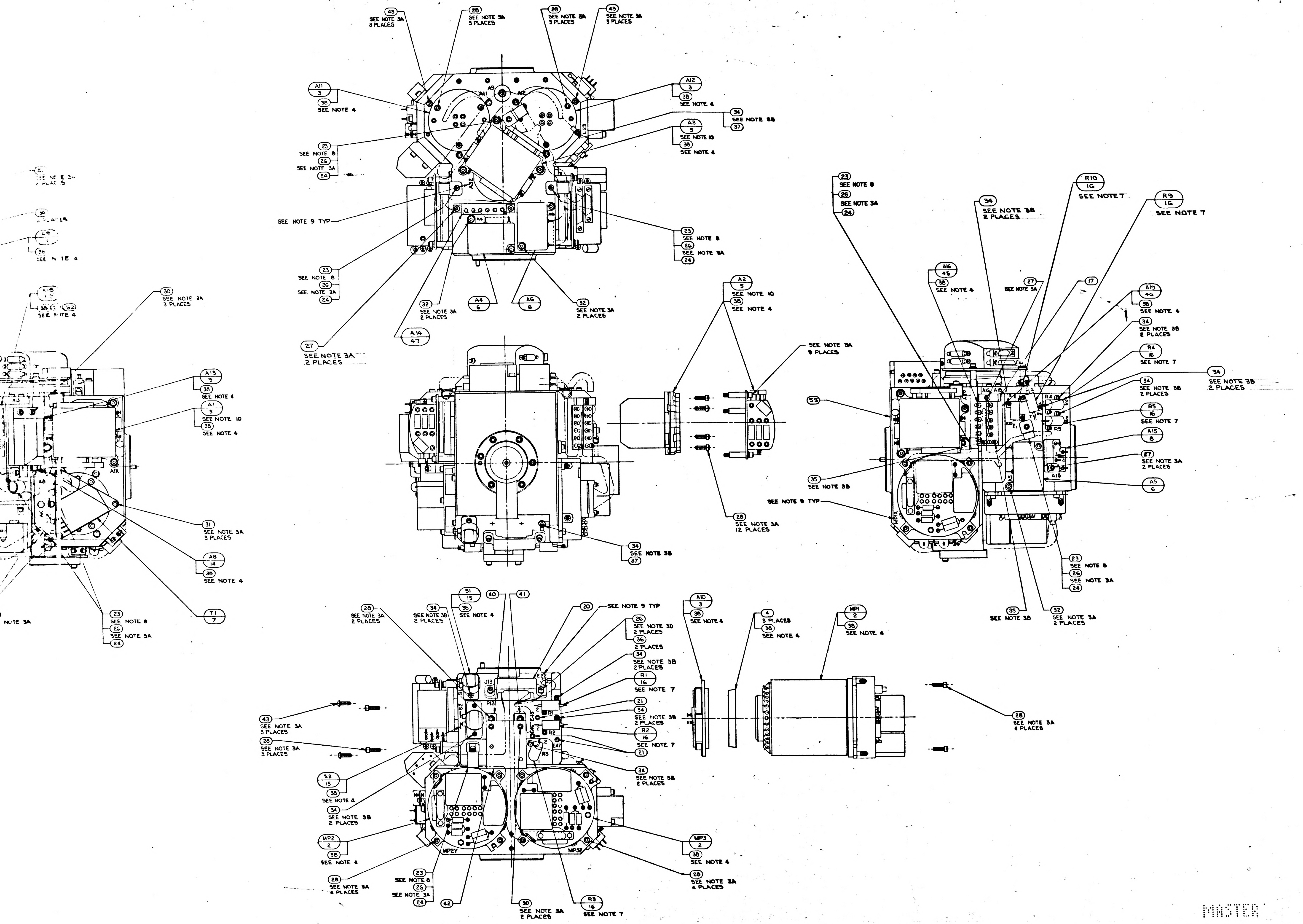
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MASTER

2018604	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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2018605	Z	1

5 4 3 2

F-2

WIRING LEGEND

COND. NO.	FROM	TO	STRIP	TIN
1-1	A8-RED	A10-1	.19 ± .02	YES
1-2	A8-RED	A10-2		
2-1	A8-BLU	A10-3		
2-2	A8-BLU	A10-4		
3-1	A9-RED	A11-1		
3-2	A9-RED	A11-2		
4-1	A9-BLU	A11-3		
4-2	A9-BLU	A11-4	.19 ± .02	YES

TABLE I

CABLE CLAMP (23)

PART NO.	DIA REF
1000220-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16
-16	11/32
-7	3/8
-17	13/32
-8	7/16
-18	15/32
-9	1/2
-19	17/32
-10	9/16
-11	19/32
1000220-12	5/8

TABLE II

RESISTORS R1 & R2

PART NO.	VALUE Ω
1010928-289	100
-287	95.3
-285	90.9
-282	84.5
-280	80.6
-277	75.0
-274	69.8
-271	64.9
-268	60.4
-264	54.4
-260	49.9
-256	45.3
-251	40.2
-244	34.0
-239	30.1
-236	28.0
-233	26.1
-230	24.3
-226	22.1
-222	20.0
-220	19.1
-218	18.2
-215	16.9
-213	16.2
-210	15.0
-207	14.0
-204	13.0
-201	12.1
-197	11.0
-195	10.5
-189	9.09
-184	8.06
-178	6.98
-171	5.90
-164	4.99
-155	4.02
-143	3.01
-126	2.0
1010928-097	1.0

TABLE III

RESISTOR R3

PART NO.	VALUE Ω
1010928-400	1430
-349	422
-333	287
-321	215
-312	174
-305	147
-299	127
-292	107
-287	95.3
-282	84.5
-277	75.0
-272	66.5
-268	60.4
-263	53.6
-258	47.5
-253	42.2
-249	38.3
-239	30.1
-233	26.1
-228	23.2
-222	20.0
-216	17.4
-210	15.0
-201	12.1
-192	9.76
-182	7.68
-170	5.76
-153	3.83
1010928-121	1.78

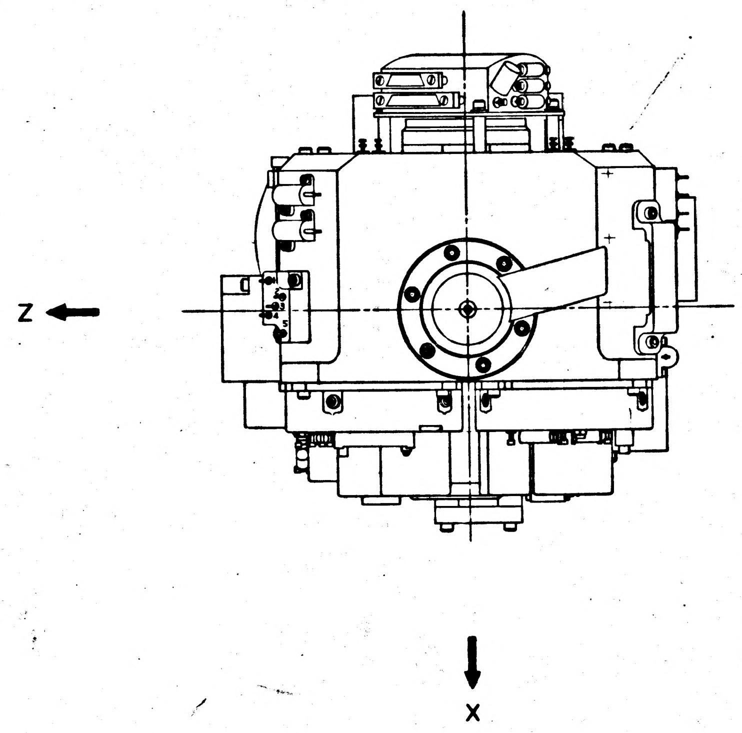
TABLE IV

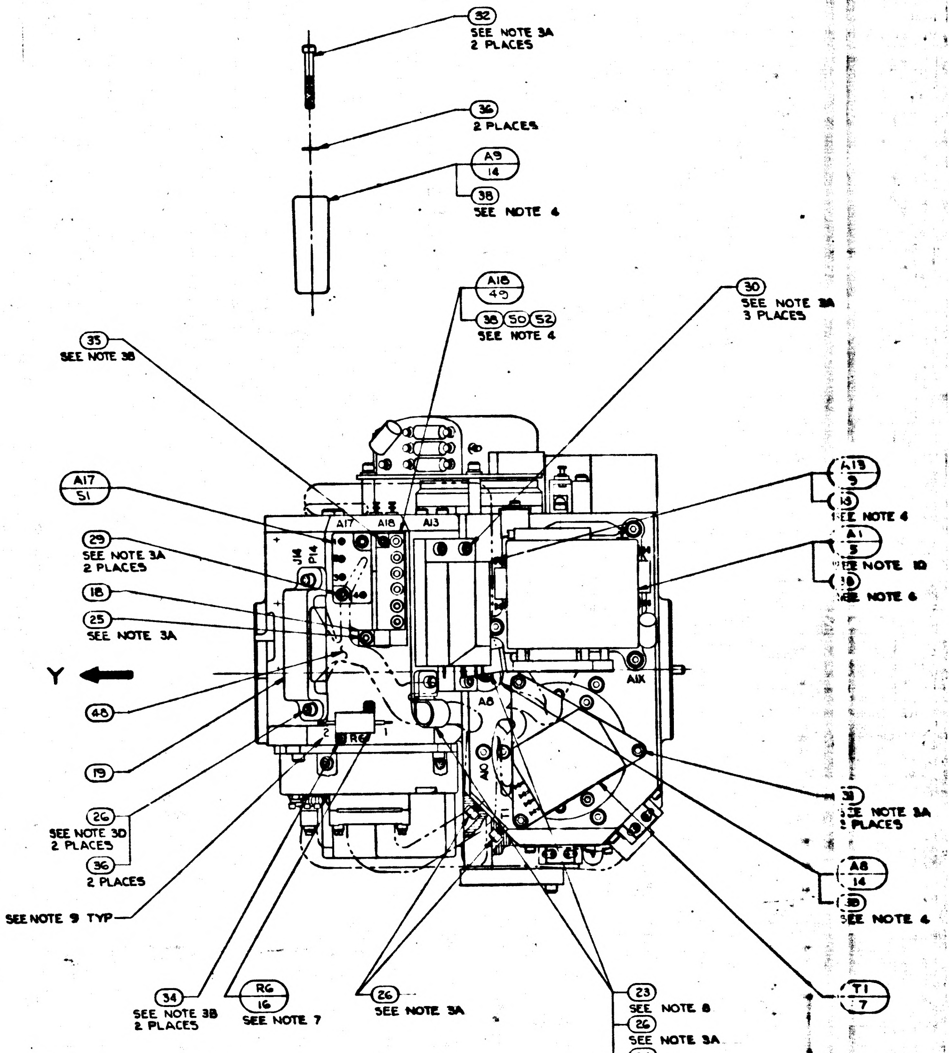
RESISTORS R4, R5, R6, R9 & R10

PART NO.	VALUE Ω
1010928-386	1020
-369	681
-349	422
-336	309
-326	243
-317	196
-309	162
-302	137
-295	115
-288	97.6
-281	82.5
-273	68.1
-265	56.2
-258	47.5
-249	38.3
-240	30.9
-228	23.2
-215	16.9
-194	10.2
1010928-164	4.99

D

C





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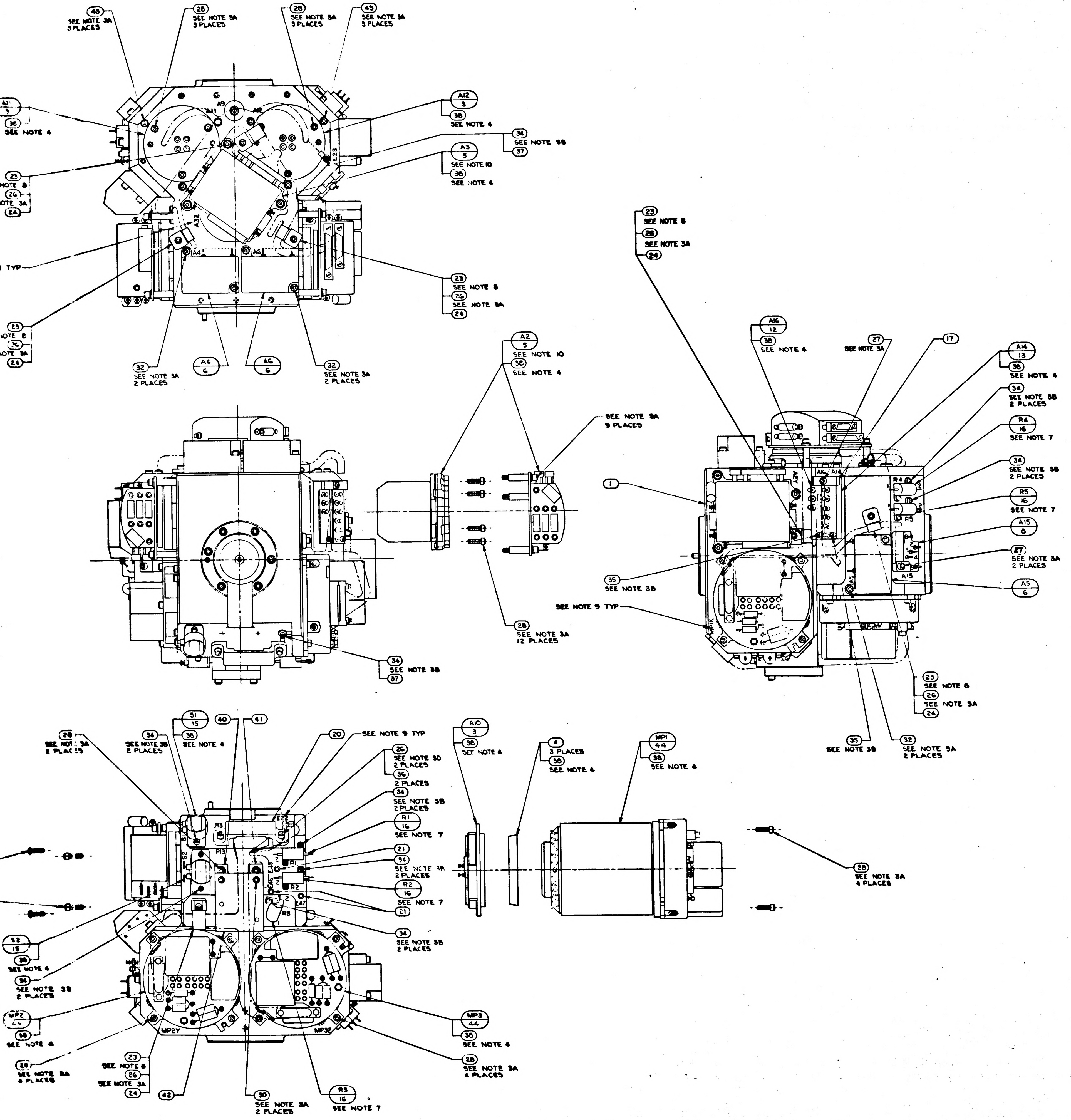
B

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL D-70327
2.
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 5.0 IN-LB
   - B. 3.5 IN-LB
   - C. 2.0 IN-LB AT FINAL SEATING, NOT TO EXCEED 1.0 IN-LB WHILE ENGAGING PINS
   - D. INSTALL FINGER TIGHT
4. APPLY A THIN FILM OF ITEM (38) TO CONTACT SURFACE BETWEEN ITEM (1) AND ITEMS (2),(3),(5),(9),(11),(12),(13),(14) & (15), BETWEEN ITEM (2) AND ITEM (3) AND BETWEEN ITEM (3) AND ITEM (4)
5. SOLDER PER ND1002071
6. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND1002032
7. RESISTORS TO BE SELECTED FROM TABLES II, III AND IV PER PS 2018601
8. ITEM (23) TO BE SELECTED FROM TABLE I AT ASSEMBLY, CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
9. MARK CHARACTERS $\frac{.10}{.14}$ HIGH, COLOR BLACK, AT LOCATIONS SHOWN PER ND1002019
10. PIP PREALIGNED ASS'Y NASA DWG NO. 2018639 SHALL BE MATCHED TO D.C. DIFF AMP NASA DWG. NO. 2007101-011, AC DIFF AMP DWG NO. 2007104-011, BINNERY CURRENT SWITCH NASA DWG. NO. 2007103-011 & EITHER PIPA CALIBRATION MOD. NASA DWG. NO. 2007105-011 PER PS 2010603 OR 6007105-011 PER PS 2010607 PRIOR TO ASSEMBLY TO STABLE MEMBER. MODULES SHALL BE MAINTAINED IN CONJUNCTION WITH THIS ASSEMBLY AND SHALL BE ASSEMBLED IN EITHER PIPA ELECTRONICS ASS'Y NASA DWG. NO. 2007201-011 OR PULSF TORQUE ASS'Y 6007000-011
11. IRIG PREALIGNED ASSY NASA DWG NO. 2021500-031 & -041 MAY BE USED IN -011 CONFIGURATION OF THIS ASSY

A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
Z	THIS SHEET ADDED PER TDRR 23699		



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-011 CONFIGURATION

MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN L.S.B. DATE CHECKED APPROVAL 110365 APPROVAL	STABLE MEMBER ASSEMBLY
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL A. C. METZGER	CODE IDENT NO 80230 · SIZE J · NASA DRAWING NO 2018605
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL W Kupfer 24Nov65	SCALE 1/1 · WT · SHEET 2 OF 2
APPLICATION				

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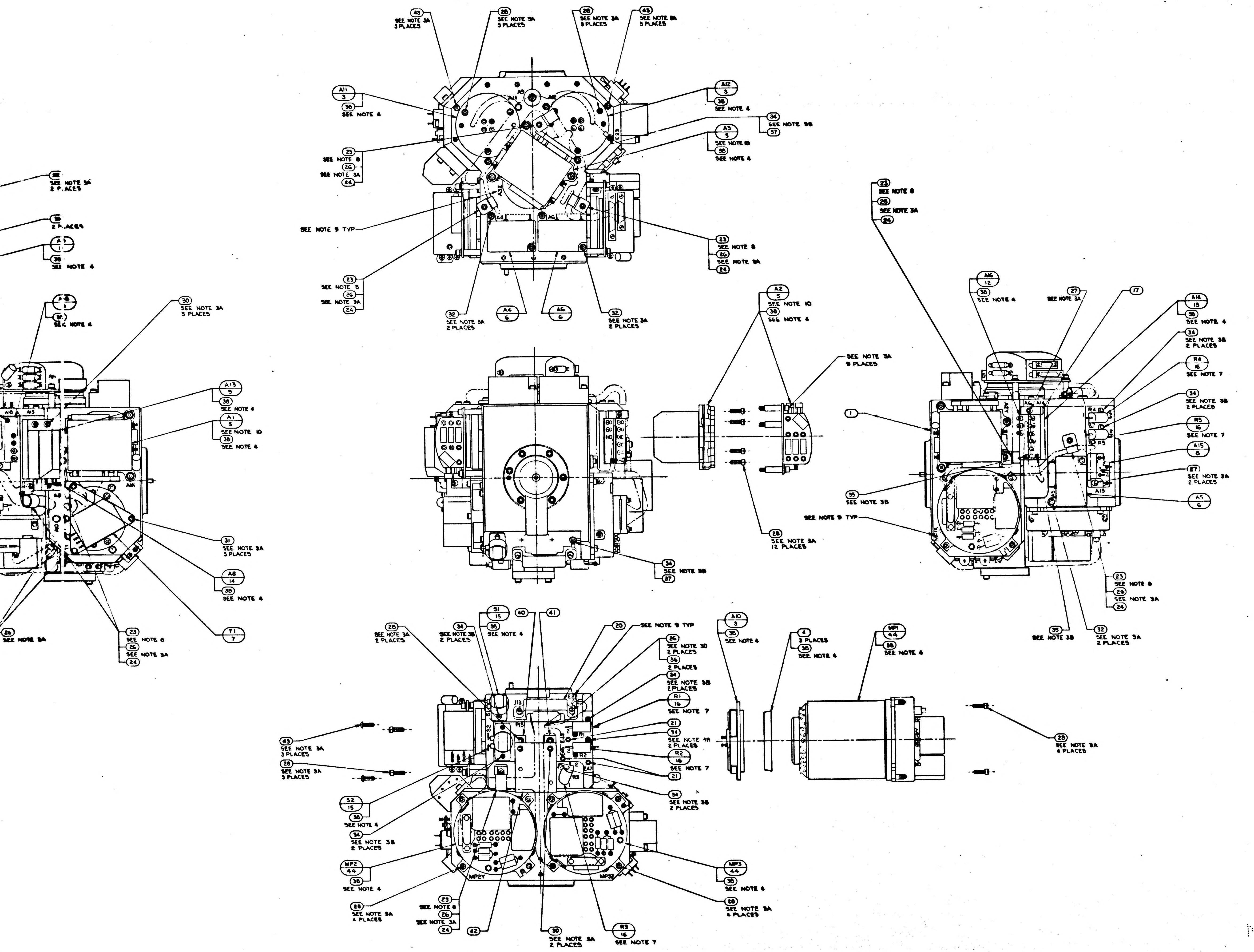
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-011 CONFIG

MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	DRAWN CHECKED APPROVAL APPROVAL
		MATERIAL	
2018604	DL 2018601	HEAT TREATMENT	NASA APPROVAL
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVED
APPLICATION			

2018605 REV Z SHEET 2

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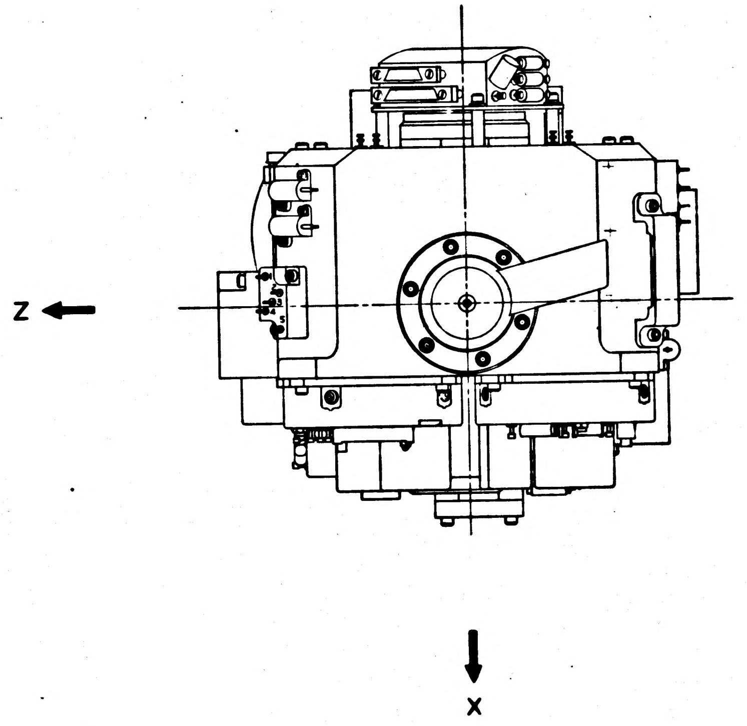

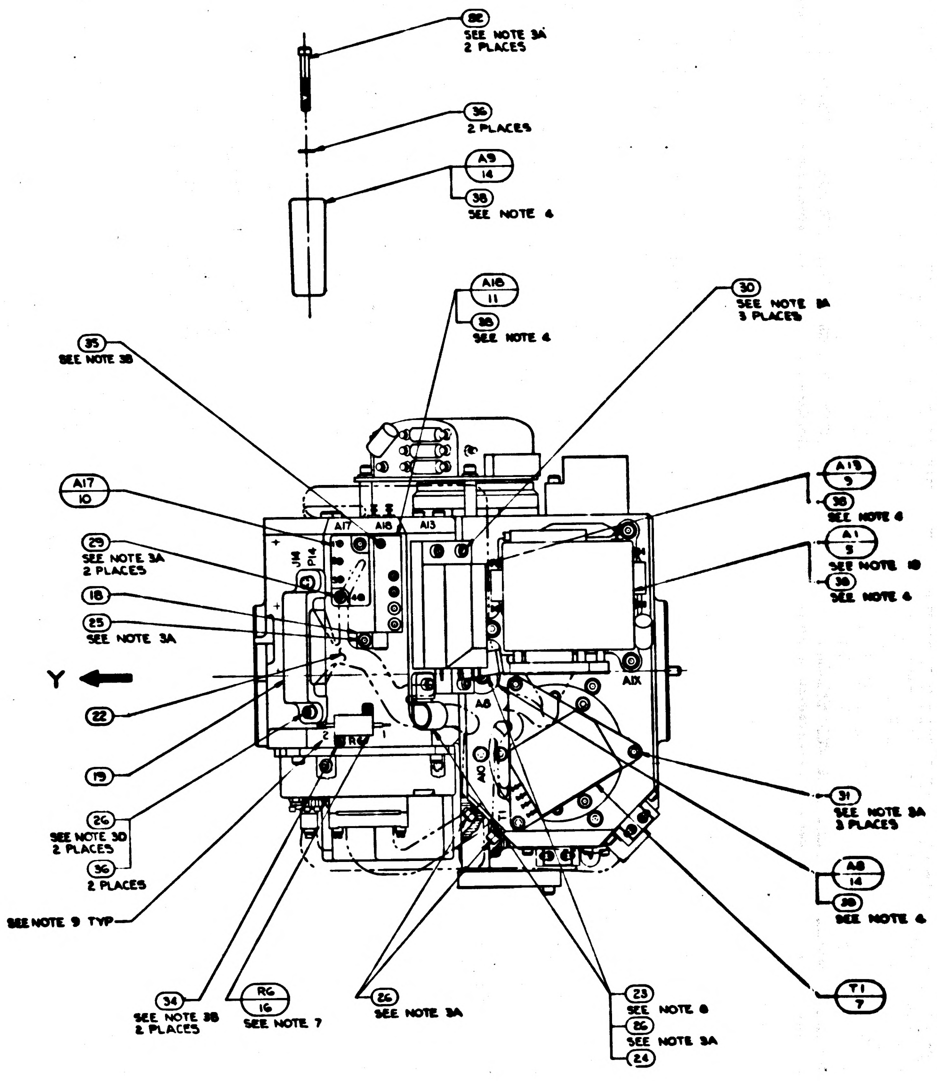
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NOTES:
1. SEE SHEET 1 FOR NOTES AND LIST OF MATERIAL

3H

PART NO.	NOMENCLATURE	QTY REQ'D
1000138	CLAMP, GYRO	3
~~1001485~~	~~THERMOSTAT, SAFETY~~	~~2~~
1006879	SILICONE COMPOUND	A/R
1000121	CONNECTOR	3
1000120	CONNECTOR	2

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	—	RELEASE TDRR 10806	7JUL64	W/K

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018604	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING
MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153
APPROVED — DATE 7Jul64
CHECKED
DRAWN JCF
APPROVED FOR MSC 7/7/64
MIT/IL APPROVAL — DATE 7/7/64

STABLE
MEMBER
ASS'Y

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

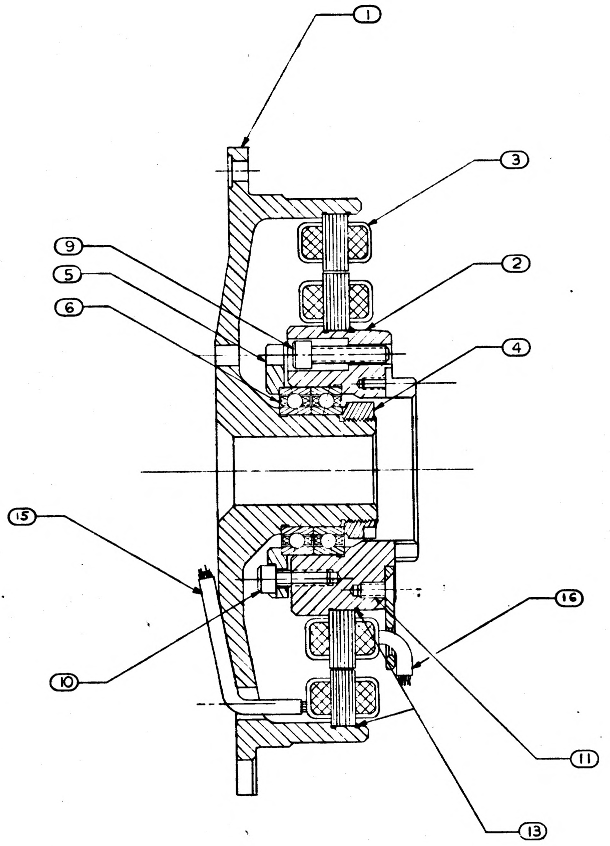
NASA DRAWING NO.
2018605

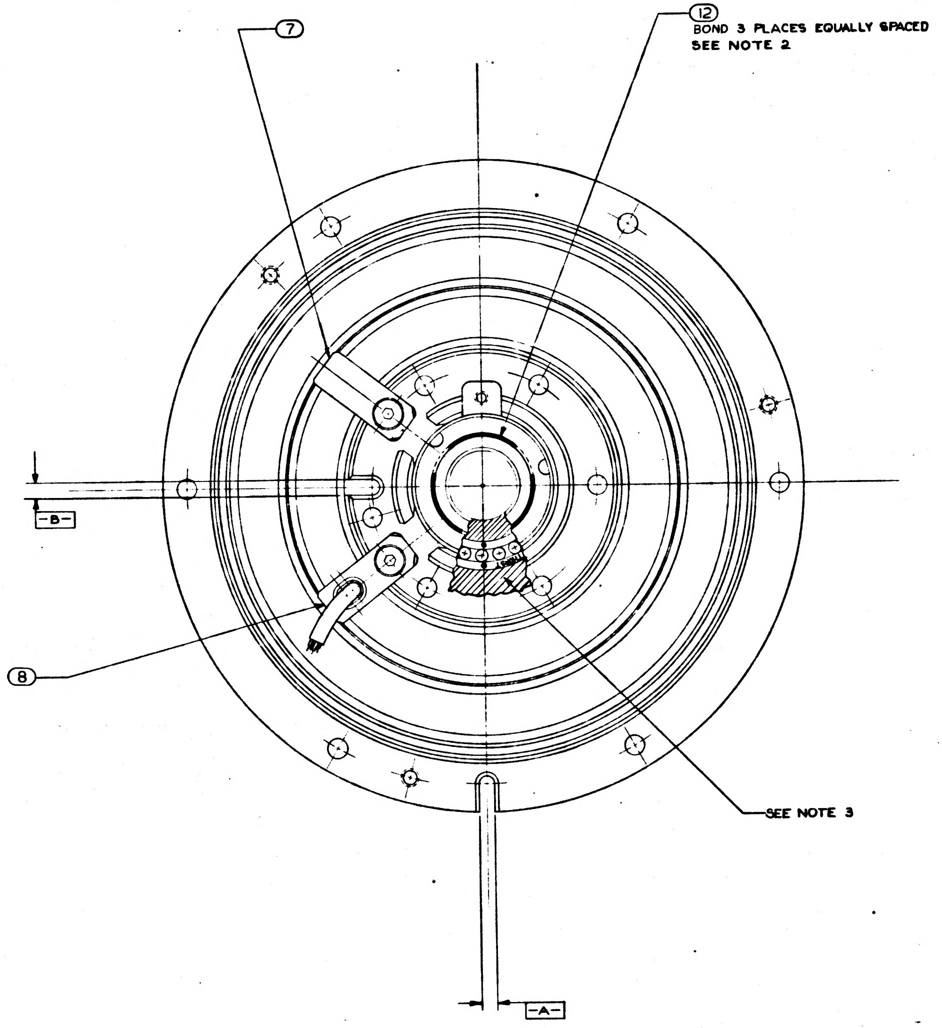
SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 11990

SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 14109	10DEC64		
B	REVISED TDRR 14780	10DEC64		





			17
1	1006776-15	INSULATION SLEEVING-½ LONG	16
1	1006776-9	INSULATION SLEEVING-1½ LONG	15
			14
AS REQ'D	1011754	INSULATION COMPOUND	13
AS REQ'D	MIL-A-13883	ADH GOODYEAR CPA 923A	12
2	1010628-13	SCREW, FLAT HD, HEX SOC S.L.	11
6	1001488-18	SCREW, HEX, SOC HEAD S.L.	10
6	1001489-22	SCREW, HEX, SOC HEAD	9
1	2018732	CLIP, WIRE RETAINER	8
1	2018731	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018733	PLATE, BRG RETAINER RSVR M.A. & O.A.	5
1	2018723	NUT, BEARING RETAINER	4
1	2018631	RESOLVER, MULTIPLE SPEED	3
1	2018730	SHAFT, STUB, RSVR M.A. & O.A.	2
1	2018739	HOUSING, BRG, RSVR, OUTER AXIS	1
011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
QTY	LIST OF MATERIALS		

2018612	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN Rul Contrerez DATE 6-25-64
CHECKED
APPROVAL C.J. Boyce 25Aug64
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 9 Sep 64

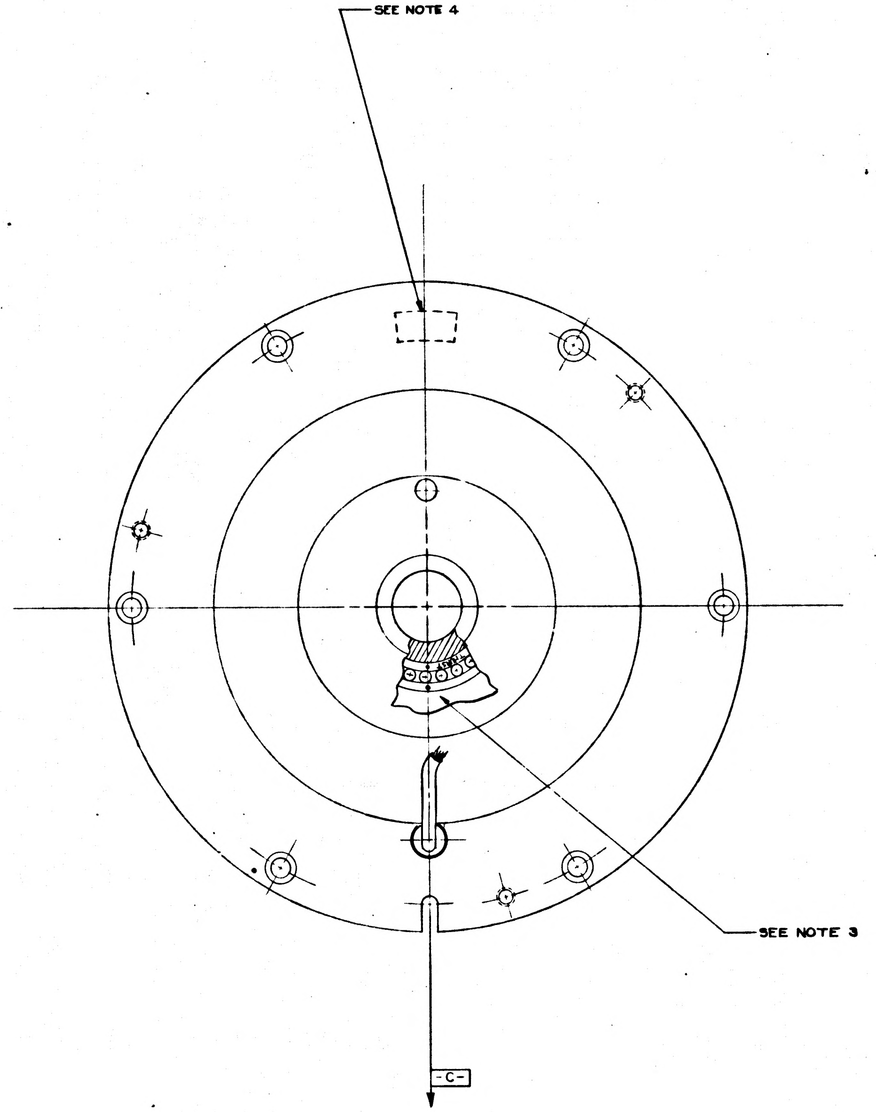
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

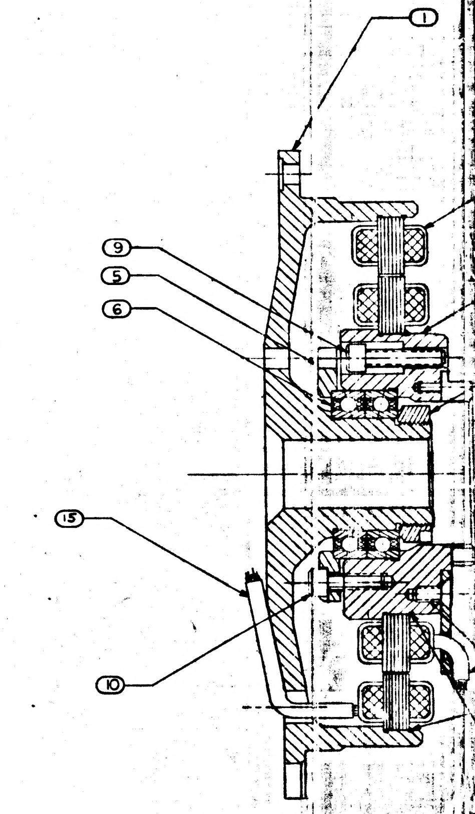
RESOLVER ASSEMBLY
OUTER AXIS

CODE IDENT NO.
SIZE R
NASA DRAWING NO. 2018606
SCALE 2-1
WT
SHEET 1 OF 1

	REV	SHEET
2018606	B	1

MASTER



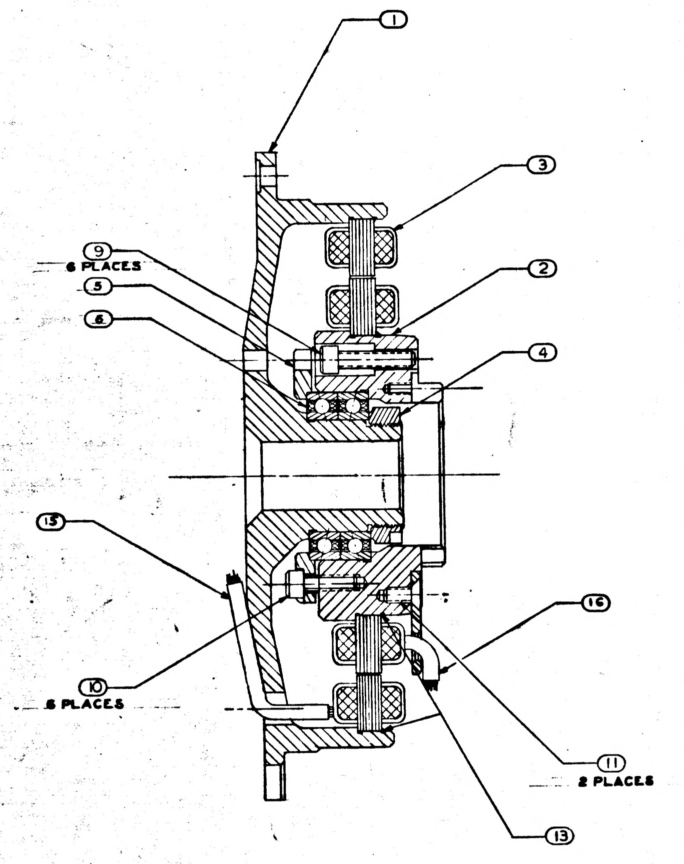


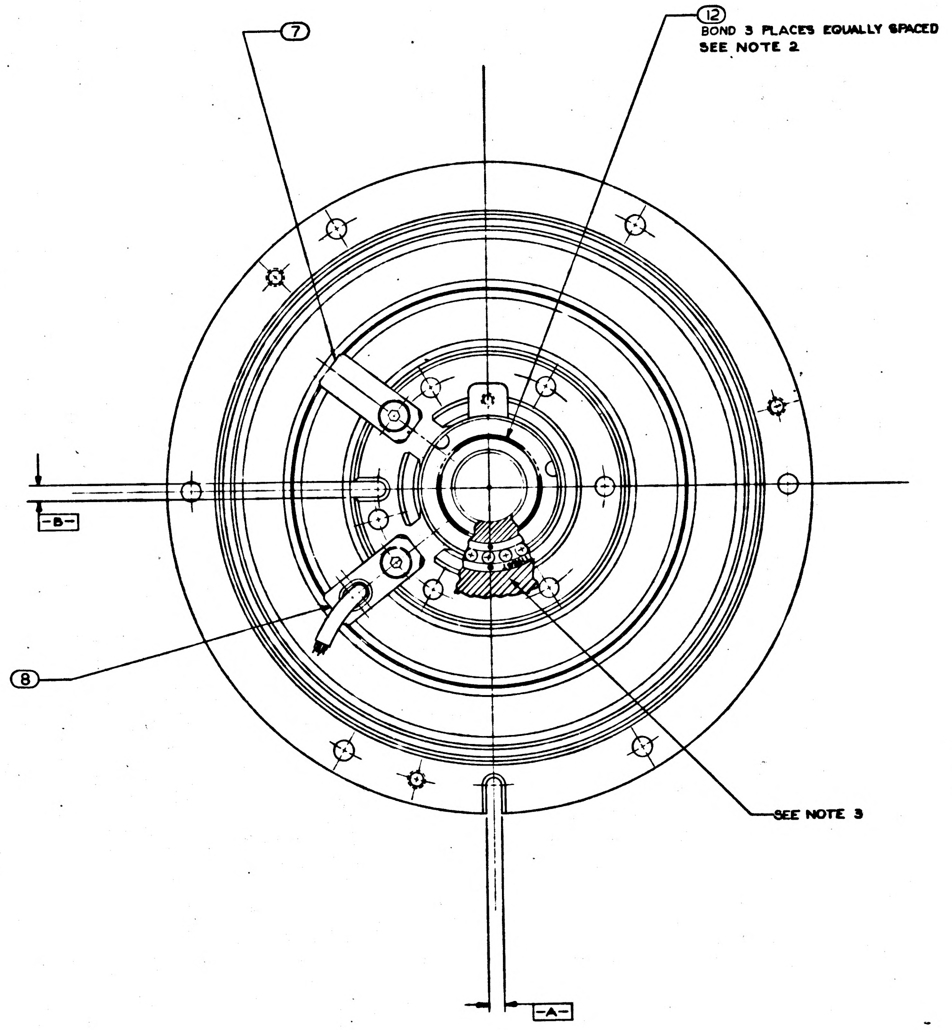
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑫ TO ITEMS ① AND ④ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑥ TO BE ALIGNED
   WHEN ITEMS ① AND ② ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO. REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ①
   AT THE INDICATED LOCATION PER ND 1002023 AND ND 1002019
5. SCREW TORQUE REQUIREMENTS ± 7%
   ④ 400 IN LB
   ⑨ 10.0 IN LB
   ⑪ 10.0 IN LB
6. WITH SLOT -A- AND -B- 90°00'00" ± 0°00'12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSIBLE)
   THE 16 X SECTION OF THE RESOLVER SHALL BE WITHIN ± 0°2' OF ELECTRICAL ZERO REFERRED TO THE 1 X SHAFT

2018606 REV B SHEET 1

REVISIONS TDRR 11980			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 14109	30DEC64	
B	REVISED TDRR 14780		
C	REVISED TDRR 17752		





QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
			17
1	1010430-110	INSULATION SLEEVING ELEC. HT. SHRK	16
1	1010430-136	INSULATION SLEEVING ELEC. HEAT SHRINK	15
			14
AS REQ'D	1011754	INSULATION COMPOUND	13
AS REQ'D	MIL-A-13883	ADH GOODYEAR CPA 923A	12
2	1010867-12	SCREW, FLAT HD, SPL SOC S.L.	11
6	1001488-18	SCREW, HEX, SOC HEAD S.L.	10
6	1001489-22	SCREW, HEX, SOC HEAD.	9
1	2018732	CLIP, WIRE RETAINER	8
1	2018731	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018733	PLATE, BRG RETAINER RSVR M.A. & O.A.	5
1	2018723	NUT, BEARING RETAINER	4
1	2018631	RESOLVER, MULTIPLE SPEED	3
1	2018730	SHAFT, STUB, RSVR M.A. & O.A.	2
1	2018739	HOUSING, BRG, RSVR, OUTER AXIS	1
D11			

LIST OF MATERIALS

NEXT ASSY	USED ON
2018612	BL 2018648

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN Bud Courtney DATE
CHECKED
APPROVAL C.J. Boyce 25Aug64
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 19Aug64

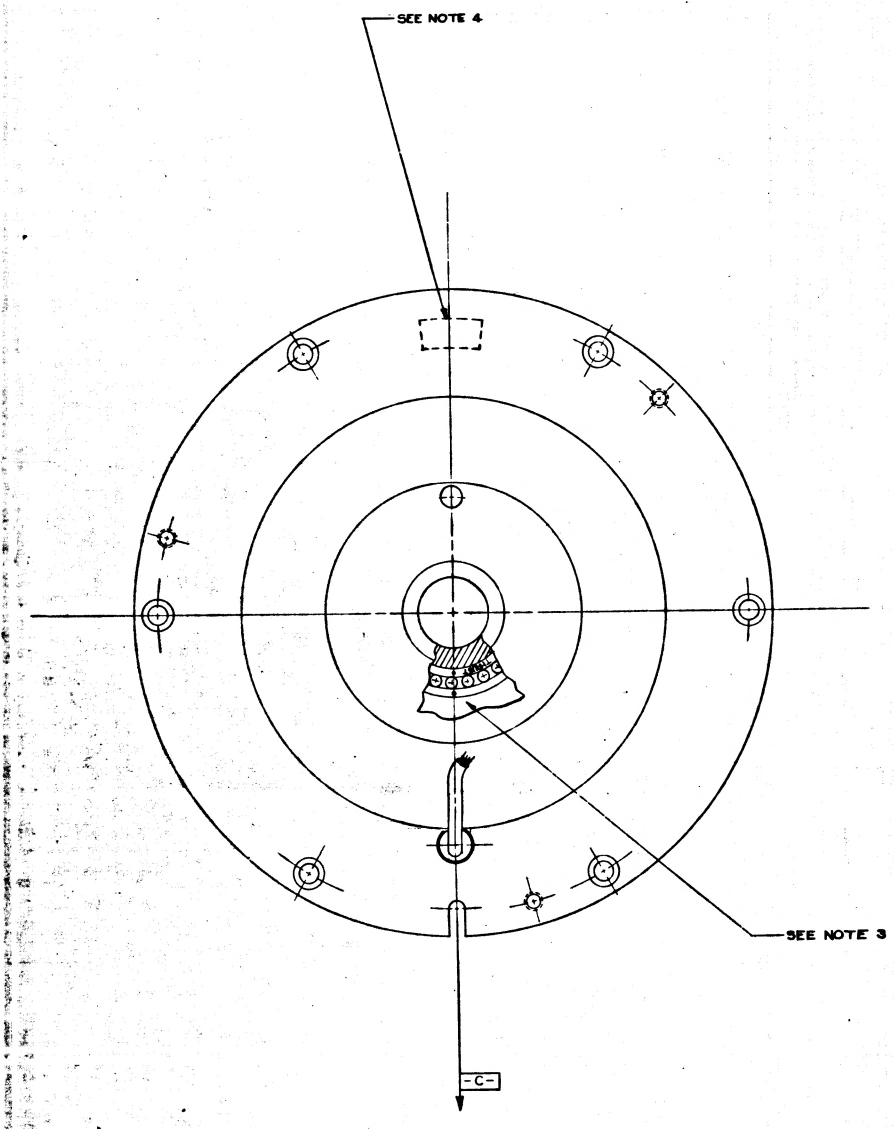
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

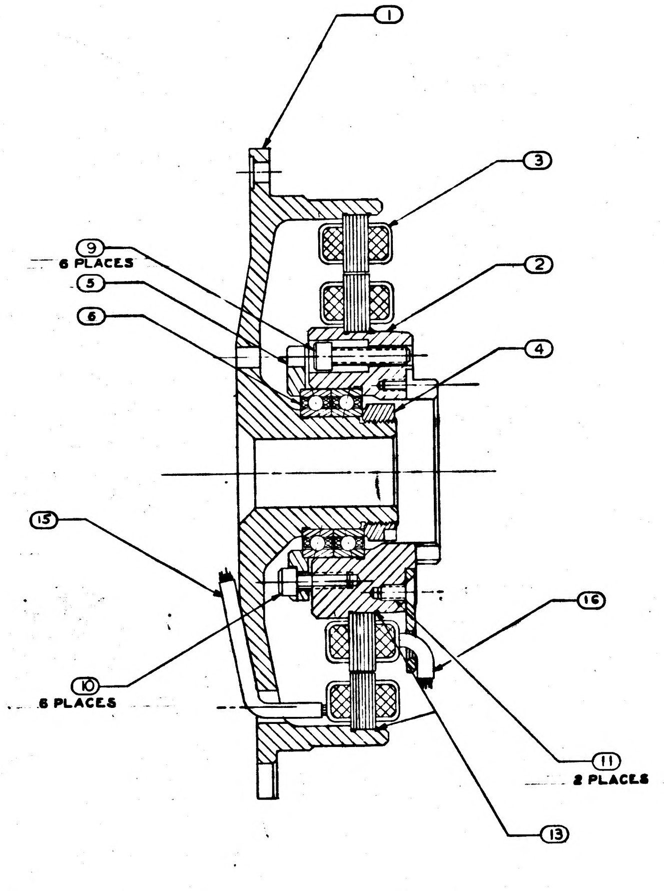
RESOLVER ASSEMBLY
OUTER AXIS

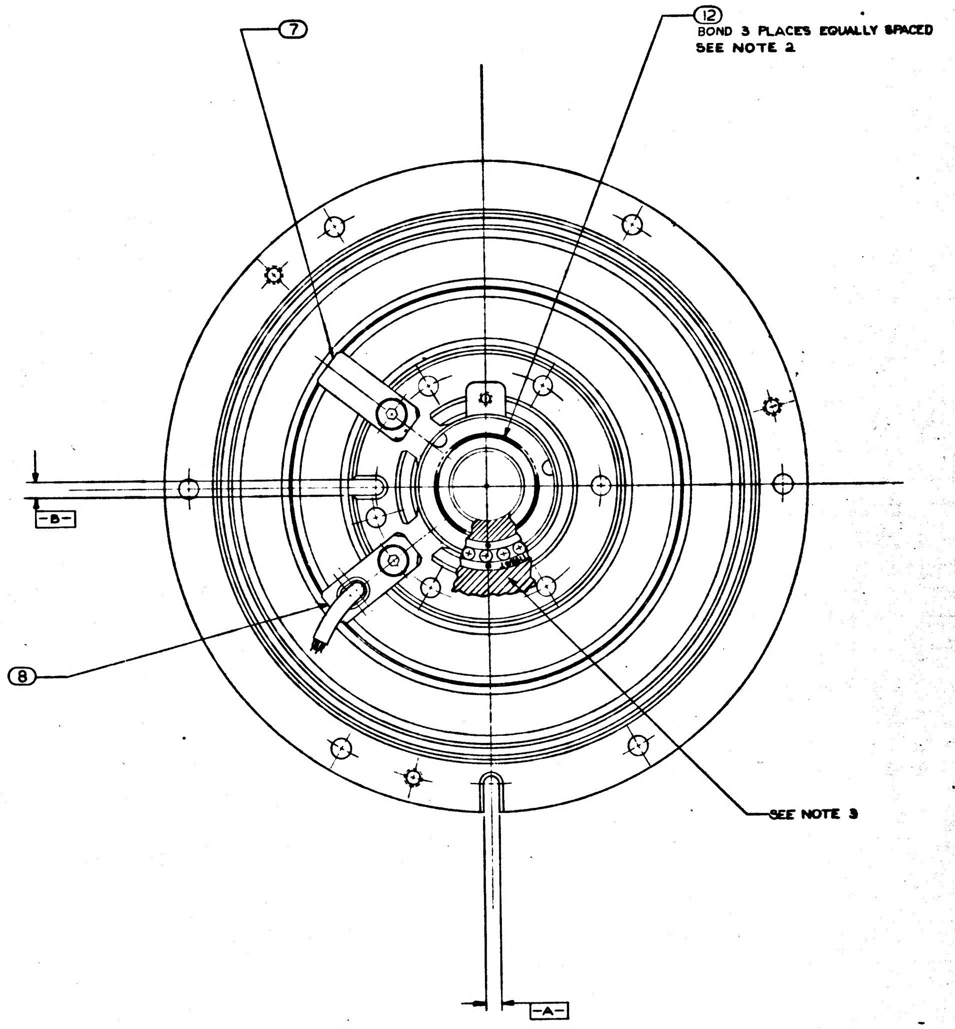
CODE IDENT NO. | SIZE J | NASA DRAWING NO. 2018606
SCALE 2-1 | WT | SHEET 1 OF 1

MASTER

2018606 | C | 1


SEE NOTE 4
SEE NOTE 3
-C-

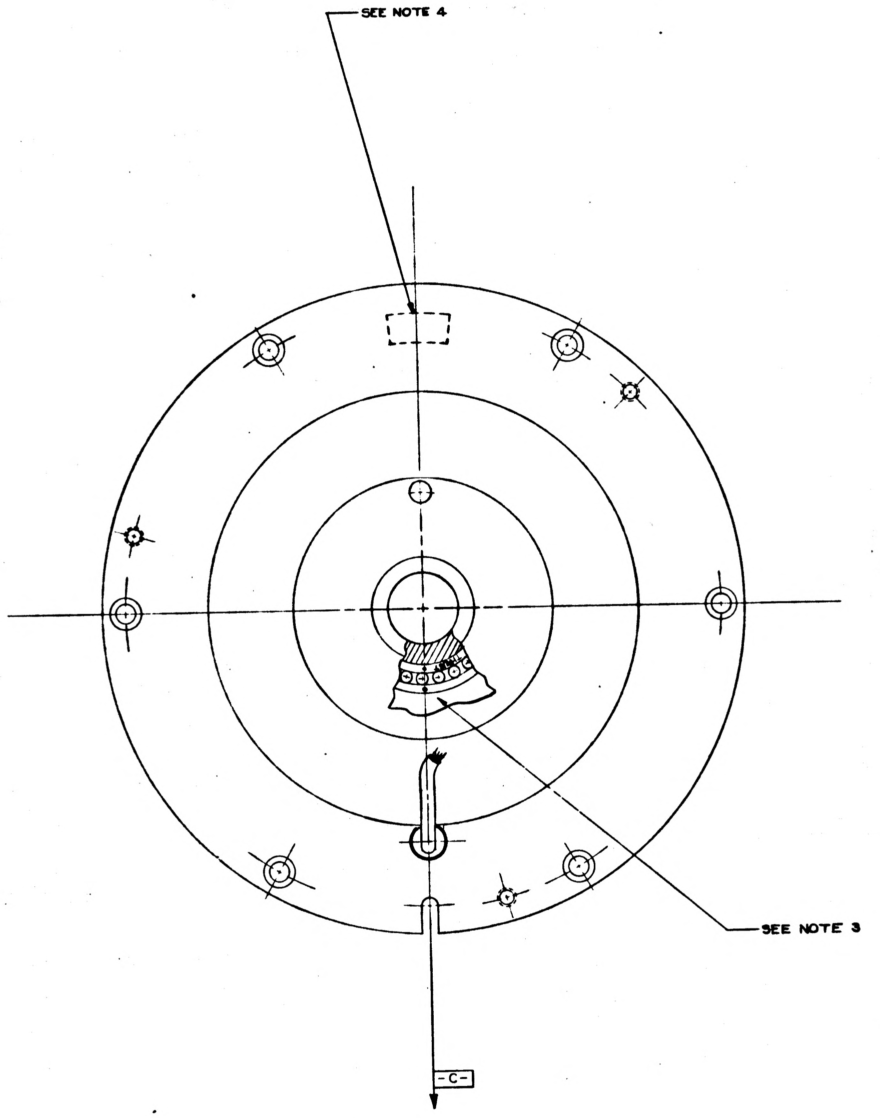

6 PLACES
6 PLACES
2 PLACES

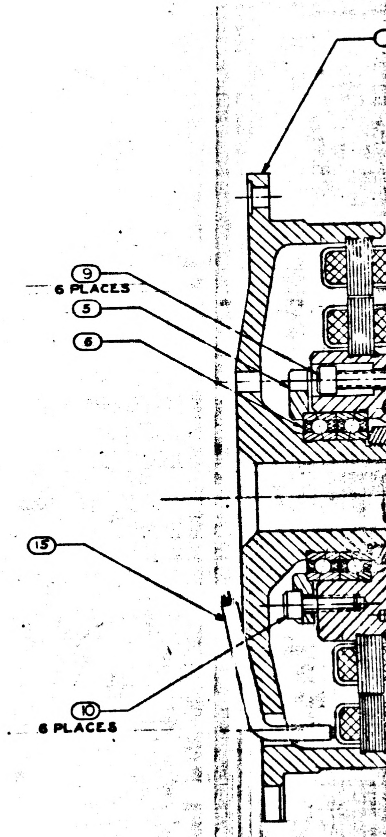

7
12
BOND 3 PLACES EQUALLY SPACED
SEE NOTE 2
-B-
8
SEE NOTE 3
-A-

MASTER

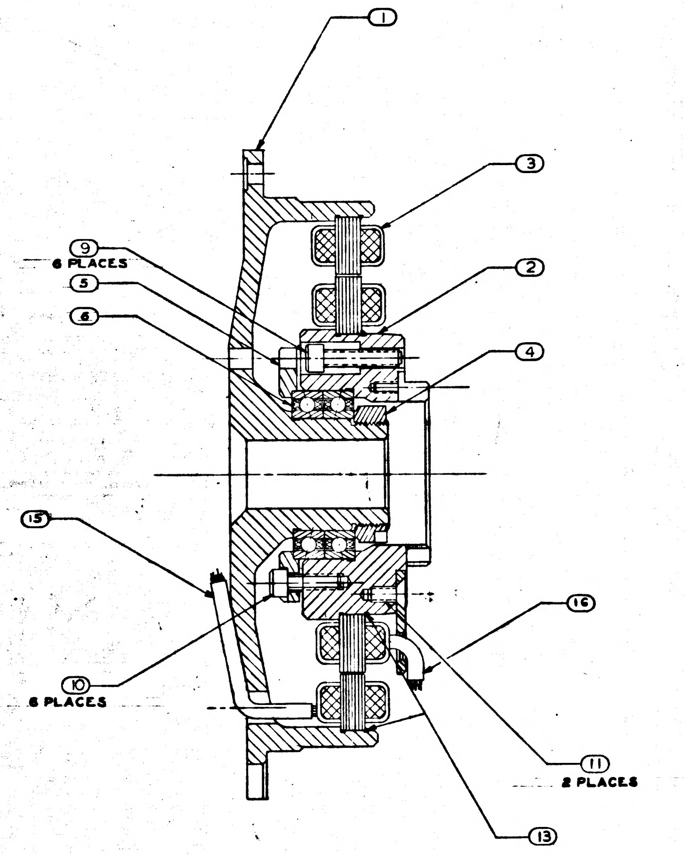
NOTES:

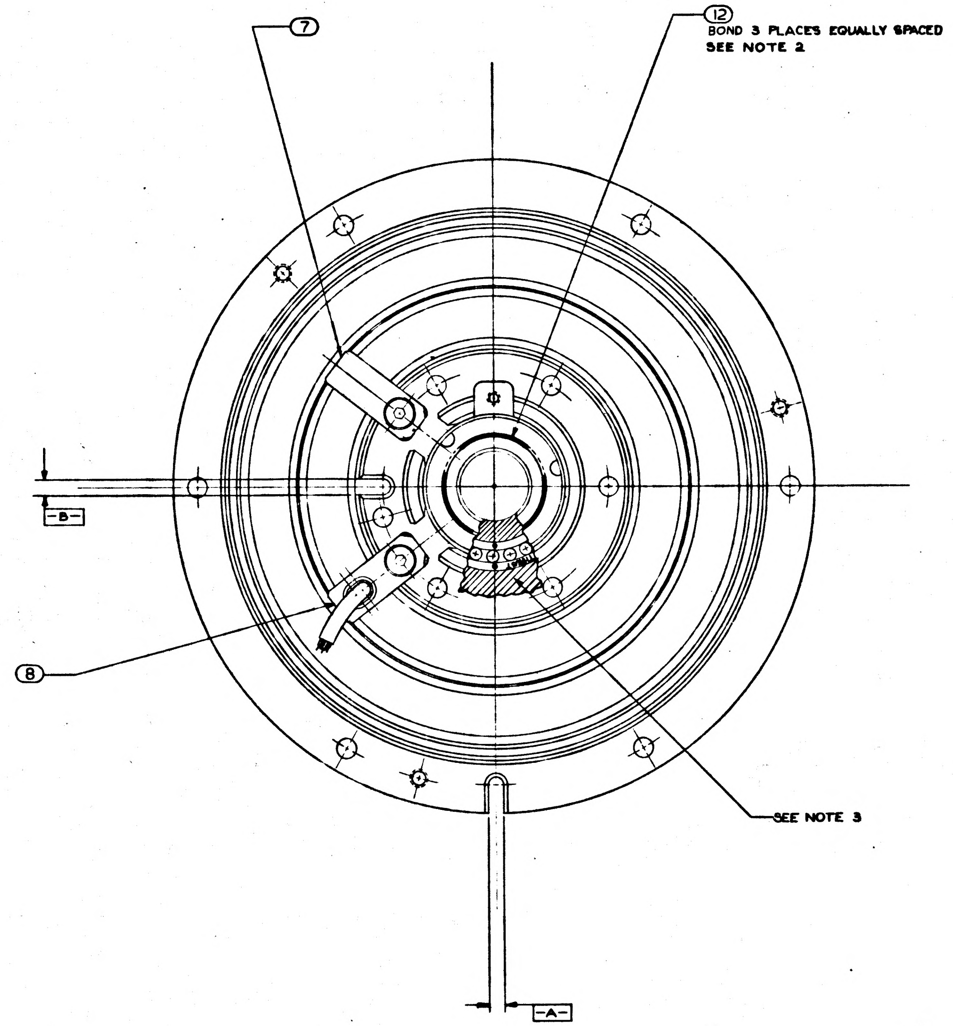
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM (12) TO ITEMS (1) AND (4) AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM (6) TO BE ALIGNED
   WHEN ITEMS (1) AND (2) ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO. REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON (1)
   AT THE INDICATED LOCATION PER ND 1002023 AND ND 1002019
5. SCREW TORQUE REQUIREMENTS ± 7%
   (4) — 400.0 IN LB
   (9) — 10.0 IN LB
   (11) — 5.0 IN LB
6. WITH SLOT $\boxed{-A-}$ AND $\boxed{-B-}$ 90°00'00" ± 0°00'12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSIBLE)
   THE 16 X SECTION OF THE RESOLVER SHALL BE WITHIN ± 0°2' OF ELECTRICAL ZERO REFERRED TO THE 1 X SHAFT





SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 11990		
A	REVISED TDRR 14109	[illegible]	
B	REVISED TDRR 14790	[illegible]	
C	REVISED TDRR 17153	23Mar65	
D	REVISED TDRR 13738	[illegible] May 65	





MASTER

QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
			17
1	1010490-110	INSULATION SLEEVING ELEC. HT. SHRK	16
1	1010490-346	INSULATION SLEEVING ELEC. HEAT SHRINK	15
			14
AS REQ'D	1011784	INSULATION COMPOUND	13
AS REQ'D	MIL-A-13883	ADH GOODYEAR CPA 923A	12
2	1010867-12	SCREW, FLAT HD, SPL SOC S.L.	11
6	1001488-18	SCREW, HEX, SOC HEAD S.L.	10
6	1001489-22	SCREW, HEX, SOC HEAD	9
1	2018732	CLIP, WIRE RETAINER	8
1	2018731	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018733	PLATE, BRG RETAINER RSVR M.A. & O.A.	5
1	2018723	NUT, BEARING RETAINER	4
1	2018631	RESOLVER, MULTIPLE SPEED	3
1	2018730	SHAFT, STUB, RSVR M.A. & O.A.	2
1	2018739	HOUSING, BRG, RSVR, OUTER AXIS	1

LIST OF MATERIALS

2018606

NEXT ASSY	USED ON
2018612	DL 2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN [illegible] DATE [illegible]
CHECKED
APPROVAL [illegible] 25Aug64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER ASSEMBLY
OUTER AXIS

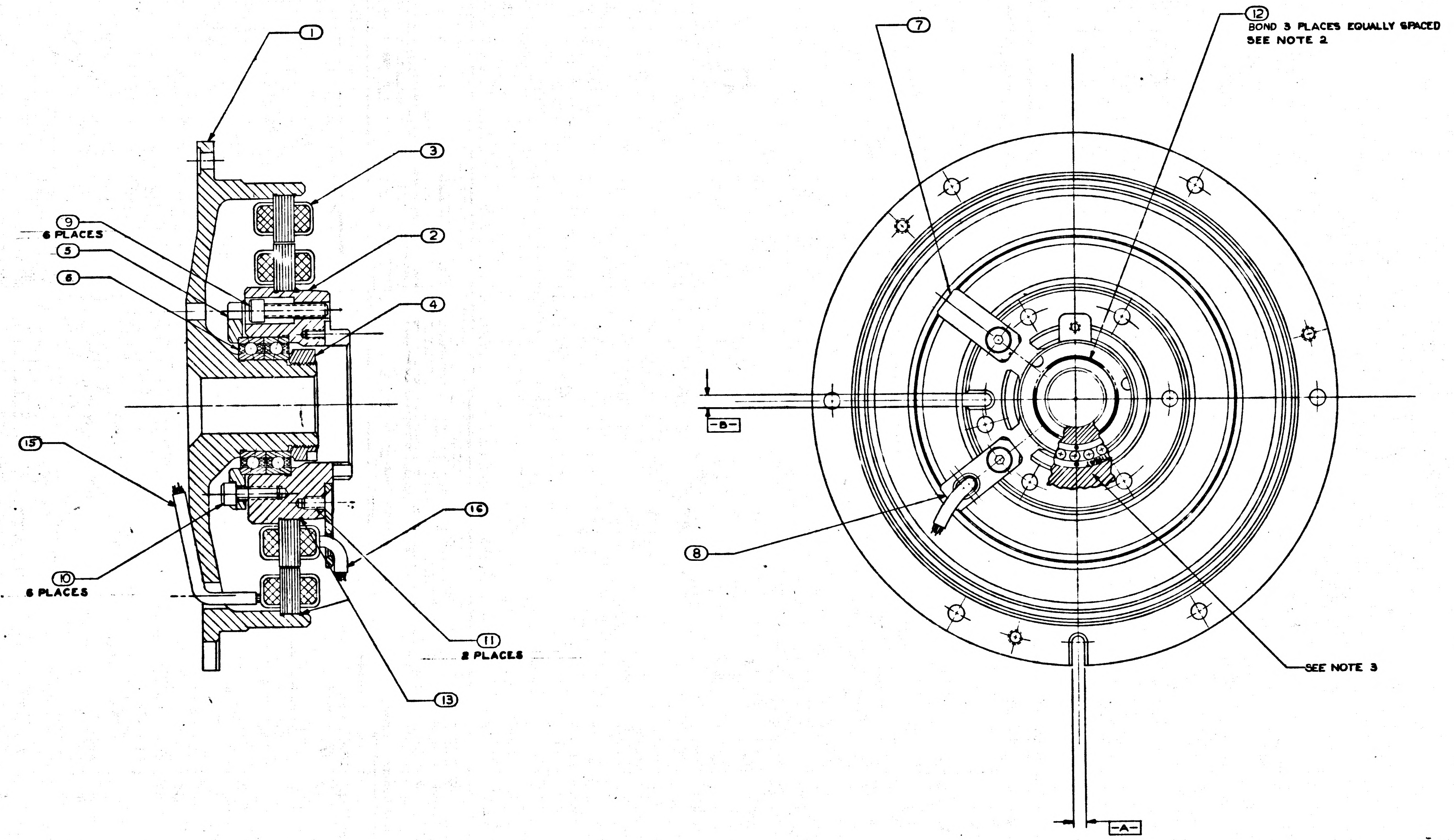
CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018606
SCALE 2-1
WT
SHEET 1 OF 1

	REV	SHEET
2018606	D	1

3H

SYM	DESCRIPTION	DATE	APPR
A	REVISED TDRR 14109	10DEC [illegible]	[illegible]
B	REVISED TDRR 14780	[illegible]	[illegible]
C	REVISED TDRR 17753	[illegible]	[illegible]
D	REVISED TDRR 18738	[illegible] May 65	[illegible]

REVISIONS TDRR 11990



QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
			17
1	1010490-110	INSULATION SLEEVING ELEC. HT. SHRK	16
1	1010490-346	INSULATION SLEEVING ELEC. HEAT SHRK	15
			14
AS REQ'D	1011754	INSULATION COMPOUND	13
AS REQ'D	MIL-A-13883	ADH GOODYEAR CPA 923A	12
2	1010867-12	SCREW, FLAT HD, SPL SOC S.L.	11
6	1001488-18	SCREW, HEX, SOC HEAD S.L.	10
6	1001489-22	SCREW, HEX, SOC HEAD	9
1	2018732	CLIP, WIRE RETAINER	8
1	2018731	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018733	PLATE, BRG RETAINER RSVR M.A. & O.A.	5
1	2018723	NUT, BEARING RETAINER	4
1	2018631	RESOLVER, MULTIPLE SPEED	3
1	2018730	SHAFT, STUB, RSVR M.A. & O.A.	2
1	2018739	HOUSING, BRG, RSVR, OUTER AXIS	1
011			

LIST OF MATERIALS

NEXT ASSY	USED ON
2018612	DL 2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

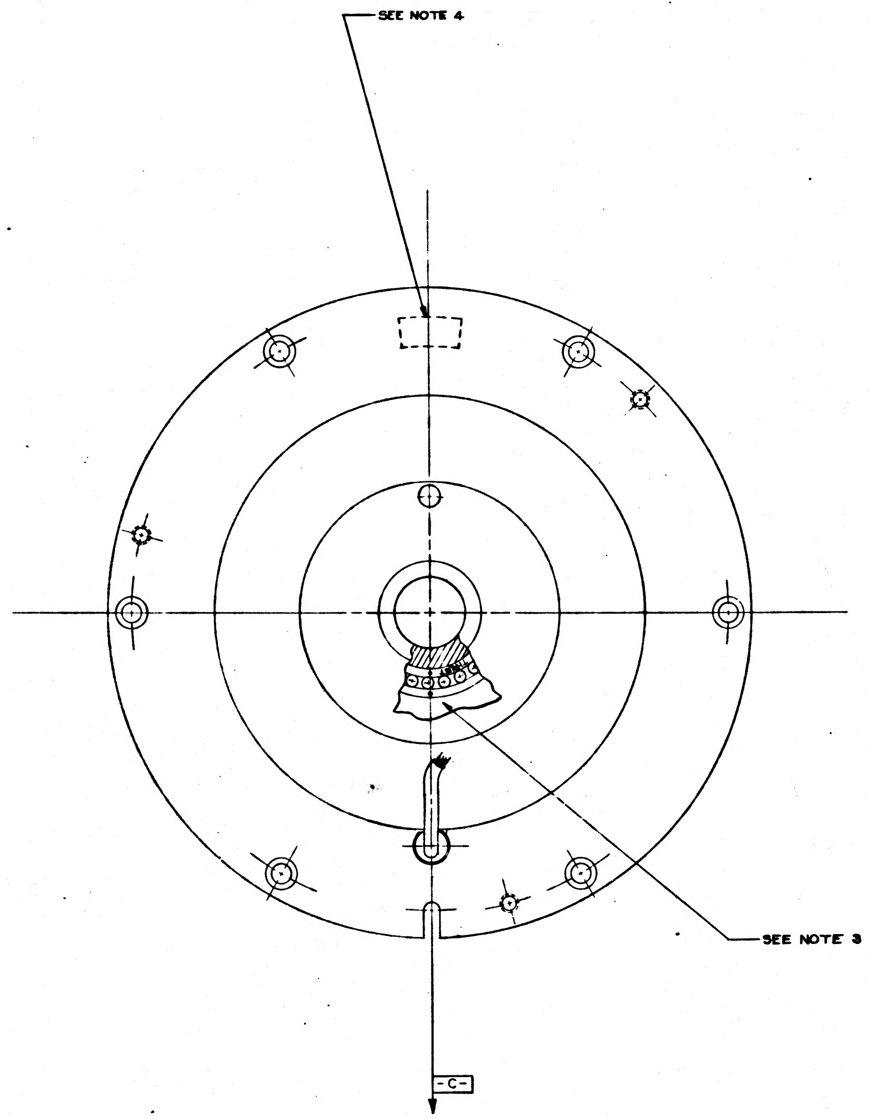
DRAWN [illegible] DATE [illegible]
CHECKED
APPROVAL A.J. Boyce 25 Aug 64
APPROVAL
NASA APPROVAL
MIT APPROVAL [illegible]

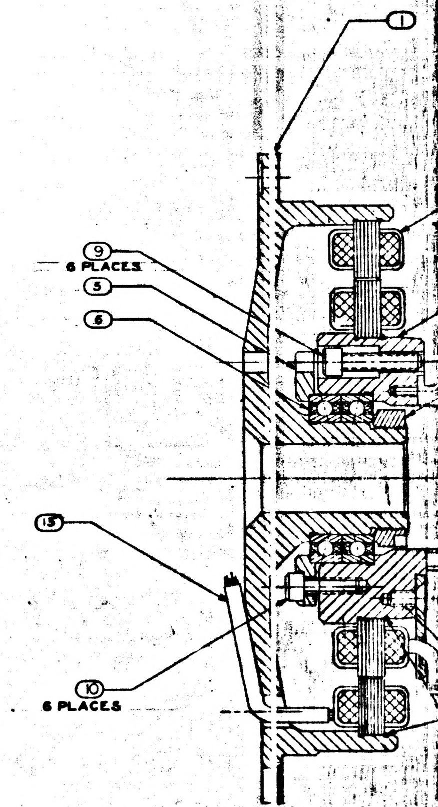
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER ASSEMBLY
OUTER AXIS

CODE IDENT NO. SIZE J NASA DRAWING NO. 2018606
SCALE 2-1 WT SHEET 1

MASTER



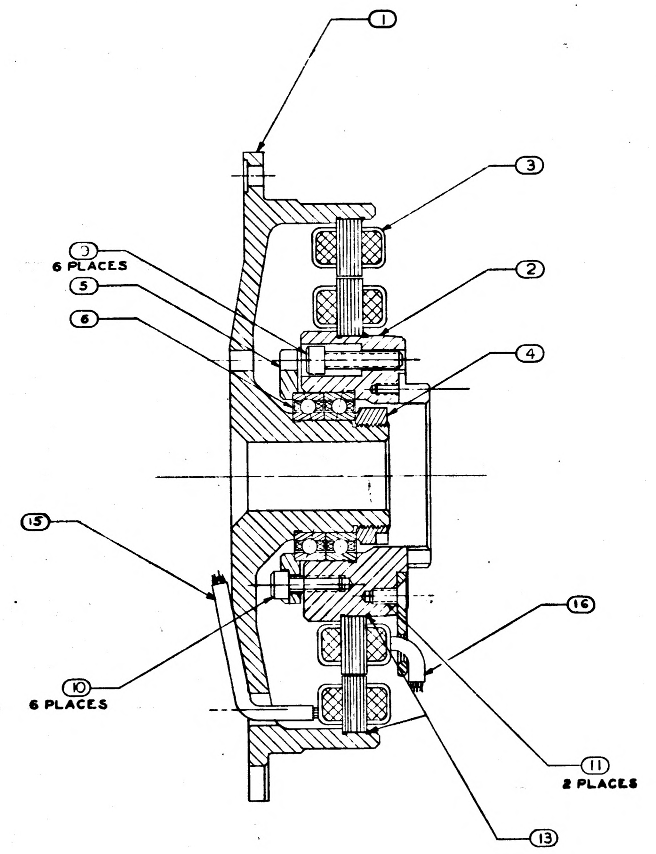


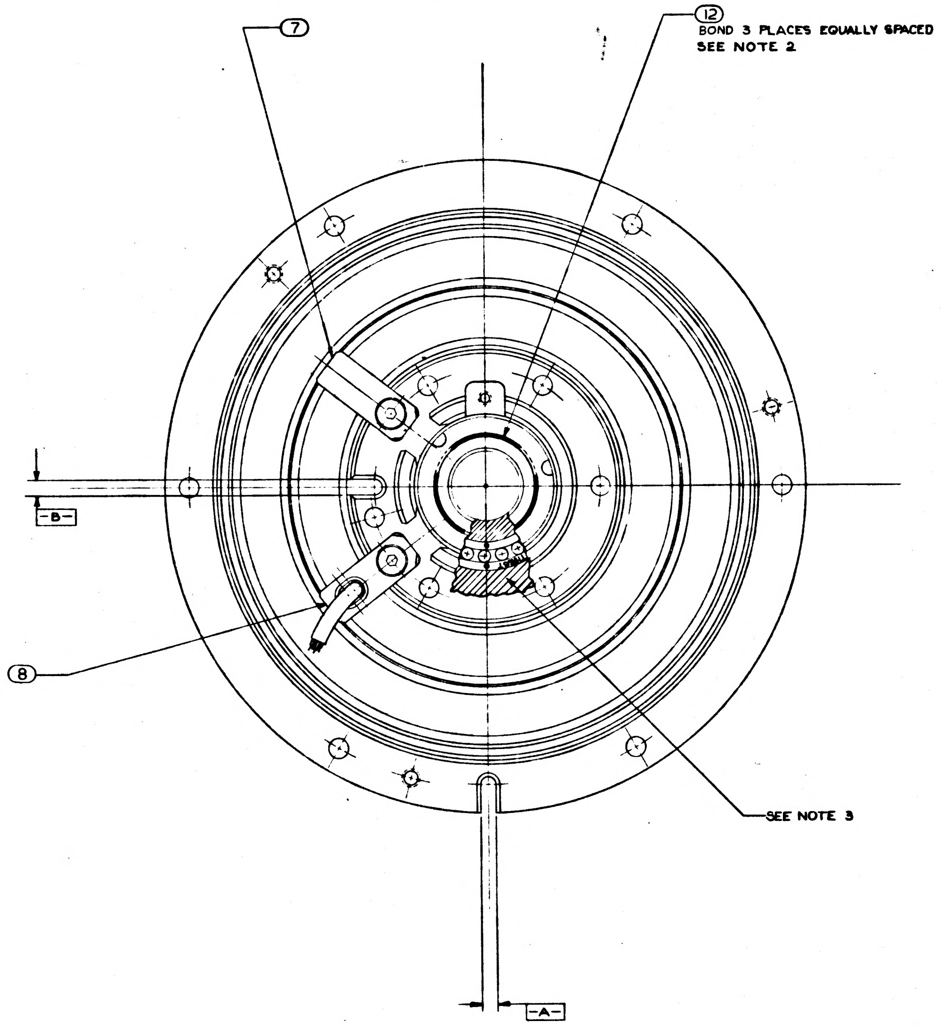
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM (12) TO ITEMS (1) AND (4) AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM (6) TO BE ALIGNED
   WHEN ITEMS (1) AND (2) ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO. REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON (1)
   AT THE INDICATED LOCATION PER ND 1002023 AND ND 1002019
5. SCREW TORQUE REQUIREMENTS ± 7%
   (4) ... 400.0 IN LB
   (9) ... 10.0 IN LB
   (11) ... 5.0 IN LB
6. WITH SLOT $\boxed{-A-}$ AND $\boxed{-B-}$ 90°00'00" ± 0°00'12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSIBLE)
   THE 16 X SECTION OF THE RESOLVER SHALL BE WITHIN ± 0°2' OF ELECTRICAL ZERO REFERRED TO THE 1 X SHAFT

F-1

REVISIONS TDRR 11930			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 14109	10DEC64	
B	REVISED TDRR 14780	10DEC64	
C	REVISED TDRR 17753	23MAR65	
D	REVISED TDRR 18738	11May65	
E	REVISED TDRR 21806	21May65	





QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
			17
1	1010430-110	INSULATION SLEEVING ELEC. HT. SHRK	16
1	1010430-346	INSULATION SLEEVING ELEC. HEAT SHRINK	15
			14
AS REQ'D	1010996	ADHESIVE	13
AS REQ'D	MIL-A-13883 TYPE I	ADH 3M EC1099	12
2	1010867-12	SCREW, FLAT HD, SPL SOC S.L.	11
6	1001488-18	SCREW, HEX, SOC HEAD S.L.	10
6	1001489-22	SCREW, HEX, SOC HEAD	9
1	2018732	CLIP, WIRE RETAINER	8
1	2018731	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018733	PLATE, BRG RETAINER RSVR M.A. & O.A.	5
1	2018723	NUT, BEARING RETAINER	4
1	2018631	RESOLVER, MULTIPLE SPEED	3
1	2018730	SHAFT, STUB, RSVR M.A. & O.A.	2
1	2018739	HOUSING, BRG, RSVR, OUTER AXIS	1
011			

LIST OF MATERIALS

2018612	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO CONTRACT
DRAWN R.J. Courtney DATE 8-25-64
CHECKED
APPROVAL C.J. Boyce 25Aug64
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER ASSEMBLY
OUTER AXIS

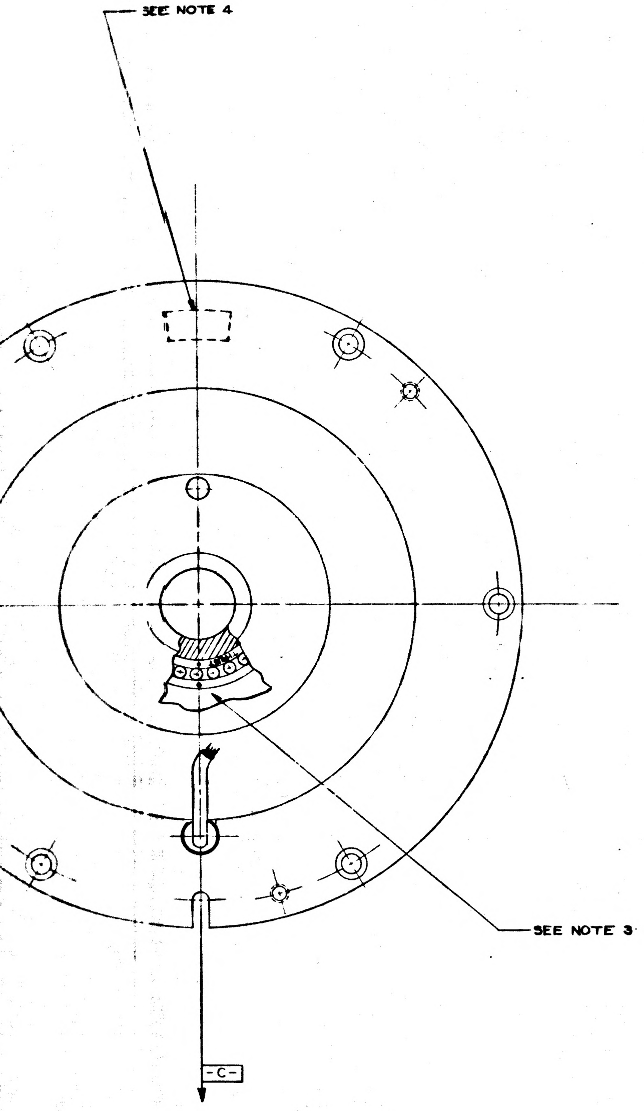
CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	J	2018606
SCALE 2-1	WT	SHEET 1 OF 1

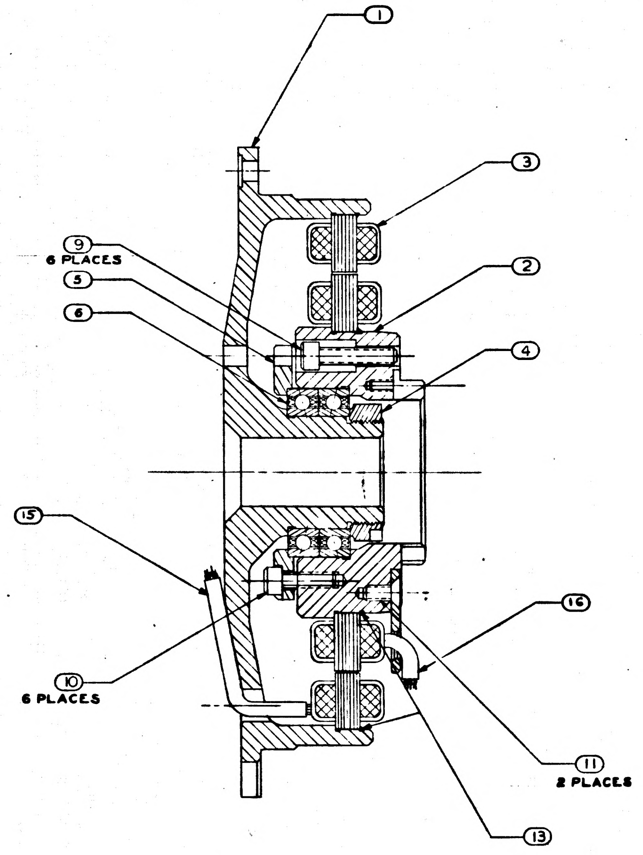
2018606

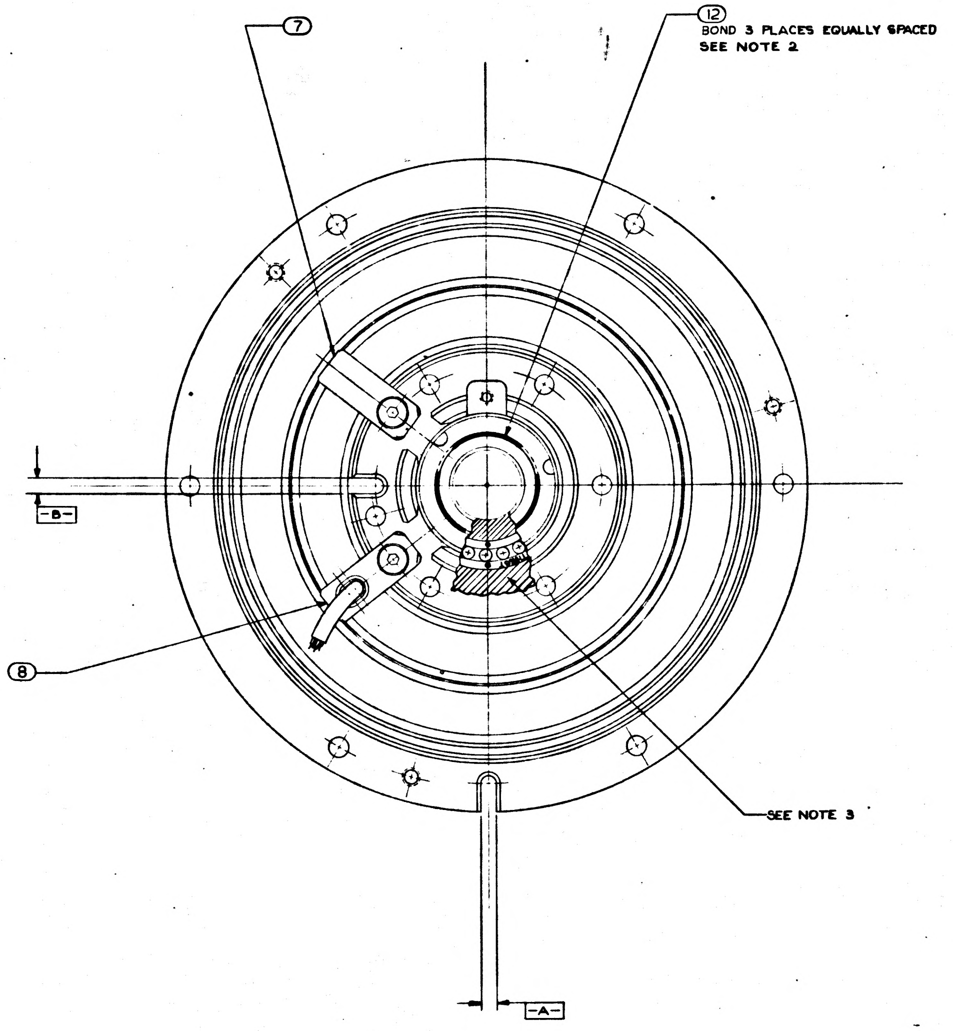
3H

MASTER

	REV	SHEET
2018606	E	1


SEE NOTE 4
SEE NOTE 3
-C-


1
3
9
6 PLACES
5
6
2
4
15
16
10
6 PLACES
11
2 PLACES
13


7
12
BOND 3 PLACES EQUALLY SPACED
SEE NOTE 2
-B-
8
SEE NOTE 3
-A-

1	1010490-11
1	1010490-3
AS REQ'D	1010996
AS REQ'D	MIL-A-1388
2	1010867-.2
6	1001488-18
6	1001489-22
1	2018732
1	2018731
1	2018621
1	2018733
1	2018723
1	2018631
1	2018730
1	2018739
QTY	

2018612	BL 2018601
NEXT ASSY	USED ON
APPLICATION	

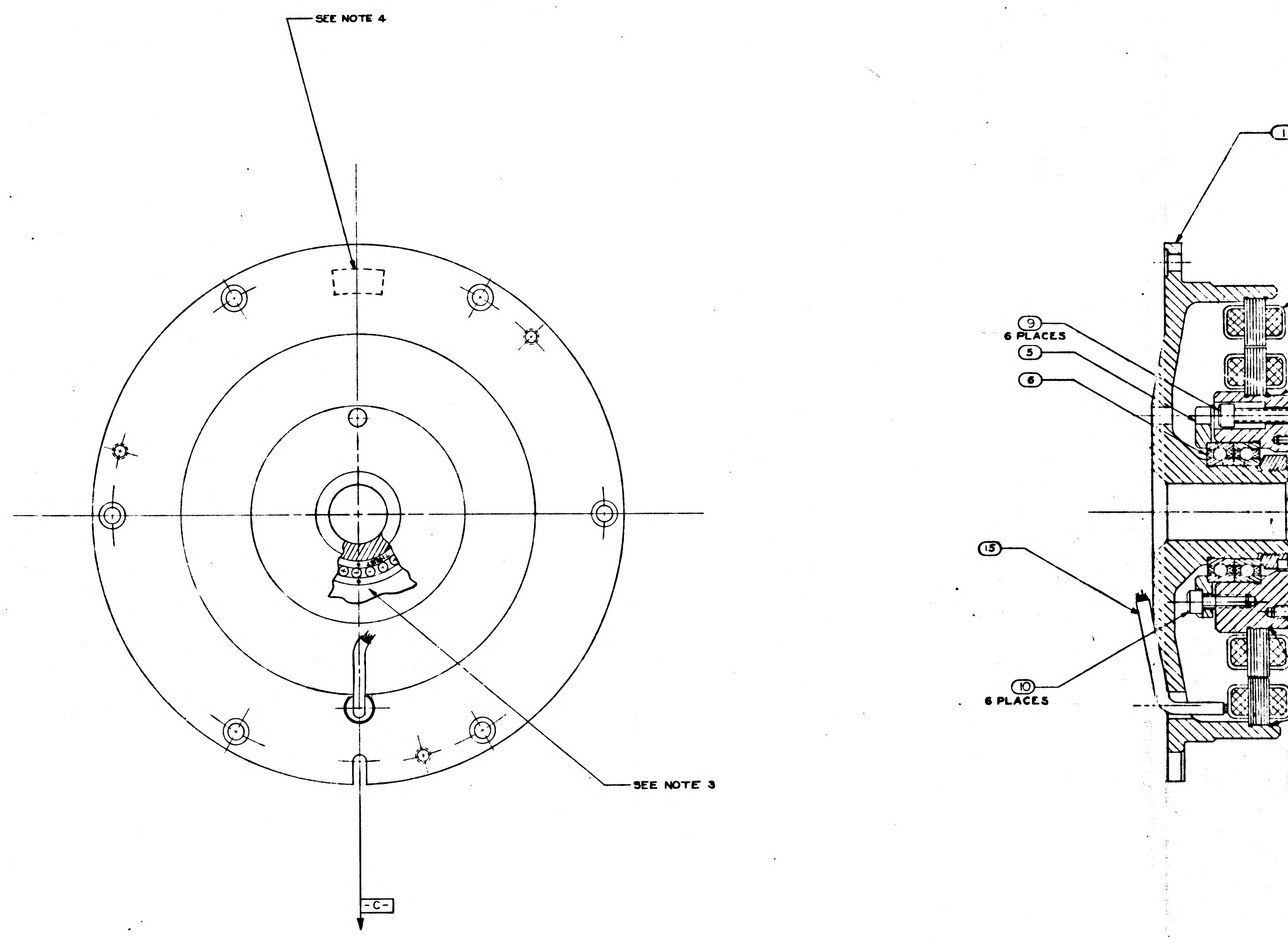
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION
DRAWN
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
UNIT APPROVAL

MASTER

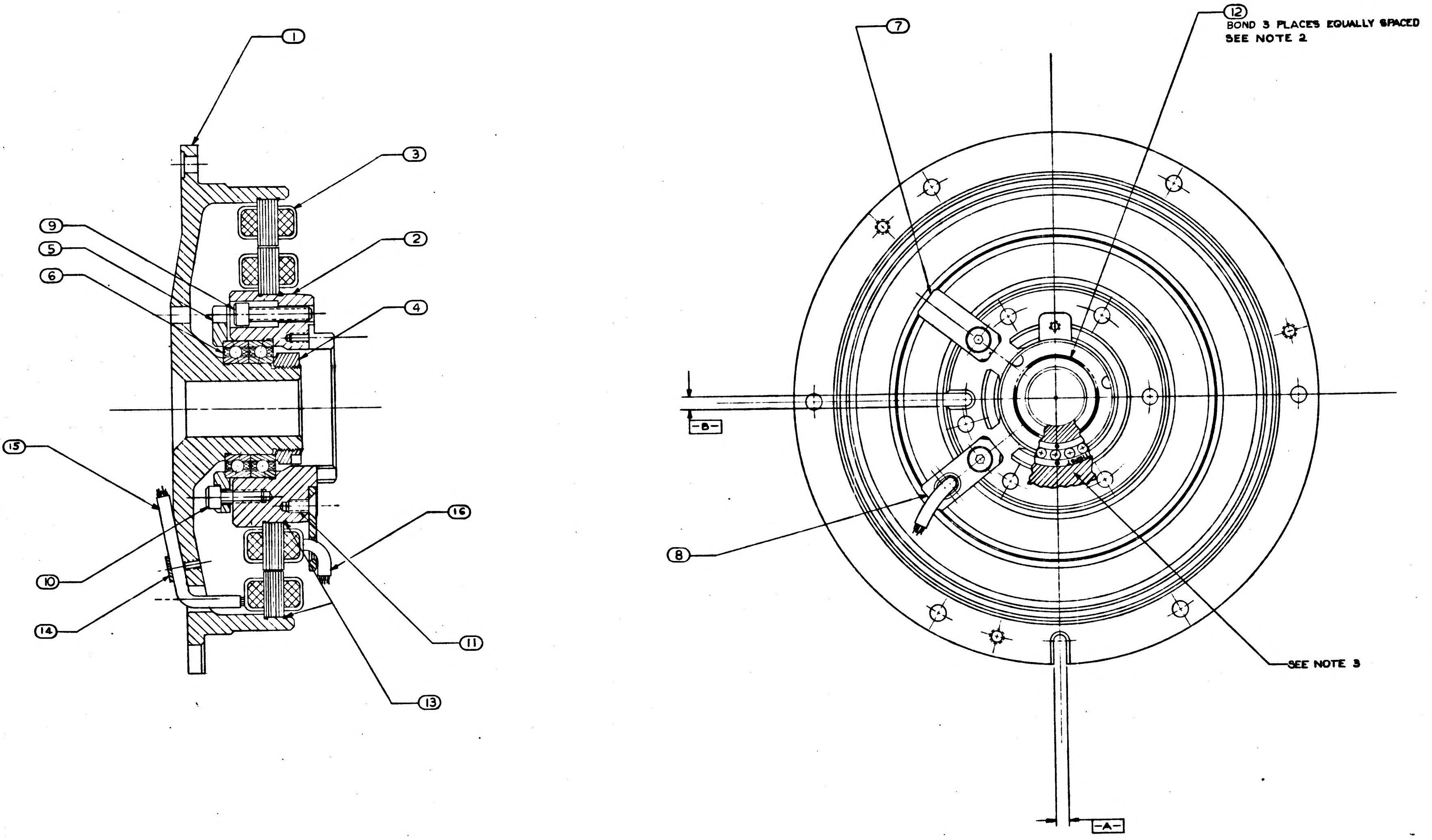
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑫ TO ITEMS ① AND ④ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑥ TO BE ALIGNED
   WHEN ITEMS ① AND ② ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO. REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ①
   AT THE INDICATED LOCATION PER ND 1002023 AND ND 1002019
5. SCREW TORQUE REQUIREMENTS ± 7%
   ④ 400.0 IN LB
   ⑨ 10.0 IN LB
   ⑪ 5.0 IN LB
6. WITH SLOT -A- AND -B- 90°00'00" ± 0°00'12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSIBLE)
   THE 16 X SECTION OF THE RESOLVER SHALL BE WITHIN ± 0°2' OF ELECTRICAL ZERO REFERRED TO THE 1 X SHAFT



F-1

2018606 REV E SHEET 1



QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1010618-1	SCREW BUTTON HEAD S.L.	17
1	1006776-15	INSULATION SLEEVING-½ LONG	16
1	1006776-9	INSULATION SLEEVING-1½ LONG	15
1	2018768	CLIP, WIRE RETAINER	14
AS REQ'D	1011754	INSULATION COMPOUND	13
AS REQ'D	MIL-A-13883	ADH GOODYEAR CPA 923A	12
2	2018635-13	SCREW, FLAT HD, HEX SOC S.L.	11
6	1001488-18	SCREW, HEX, SOC HEAD S.L.	10
6	1001489-22	SCREW, HEX, SOC HEAD	9
1	2018732	CLIP, WIRE RETAINER	8
1	2018731	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018733	PLATE, BRG RETAINER RSVR M.A. & O.A.	5
1	2018723	NUT, BEARING RETAINER	4
1	2018631	RESOLVER, MULTIPLE SPEED	3
1	2018730	SHAFT, STUB, RSVR M.A. & O.A.	2
1	2018739	HOUSING, BRG, RSVR, OUTER AXIS	1
O11			

LIST OF MATERIALS

NEXT ASSY	USED ON
2018612	DL 2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN [illegible] DATE [illegible]
CHECKED
APPROVAL C.J. [illegible] 25 Aug 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER ASSEMBLY
OUTER AXIS

CODE IDENT NO.
SIZE R
NASA DRAWING NO. 2018606
SCALE 2-1
WT
SHEET 1 OF 1

2018606

E12

MASTER

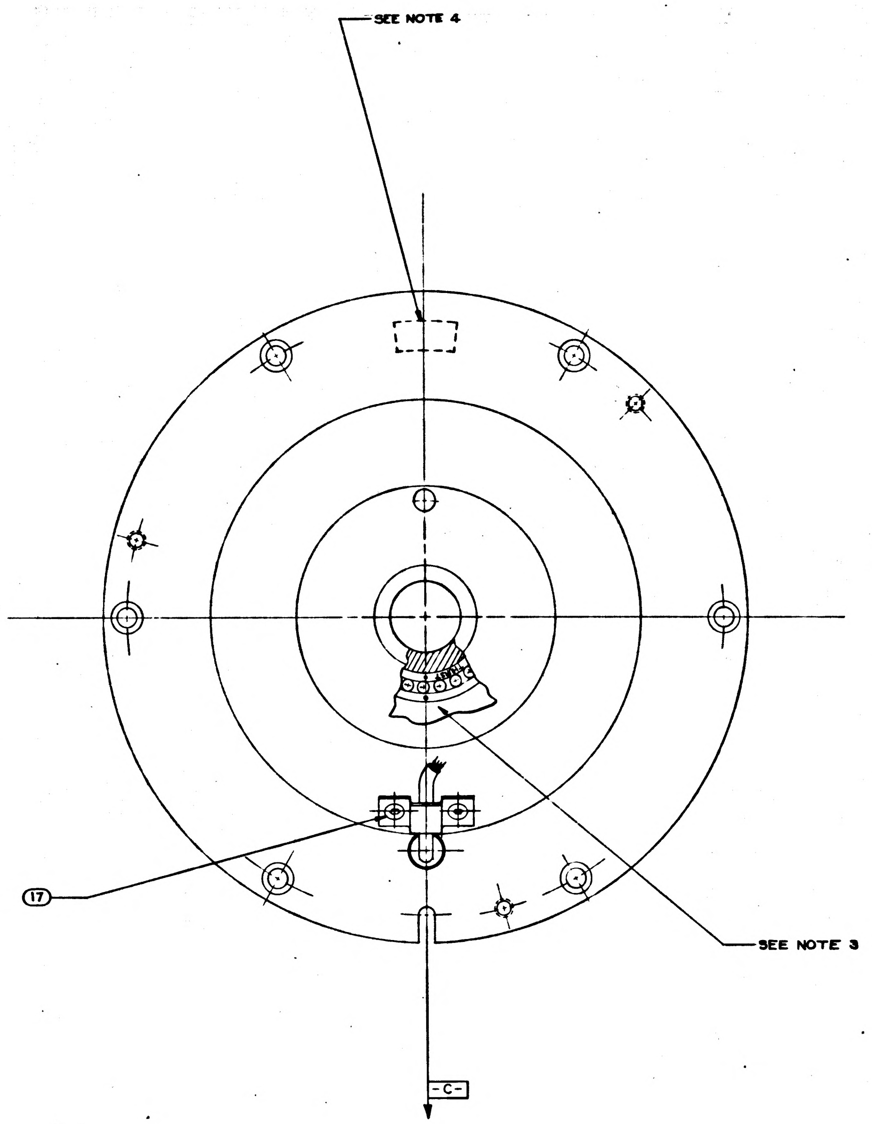
2018606 REV SHEET

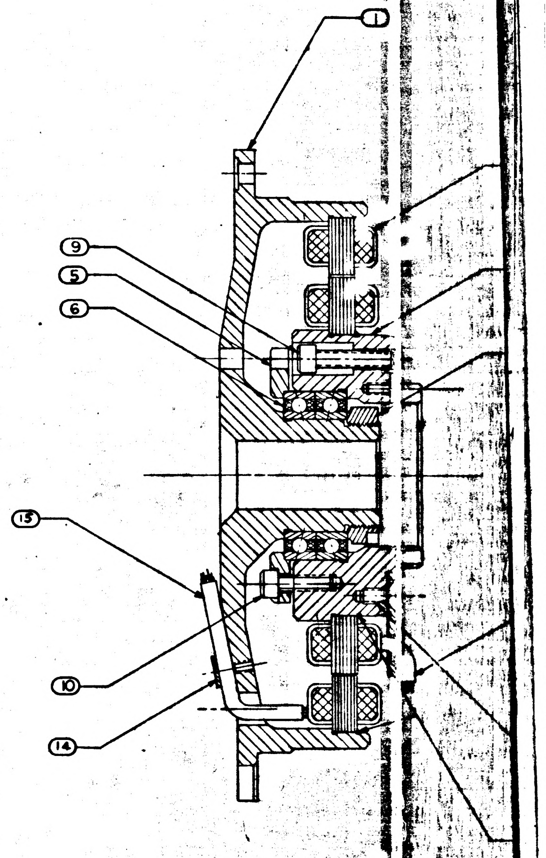
4 3 2 1

D C B A

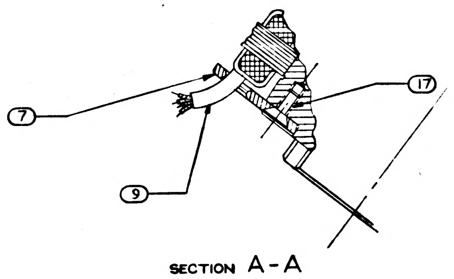
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑫ TO ITEMS ① AND ④ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑥ TO BE ALIGNED
   WHEN ITEMS ① AND ② ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO. REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ①
   AT THE INDICATED LOCATION PER ND 1002023 ~~AND ND 1002019~~
5. SCREW TORQUE REQUIREMENTS ± 7%
   ④ 400 IN LB
   ⑨ 10.0 IN LB
   ⑪⑰ 10.0 IN LB
6. WITH SLOT -A- AND -B- 90°00'00" ± 0°00'12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSIBLE)
   THE 16 X SECTION OF THE RESOLVER SHALL BE WITHIN ± 0°2' OF ELECTRICAL ZERO REFERRED TO THE 1 X SHAFT

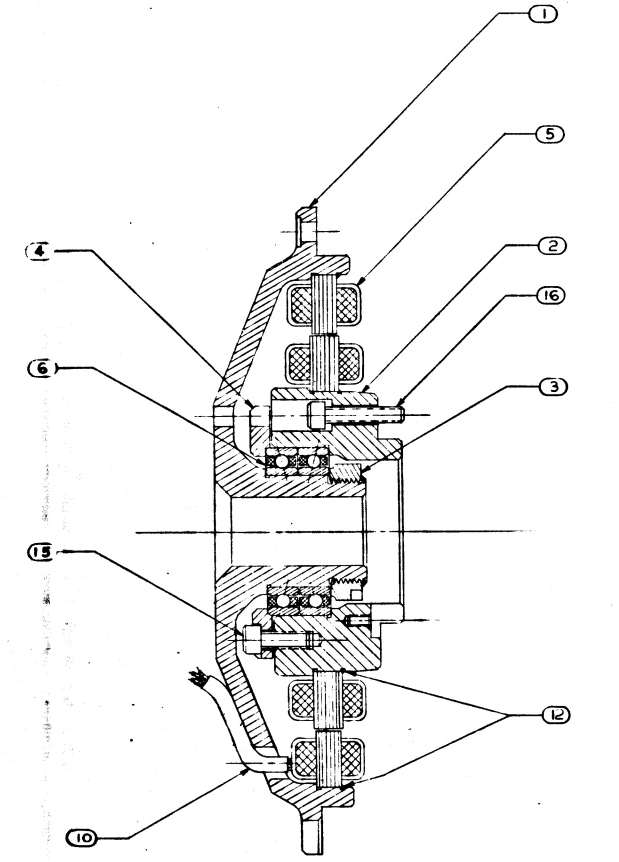


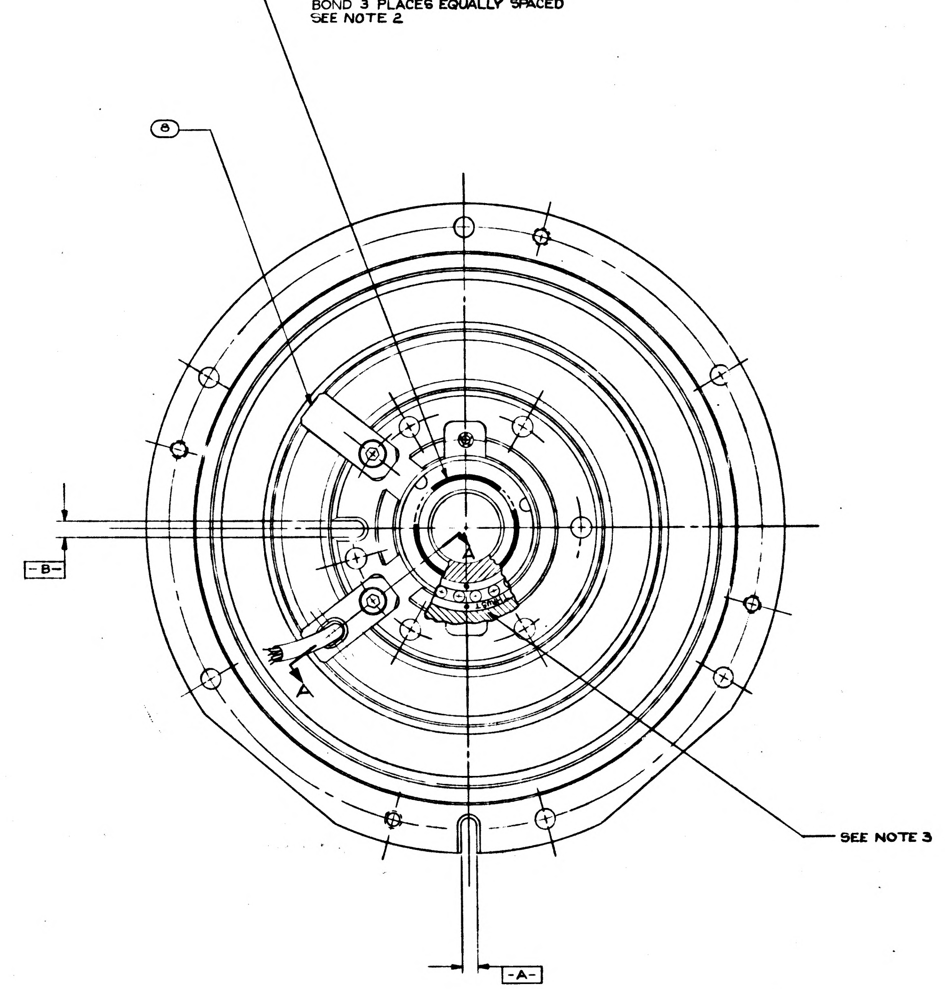


SYM	DESCRIPTION	DATE	APPROVAL	
REVISIONS TDRR 11990				
A	REVISED TDRR 14109	10DEC64		
B	REVISED TDRR 14780	10DEC64		JK



SECTION A-A





QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1010628-13	SCREW, FLAT HD, ~~HEX~~ SOC S.L.	17
6	1001489-22	SCREW, HEX, SOC HEAD	16
6	1001488-18	SCREW, HEX, SOC HEAD S.L.	15
			14
			13
AS REQ'D	1011754	INSULATION COMPOUND	12
AS REQ'D	MIL-A-13883	ADH GOODYEAR CPA 923 A	11
1	1006776-9	INSULATION SLEEVING - 7/8 LONG	10
1	1006776-15	INSULATION SLEEVING - 1/2 LONG	9
1	2018731	CLIP, WIRE RETAINER	8
1	2018732	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018631	RESOLVER, MULTIPLE SPEED	5
1	2018733	PLATE, BRG RETAINER, RSVR M.A.&O.A.	4
1	2018723	NUT, BRG RETAINER	3
1	2018730	SHAFT, STUB, RESOLVER M.A.&O.A.	2
1	2018736	HOUSING, BRG, RSVR, MIDDLE AXIS	1
011			

LIST OF MATERIALS

NEXT ASSY	USED ON
2018613	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN R.W. CONTAM DATE 8-20-64
CHECKED
APPROVAL A.J. Boyce 25 Aug 64
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 28 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER
ASSEMBLY
MIDDLE AXIS

CODE IDENT NO.
SIZE 2-1
NASA DRAWING NO. 2018607
SCALE 2-1
WT
SHEET 1 OF 1

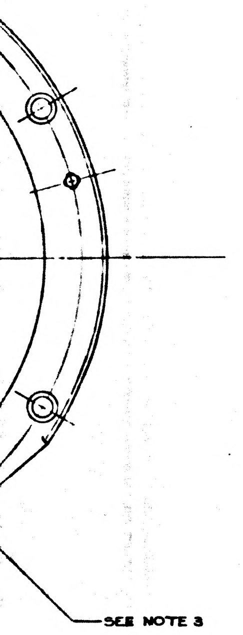
2018607 B

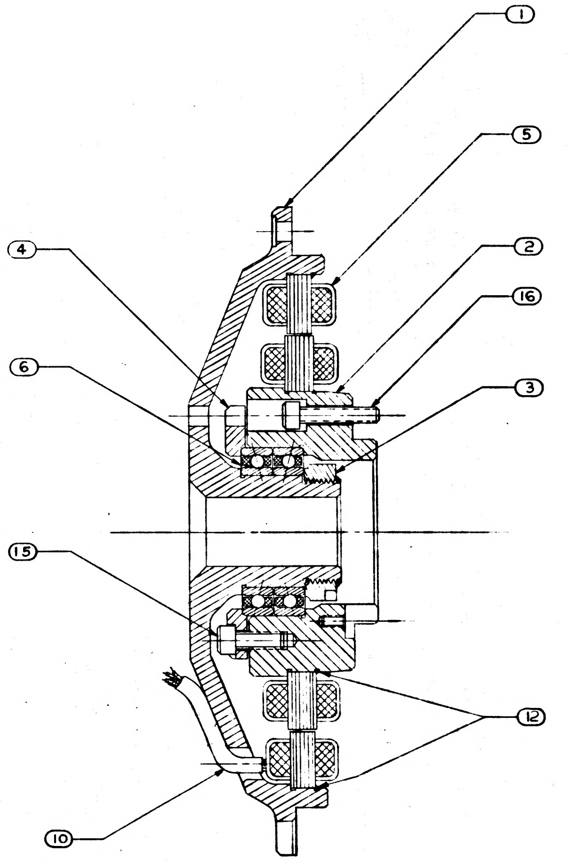
2018607 REV B SHEET 1

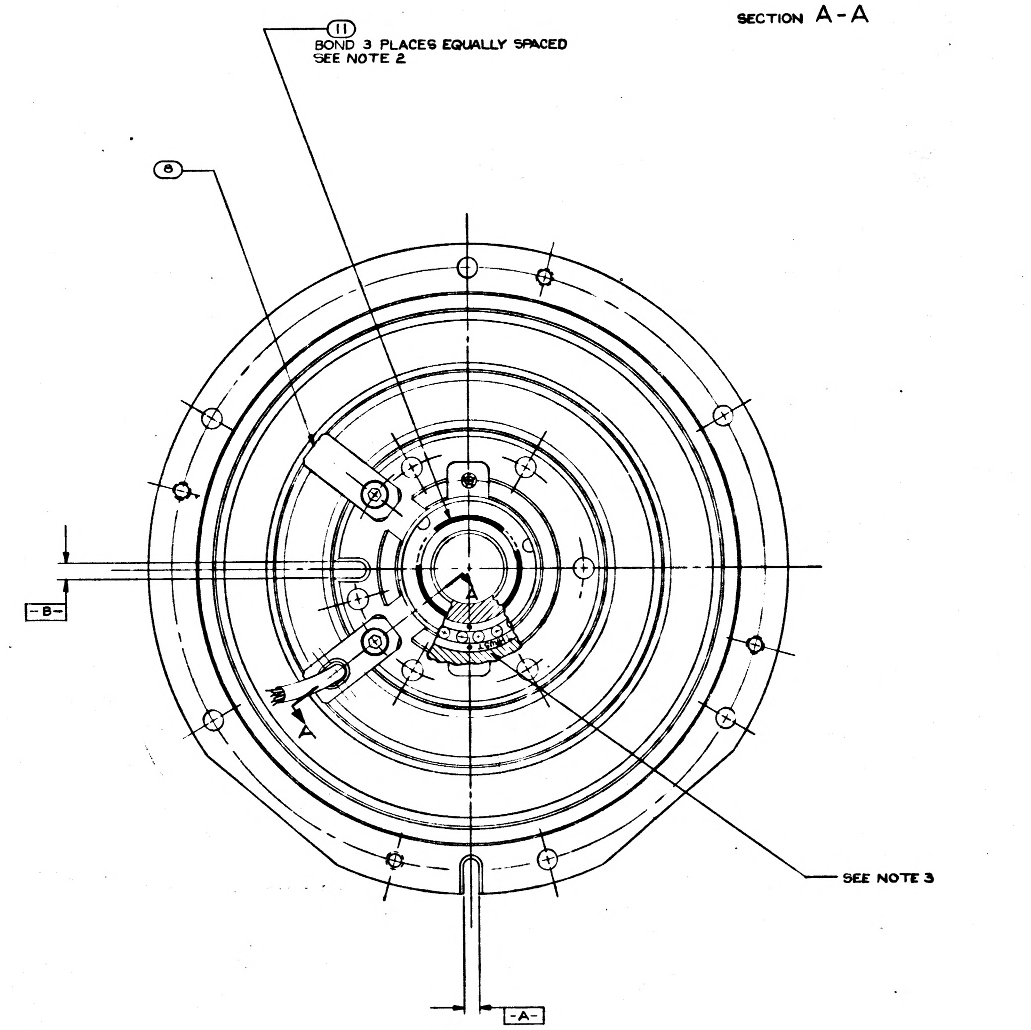
MASTER

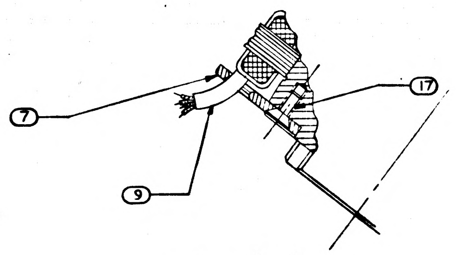
F3

SYM		DESCRIPTION
A	REVISED	TDRR 4108
B	REVISED	TDRR 4780









SECTION A-A

QTY	PART OR IDENTIFYING NO.	NOMENCLATURE DESCRIPTION
2	1010628-13	SCR EW, FLAT HD, HEX SOC
6	1001489-22	SCR EW, HEX, SOC HEAD
6	1001488-18	SCR EW, HEX, SOC HEAD
AS REQ'D	1011754	INS LATION COMPOUND
AS REQ'D	MIL-A-13883	AD GOODYEAR LPA 9
1	1006776-9	INS LATION SLEEVING
1	1006776-15	INS ULATION SLEEVING
1	2018731	CLI WIRE RETAINER
1	2018732	CL P, WIRE RETAINER
1	2018621	BE RING, BALL, DUPL
1	2018631	RE OLVER, MULTIPLE
1	2018733	PL TE, BRG RETAINER,
1	2018723	NU , BRG RETAINER
1	2018730	SH FT, STUB, RESOLVER
1	2018736	HO SING, BRG, RSVR,
011		

LIST OF MATERIALS

NEXT ASSY	USED ON
2018613	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
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DWG. NO. CONTRACT
DRAWN R.W. CONZ DATE 5-20-64
CHECKED
APPROVAL G.J. Bogue 25 Aug 64
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 28 Sept

MANNED SPACECRAFT
HOUSTON, TEXAS

RESOLVER
ASSEMBLY
MIDDLE AXIS

CODE IDENT NO. SIZE 2-1
SCALE 2 : WT

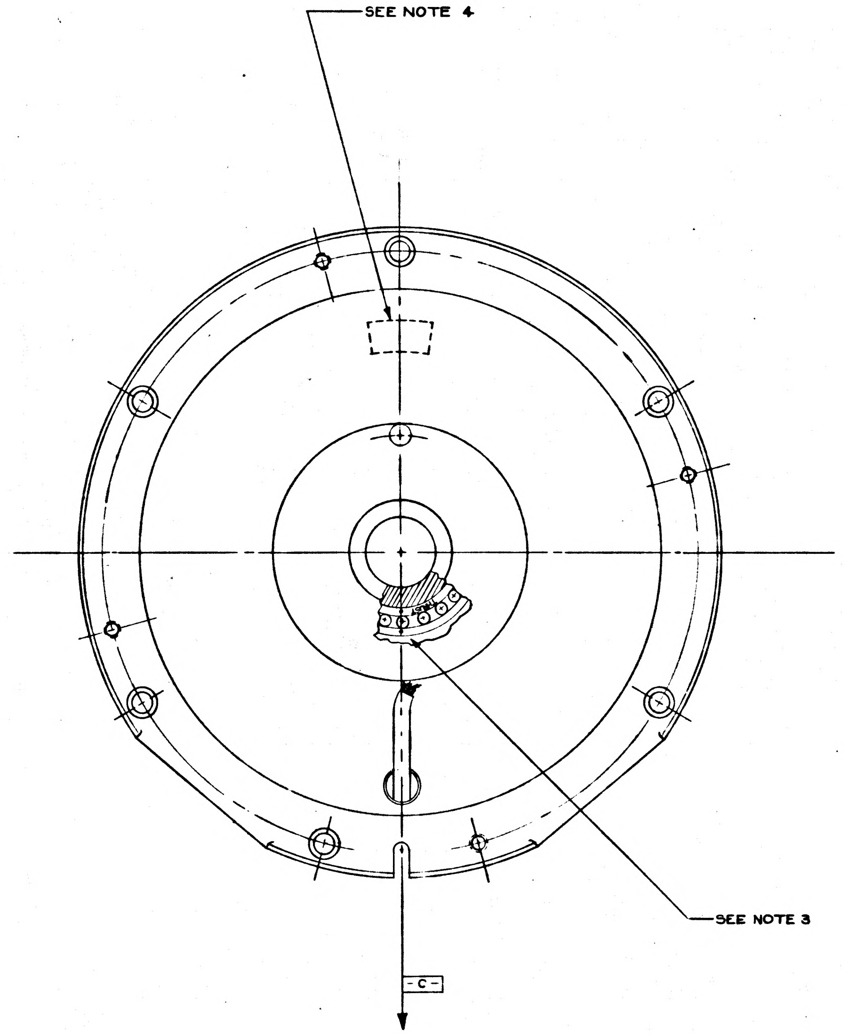
MASTER

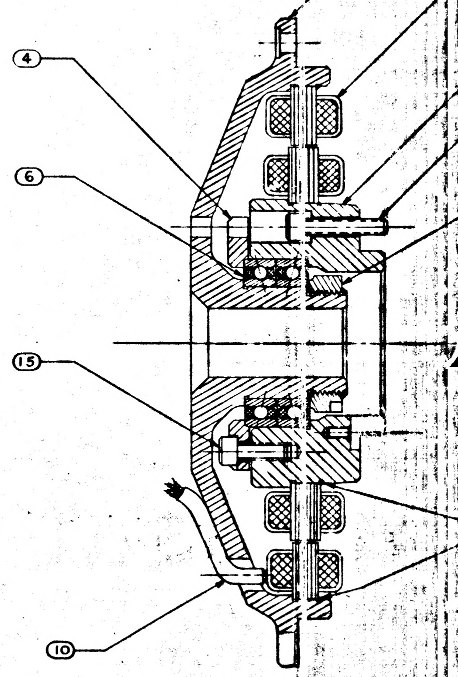
2018607 REV B SHEET 1

F-2

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑪ TO ITEMS ① AND ③ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑥ TO BE ALIGNED WITHIN 5° OF -C- AND IN THE DIRECTION OF ARROW WHEN ITEMS ① AND ② ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO. REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ① AT THE INDICATED LOCATION PER ND 1002023 AND ND1002019
5. SCREW TORQUE REQUIREMENTS ± 7%
   - ③ 400 IN
   - ⑮ 10.0 IN
   - ⑰ 5.0 IN
6. WITH SLOT -A- AND -B- 90°00'00" ±0°00'12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSABLE) THE 16 X SECTION OF THE RESOLVER SHALL BE WITHIN ±0°2' OF ELECTRICAL ZERO REFERRED TO THE 1X SHAFT





	REV	SHEET
2018607	B	1

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 11990			
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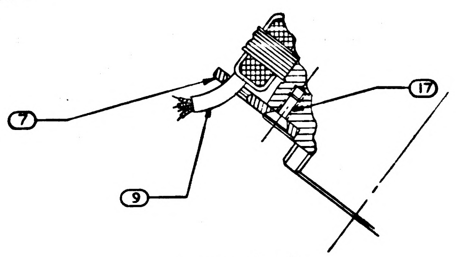
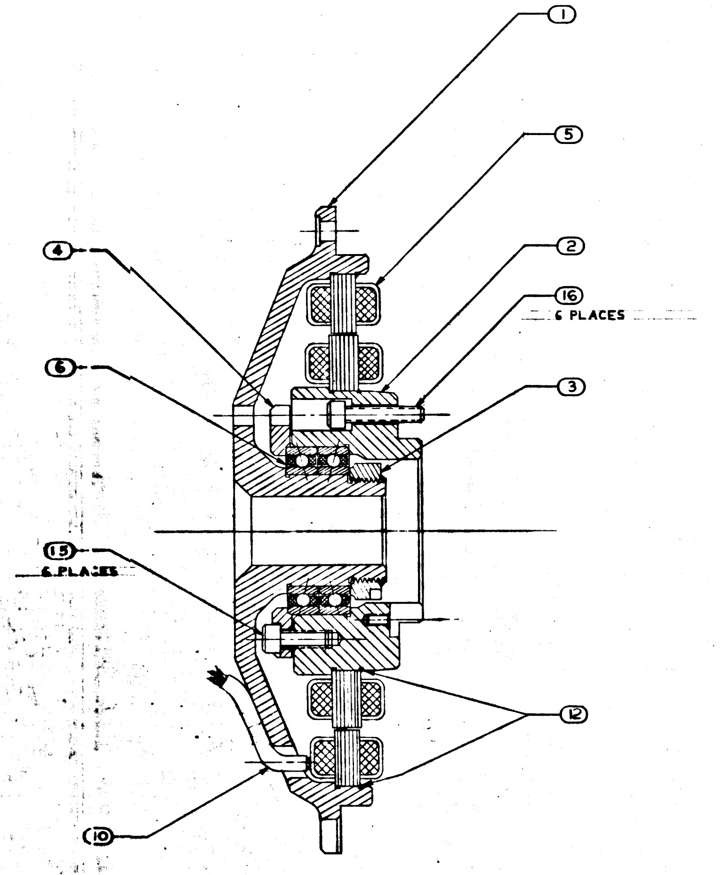
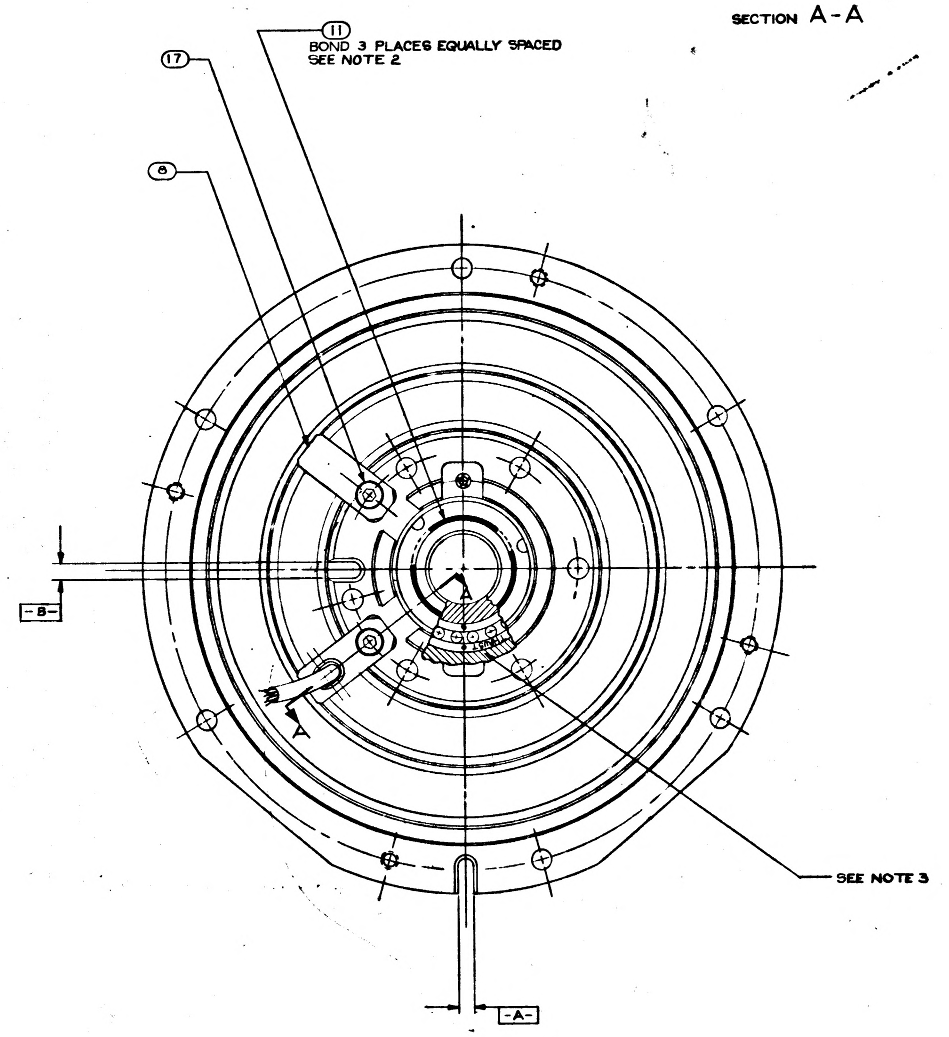
B	REVISED TDRR 14780	10 DEC 64		
C	REVISED TDRR 17753	[illegible]		



SECTION A-A





QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1010867-12	SCREW, FLAT HD, SPL SOC S.L.	17
6	1001489-22	SCREW, HEX, SOC HEAD	16
6	1001488-18	SCREW, HEX, SOC HEAD S.L.	15
			14
			13
AS REQ'D	1011754	INSULATION COMPOUND	12
AS REQ'D	MIL-A-13883	ADH GOODYEAR CPA 923 A	11
1	1010490-196	INSULATION SLEEVING, ELEC. HEAT SHRINK	10
1	1010490-110	INSULATION, SLEEVING, ELEC. HEAT SHRINK	9
1	2018731	CLIP, WIRE RETAINER	8
1	2018732	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018631	RESOLVER, MULTIPLE SPEED	5
1	2018733	PLATE, BRG RETAINER, RSVR M.A.&O.A.	4
1	2018723	NUT, BRG RETAINER	3
1	2018730	SHAFT, STUB, RESOLVER M.A.&O.A.	2
1	2018736	HOUSING, BRG, RSVR, MIDDLE AXIS	1
011			
	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018613	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
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MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN R.W. CONTAM DATE 8-20-64
CHECKED
APPROVAL G. J. Bogner 25 Aug 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

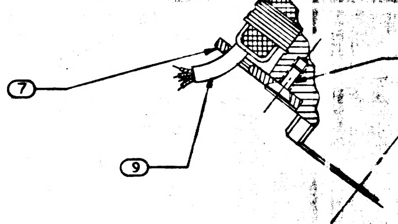
RESOLVER
ASSEMBLY
MIDDLE AXIS

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018607
SCALE 2-1
WT
SHEET 1 OF 1

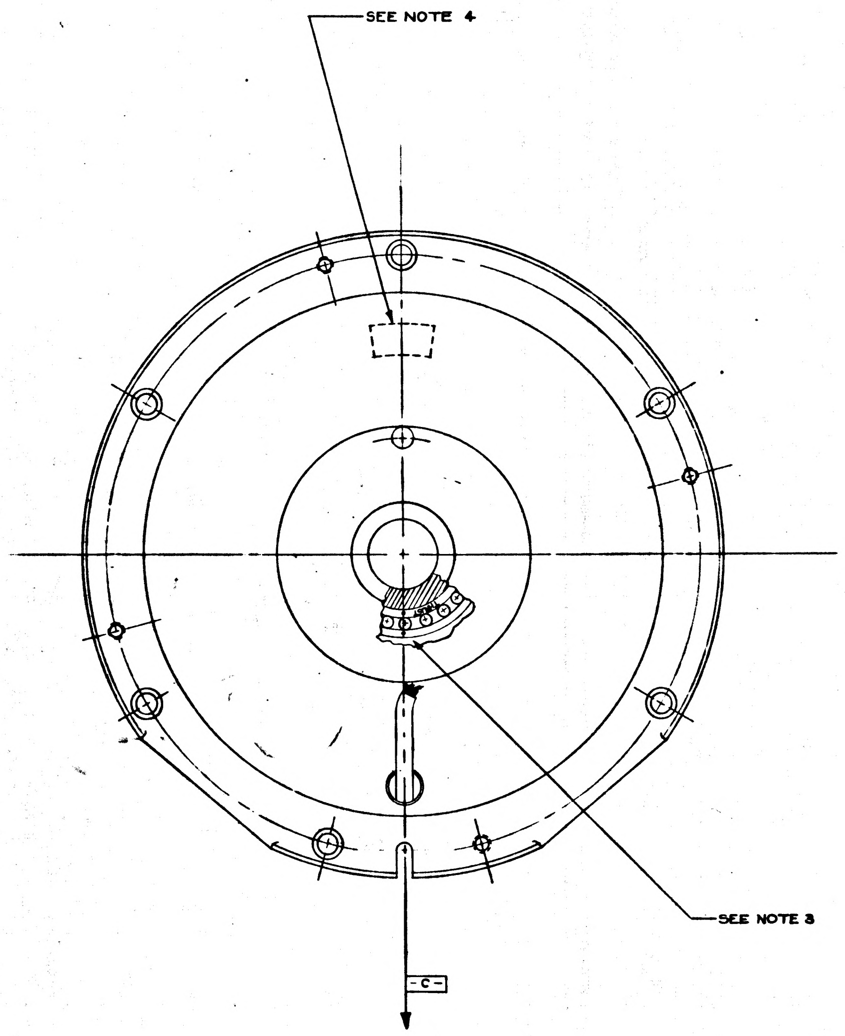
2018607 C

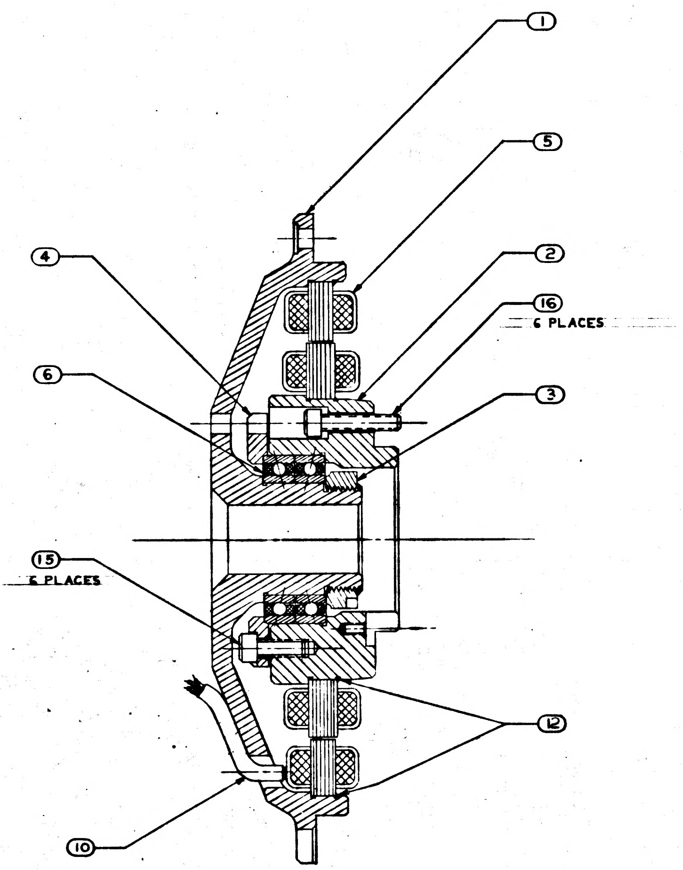
2018607 REV C SHEET 1

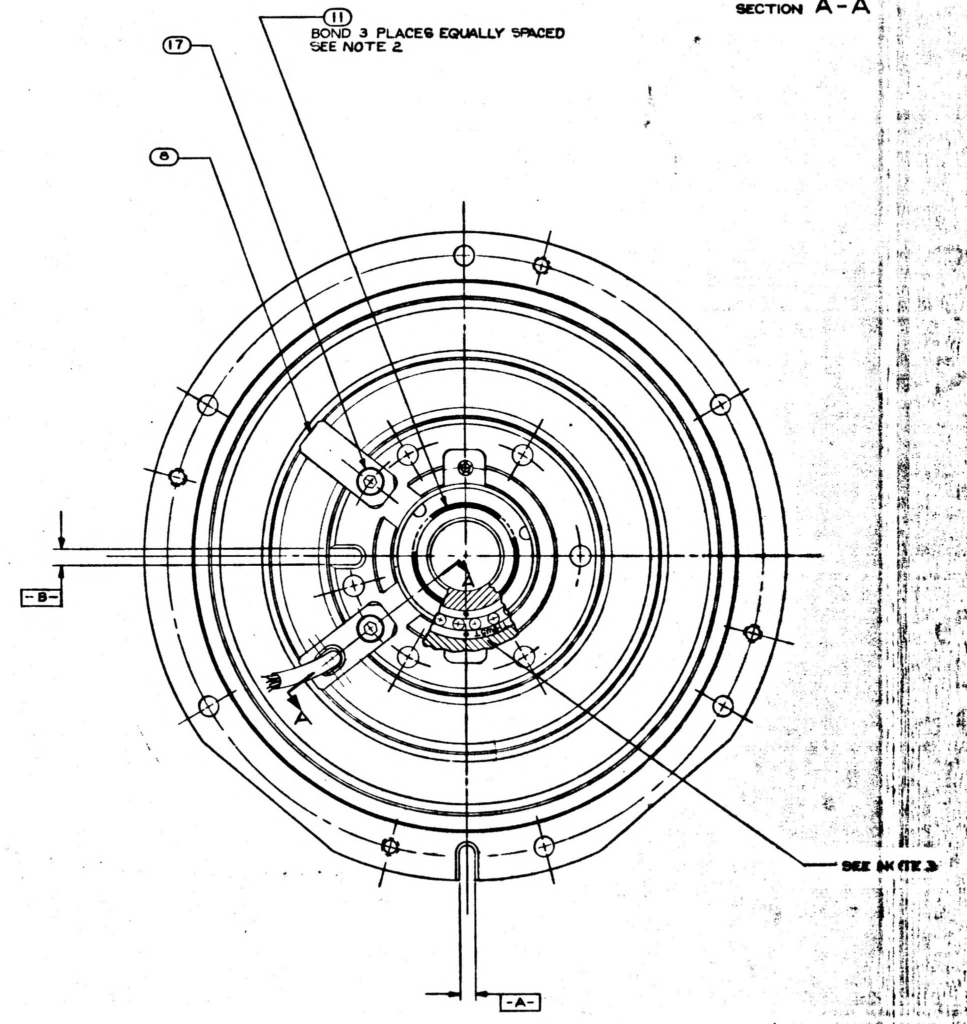
MASTER



SECTION A-A

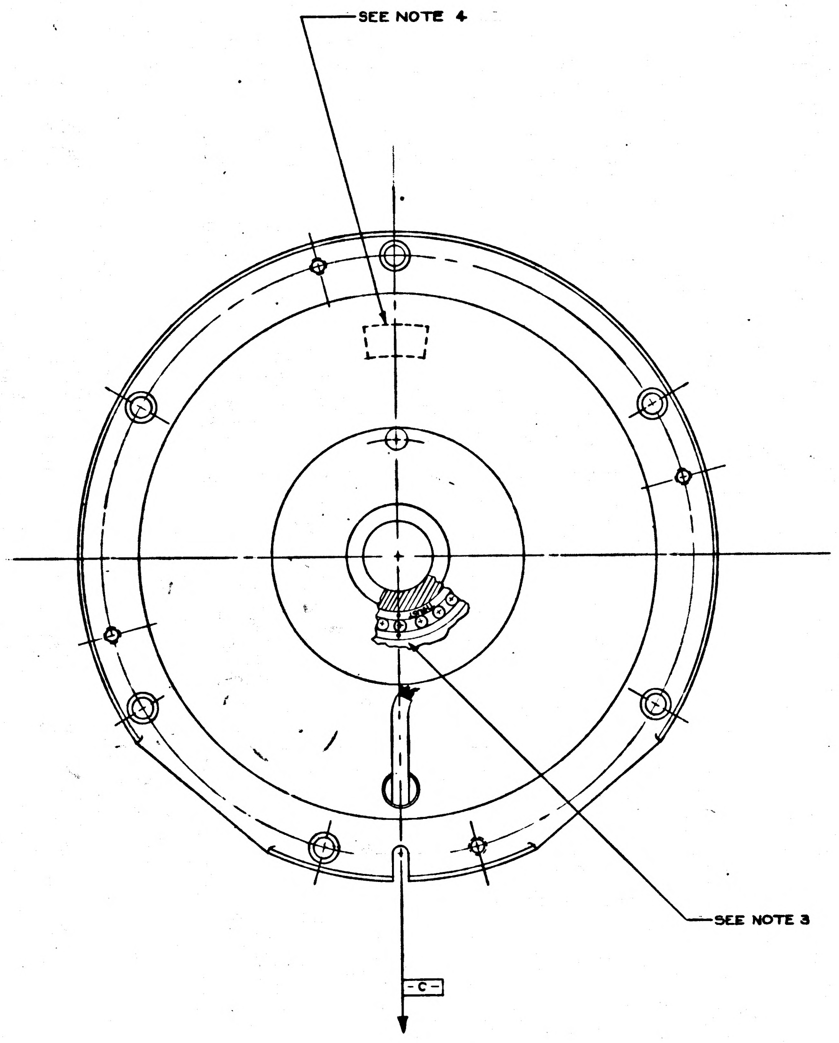

SEE NOTE 4
SEE NOTE 3
-C-

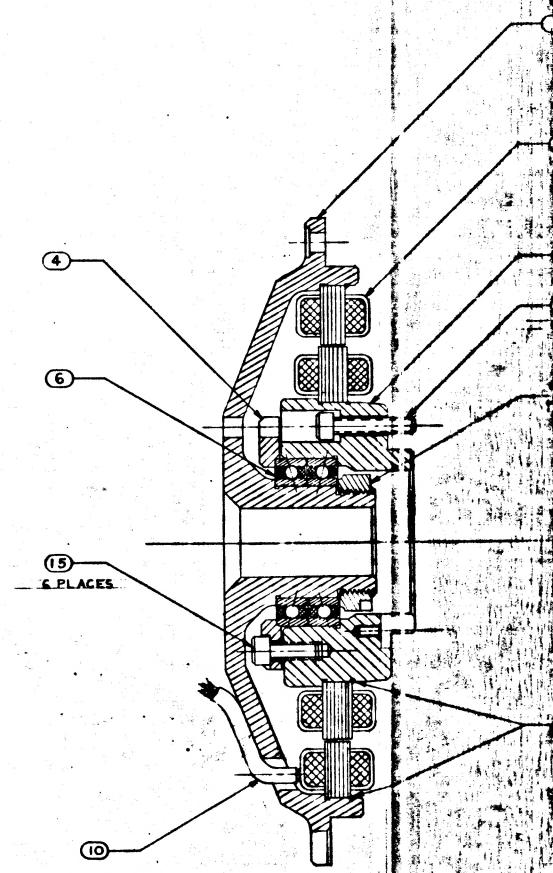

6 PLACES
5 PLACES


11
BOND 3 PLACES EQUALLY SPACED
SEE NOTE 2
17
8
A
A
-B-
SEE NOTE 3
-A-

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑪ TO ITEMS ① AND ③ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑥ TO BE ALIGNED WITHIN 5° OF -C- AND IN THE DIRECTION OF ARROW WHEN ITEMS ① AND ② ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO. REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ① AT THE INDICATED LOCATION PER ND 1002023 AND ND1002019
5. SCREW TORQUE REQUIREMENTS ± 7%
   - ③ 400.0 IN-LB
   - ⑮ 10.0 IN-LB
   - ⑰ 5.0 IN-LB
6. WITH SLOT -A- AND -B- 90°00'00" ±0°00'12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSABLE) THE 16 X SECTION OF THE RESOLVER SHALL BE WITHIN ±0°2' OF ELECTRICAL ZERO REFERRED TO THE 1X SHAFT

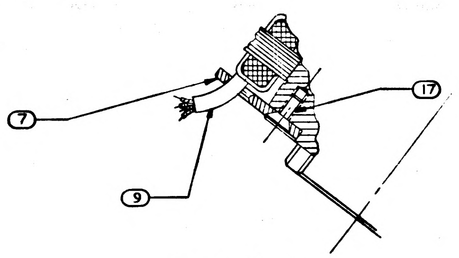




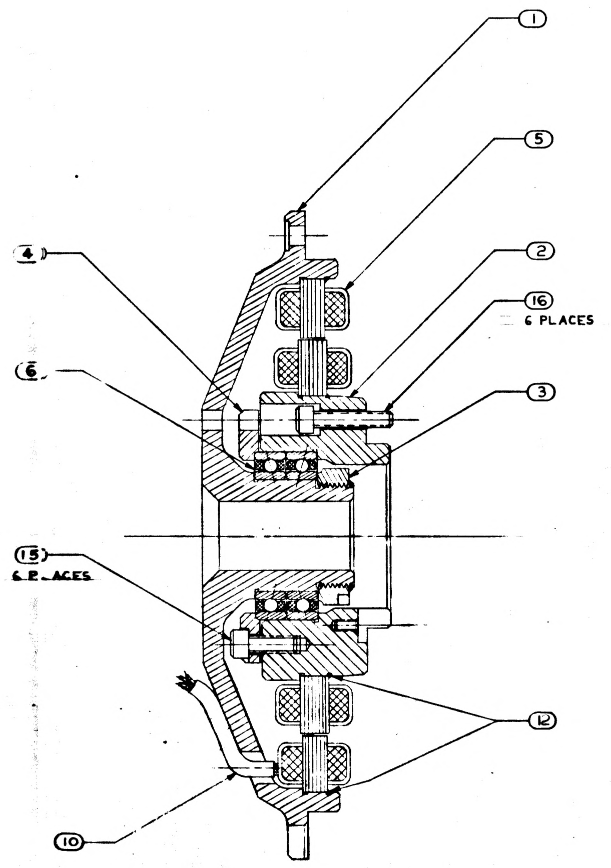
2018607 REV C SHEET 1

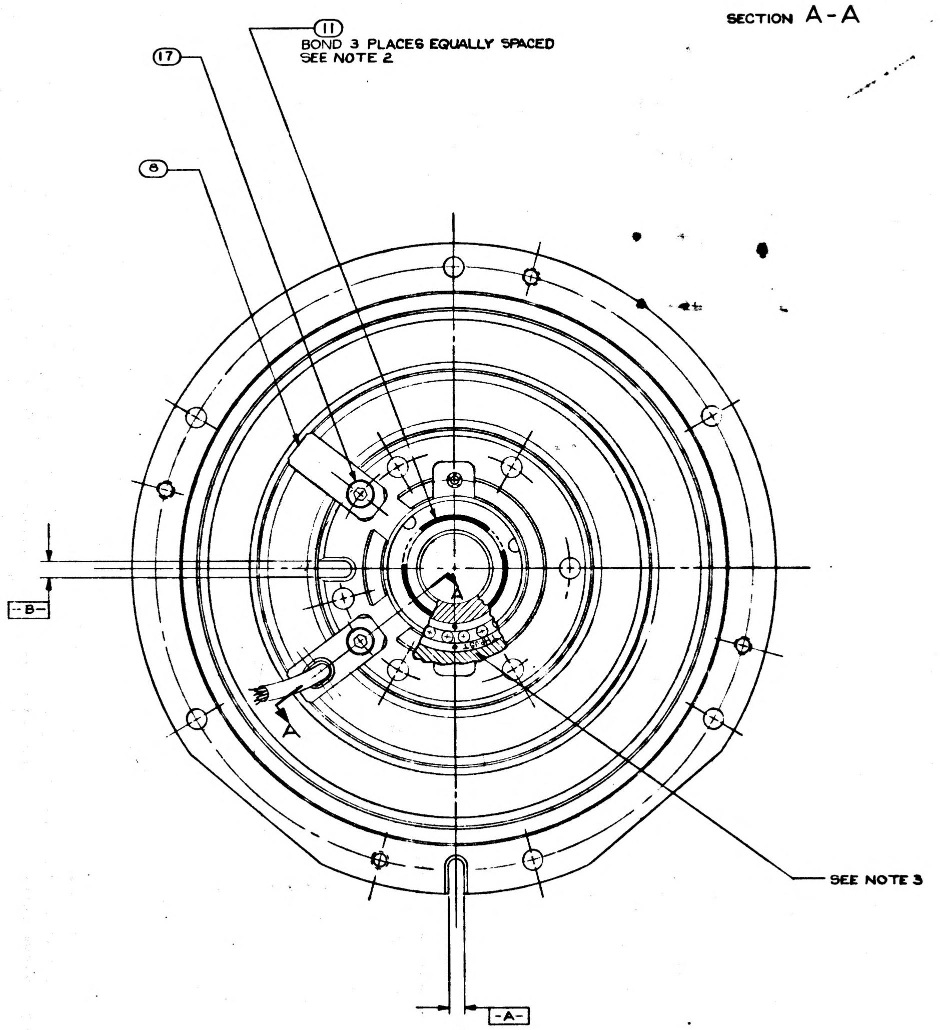
REVISIONS TDRR 11550

SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 14105	10DEC64		WK
B	REVISED TDRR 14780	10DEC64		WK
C	REVISED TDRR 17753	23MAR65		WK
D	REVISED TDRR 21806	31AUG65		WK



SECTION A-A





QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1010867-12	SCREW, FLAT HD, SPL SOC S.L.	17
6	1001489-22	SCREW, HEX, SOC HEAD	16
6	1001488-18	SCREW, HEX, SOC HEAD S.L.	15
			14
			13
AS REQ'D	1010996	ADHESIVE	12
AS REQ'D	MIL-A-13883 TYPE I	ADH 3M EC1099	11
1	1010490-196	INSULATION SLEEVING, ELEC. HEAT SHRIN	10
1	1010490-110	INSULATION, SLEEVING, ELEC. HEAT SHRIN	9
1	2018731	CLIP, WIRE RETAINER	8
1	2018732	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018631	RESOLVER, MULTIPLE SPEED	5
1	2018733	PLATE, BRG RETAINER, RSVR M.A.&O.A.	4
1	2018723	NUT, BRG RETAINER	3
1	2018730	SHAFT, STUB, RESOLVER M.A.&O.A.	2
1	2018736	HOUSING, BRG, RSVR, MIDDLE AXIS	1
011			

LIST OF MATERIALS

2018607 D

NEXT ASSY	USED ON
2018613	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
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MATERIAL
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DWG. NO. CONTRACT
DRAWN R.W. CONTAM DATE 5-20-64
CHECKED
APPROVAL A.J. Boyce 25 Aug 64
APPROVAL
NASA APPROVAL
MIT APPROVAL W 25 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER
ASSEMBLY
MIDDLE AXIS

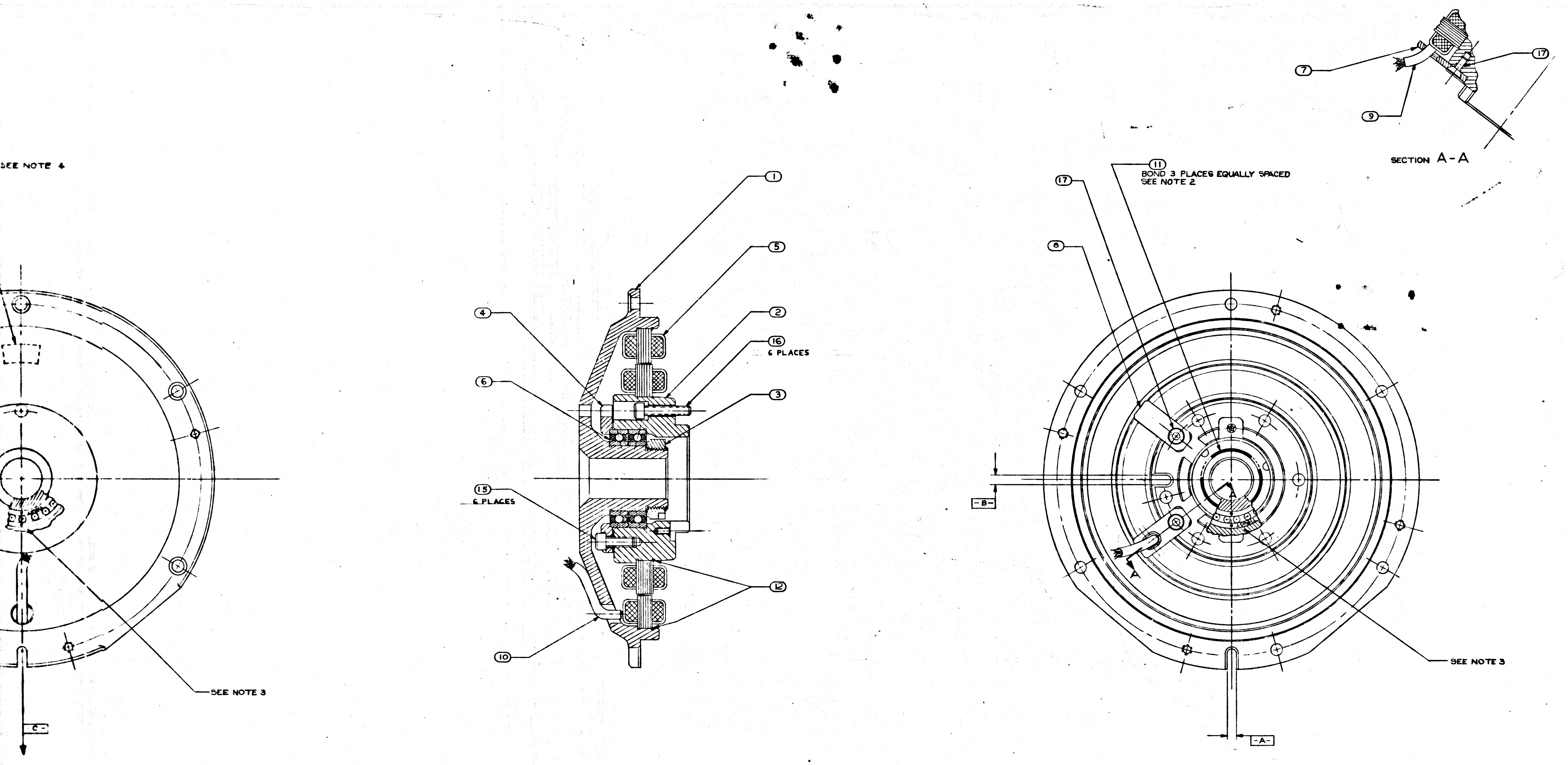
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018607
SCALE 2-1
WT
SHEET 1 OF 1

2018607 REV D SHEET 1

MASTER

F3

317



SECTION A-A
7
9
17
11
BOND 3 PLACES EQUALLY SPACED
SEE NOTE 2
17
8
A
A
-B-
-A-
SEE NOTE 3
1
5
4
2
16
6 PLACES
6
3
15
6 PLACES
12
10
SEE NOTE 4
SEE NOTE 3
-C-
5
4
3
2

2	1010867-12
6	1001489-22
6	1001488-18
AS REQ	1010996
AS REQ	MIL-A-1388
1	1010490-19
1	1010490-1
1	2018731
1	2018732
1	2018621
1	2018631
1	2018733
1	2018723
1	2018730
1	2018736
D 1 1	
QTY	

2018613	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
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FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
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MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION
DRAWN R.W. CON
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

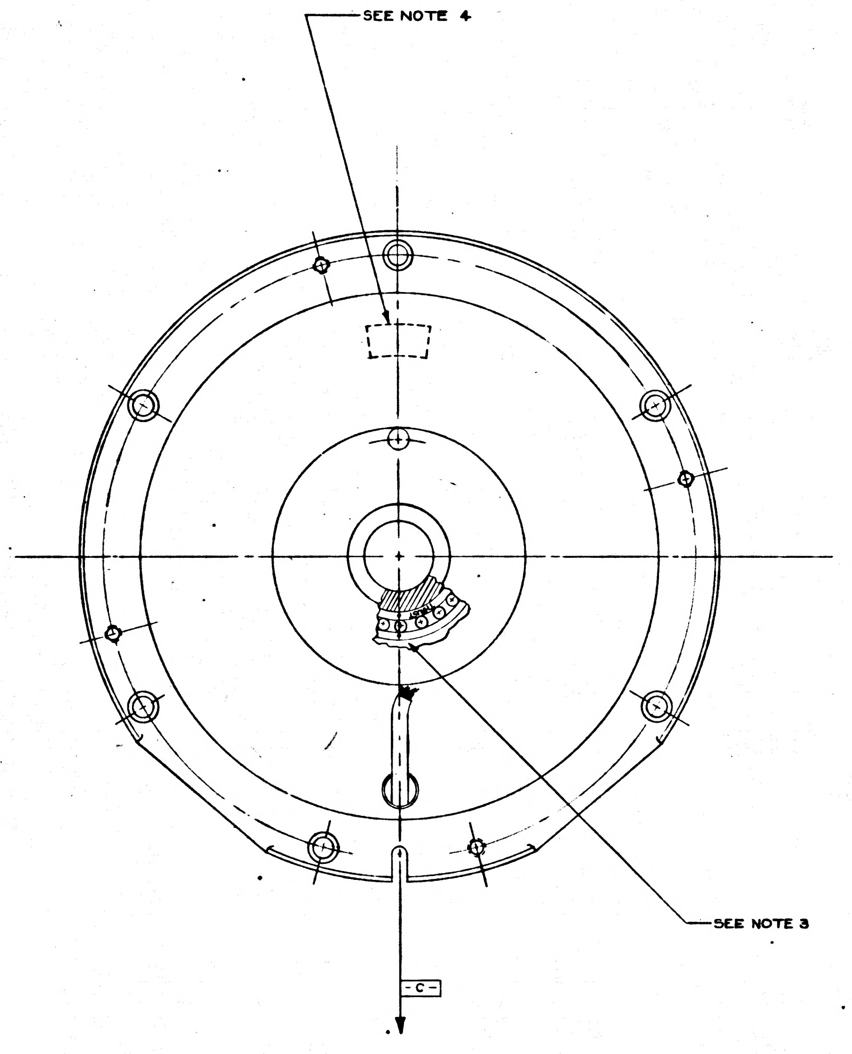
2018607 REV D SHEET 1

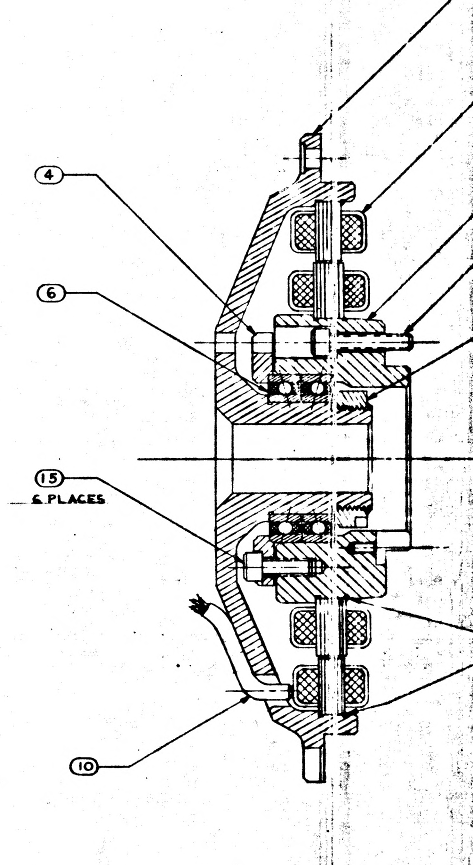
MASTER

E2

NOTES:

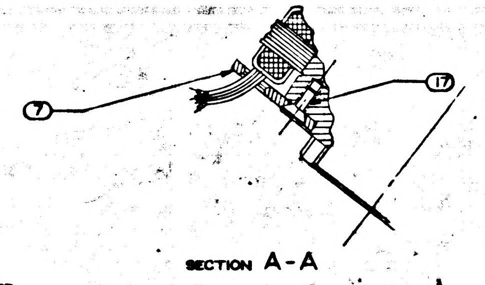
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑪ TO ITEMS ① AND ③ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑥ TO BE ALIGNED WITHIN 5° OF $\boxed{-C-}$ AND IN THE DIRECTION OF ARROW WHEN ~~ITEMS~~ ① AND ② ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO. REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ① AT THE INDICATED LOCATION PER ND 1002023 AND ND1002019
5. SCREW TORQUE REQUIREMENTS ± 7%
   - ③ 400.0 IN-LB
   - ⑮ 10.0 IN-LB
   - ⑰ 5.0 IN-LB
6. WITH ~~SLOT~~ $\boxed{-A-}$ AND $\boxed{-B-}$ 90°00'00" ±0°00'12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSABLE) THE 16 X SECTION OF THE RESOLVER SHALL BE WITHIN ±0°2' OF ELECTRICAL ZERO REFERRED TO THE 1X SHAFT



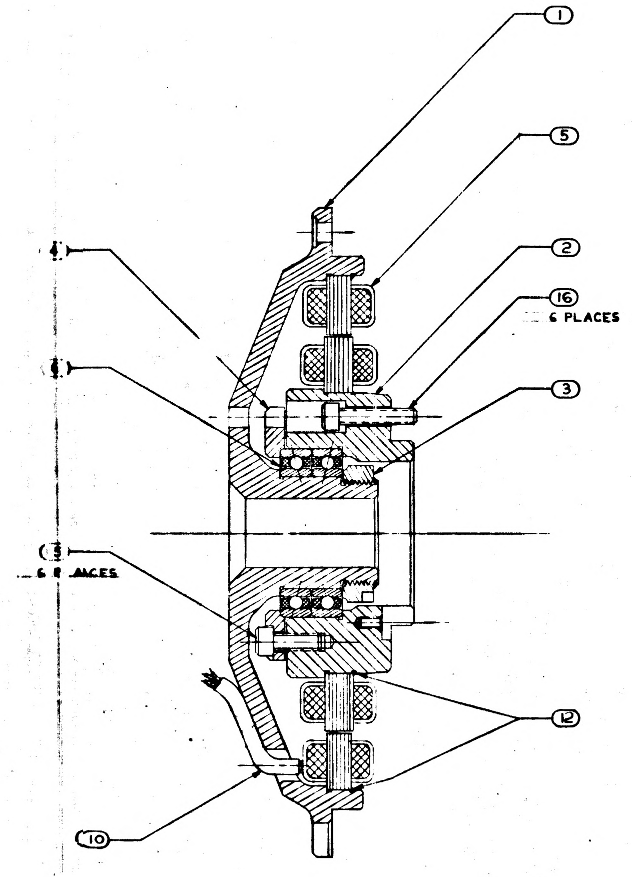


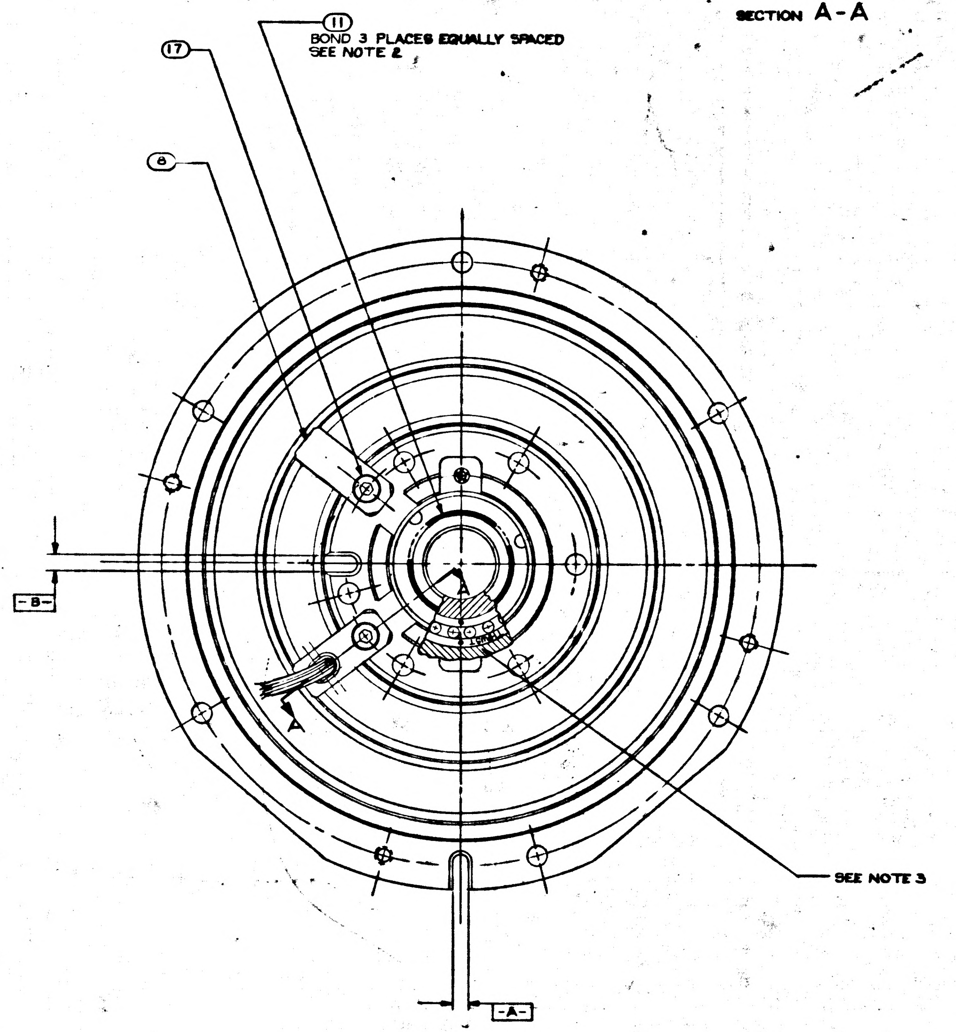
2018607 D 1

REVISIONS TDRR 11590			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 14105	[illegible]	[illegible]
B	REVISED TDRR 14780	[illegible]	JK
C	REVISED TDRR 17753	[illegible]	WK
D	REVISED TDRR 21806	[illegible]	WK
E	REVISED TDRR 23043	[illegible]	[illegible]



SECTION A-A





QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1010867-12	SCREW, FLAT HD, SPL SOC S.L.	17
~~6~~	~~1001489-22~~	~~SCREW, HEX, SOC HEAD~~	16
6	1001488-18	SCREW, HEX, SOC HEAD S.L.	15
			14
			13
AS REQ'D	1010996	ADHESIVE	12
AS REQ'D	MIL-A-13883 TYPE I	ADH 3M EC1099	11
1	1010490-196	INSULATION SLEEVING, ELEC. HEAT SHRINK	10
1	1010490-110	INSULATION, SLEEVING, ELEC. HEAT SHRINK	9
1	2018731	CLIP, WIRE RETAINER	8
1	2018732	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018631	RESOLVER, MULTIPLE SPEED	5
1	2018733	PLATE, BRG RETAINER, RSVR M.A.&O.A.	4
1	2018723	NUT, BRG RETAINER	3
1	2018730	SHAFT, STUB, RESOLVER M.A.&O.A.	2
1	2018736	HOUSING, BRG, RSVR, MIDDLE AXIS	1
011			

LIST OF MATERIALS

2018613	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.W. CONZO DATE [illegible]
CHECKED
APPROVAL 25 Aug 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER
ASSEMBLY
MIDDLE AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018607
SCALE 2-1
WT
SHEET 1 OF 1

2018607 E

2018607 REV E SHEET 1

MASTER

SYM	DESCRIPTION	DATE	APPROVAL
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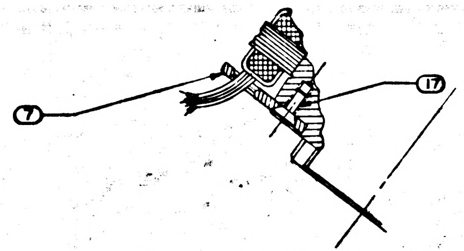
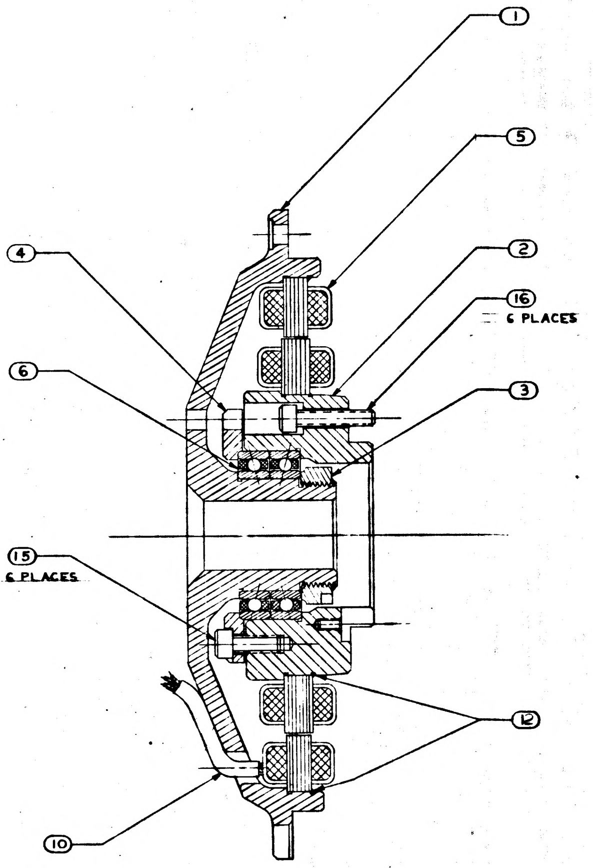
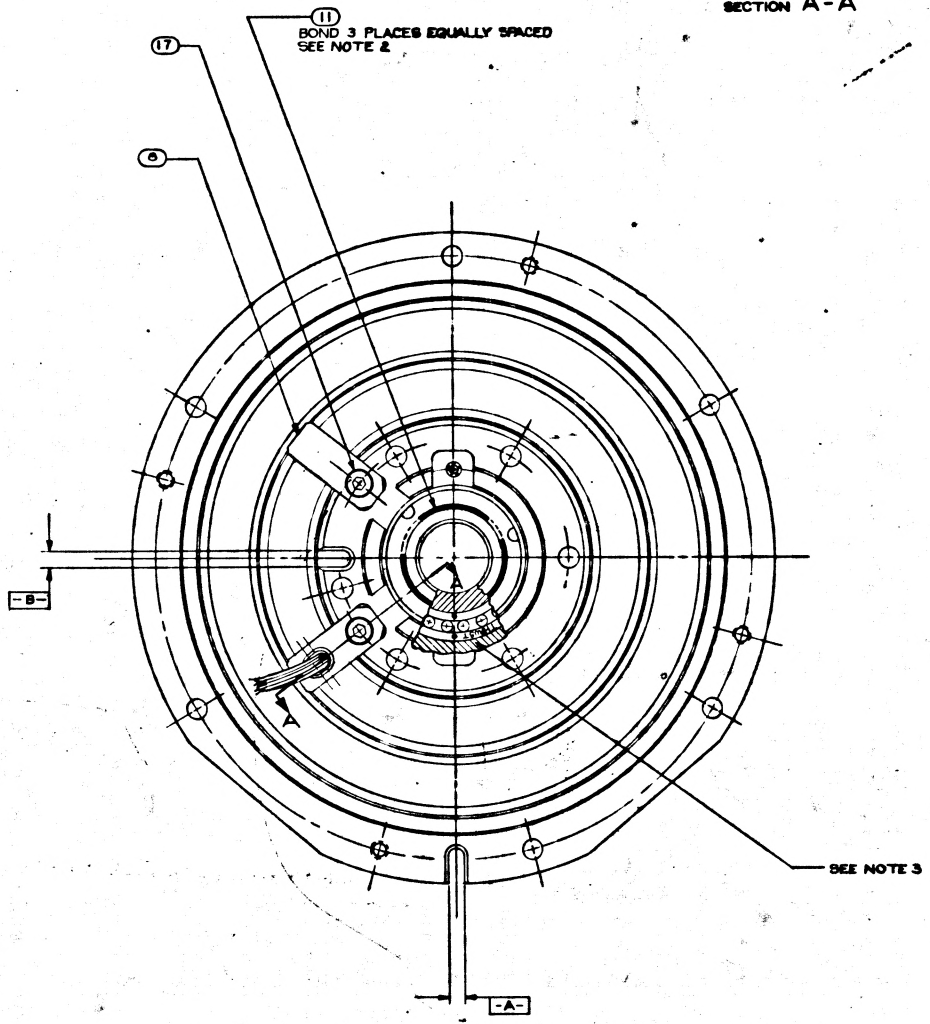
A	REVISED TDRR 14108	[illegible]	
B	REVISED TDRR 14780	[illegible] 64	
C	REVISED TDRR 17753	[illegible] 65	
D	REVISED TDRR 21806	[illegible] 65	
E	REVISED TDRR 23043	[illegible] 65	



SECTION A-A





QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION		FIND NO.
2	1010867-12	SCREW, FLAT HD, SPL SOC S.L.		17
~~6~~	~~1001489-22~~	~~SCREW, HEX, SOC HEAD~~		16
6	1001488-18	SCREW, HEX, SOC HEAD S.L.		15
				14
				13
AS REQD	1010996	ADHESIVE		12
AS REQD	MIL-A-13883 TYPE I	ADH 3M EC1098		11
1	1010490-196	INSULATION SLEEVING, ELEC. HEAT SHRINK		10
1	1010490-110	INSULATION, SLEEVING, ELEC. HEAT SHRINK		9
1	2018731	CLIP, WIRE RETAINER		8
1	2018732	CLIP, WIRE RETAINER		7
1	2018621	BEARING, BALL, DUPLEX		6
1	2018631	RESOLVER, MULTIPLE SPEED		5
1	2018733	PLATE, BRG RETAINER, RSVR	ASCA	4
1	2018723	NUT, BRG RETAINER		3
1	2018730	SHAFT, STUB, RESOLVER M.A.	Q.A.	2
1	2018736	HOUSING, BRG, RSVR, MIDDLE AX		1
011				

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY	USED ON
2018613	DL2018601

APPLICATION

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.W. CONTI DATE 8-20-64
CHECKED
APPROVAL G. Bayne 25 Aug 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER
ASSEMBLY
MIDDLE AXIS

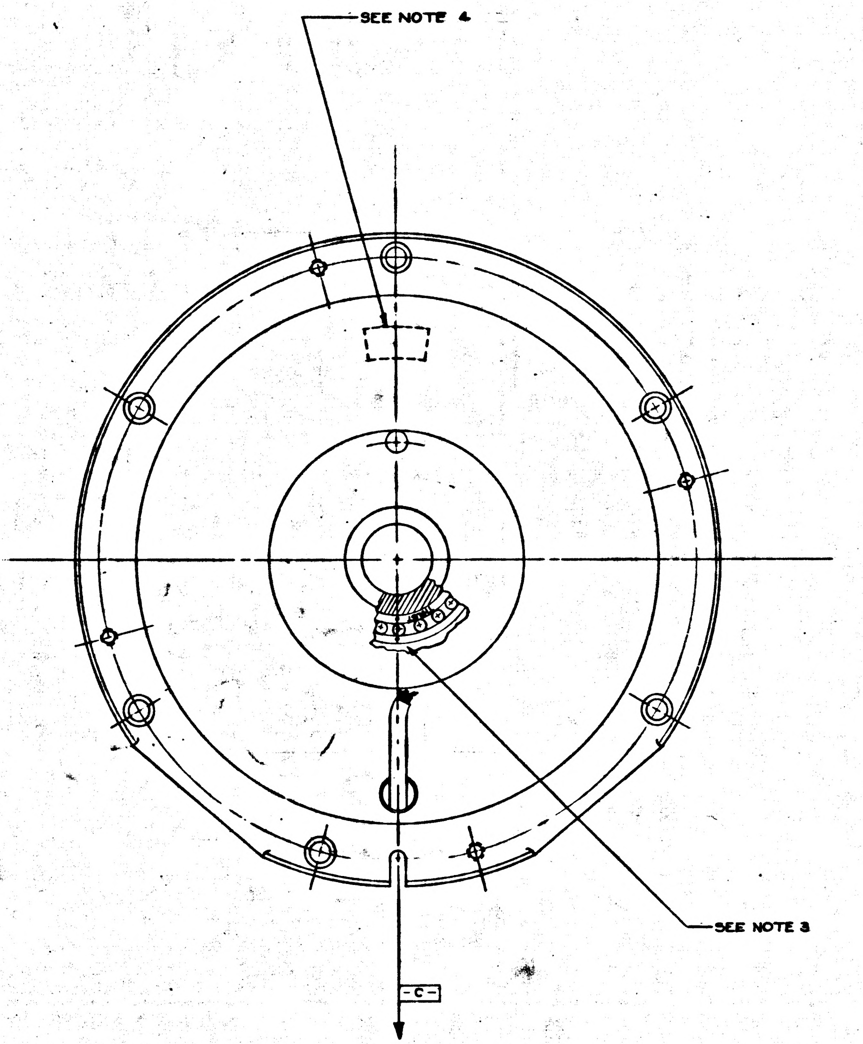
CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018607
SCALE 2-1 WT

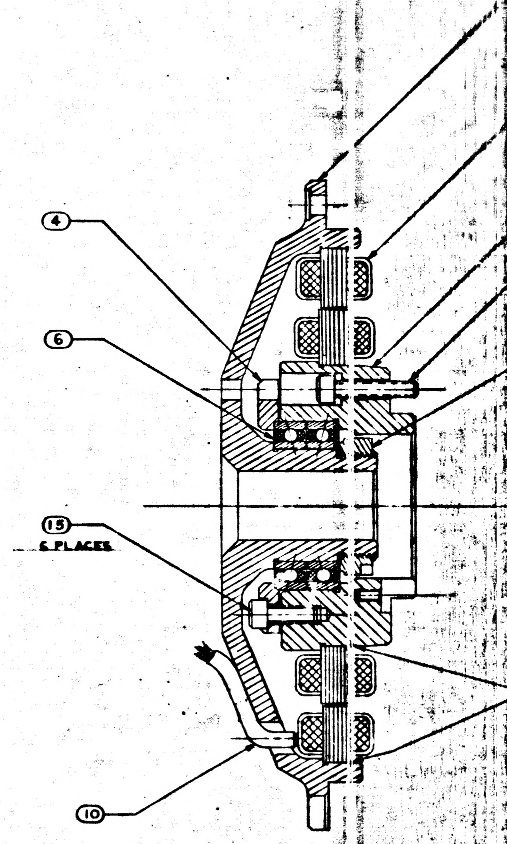
2018607 E

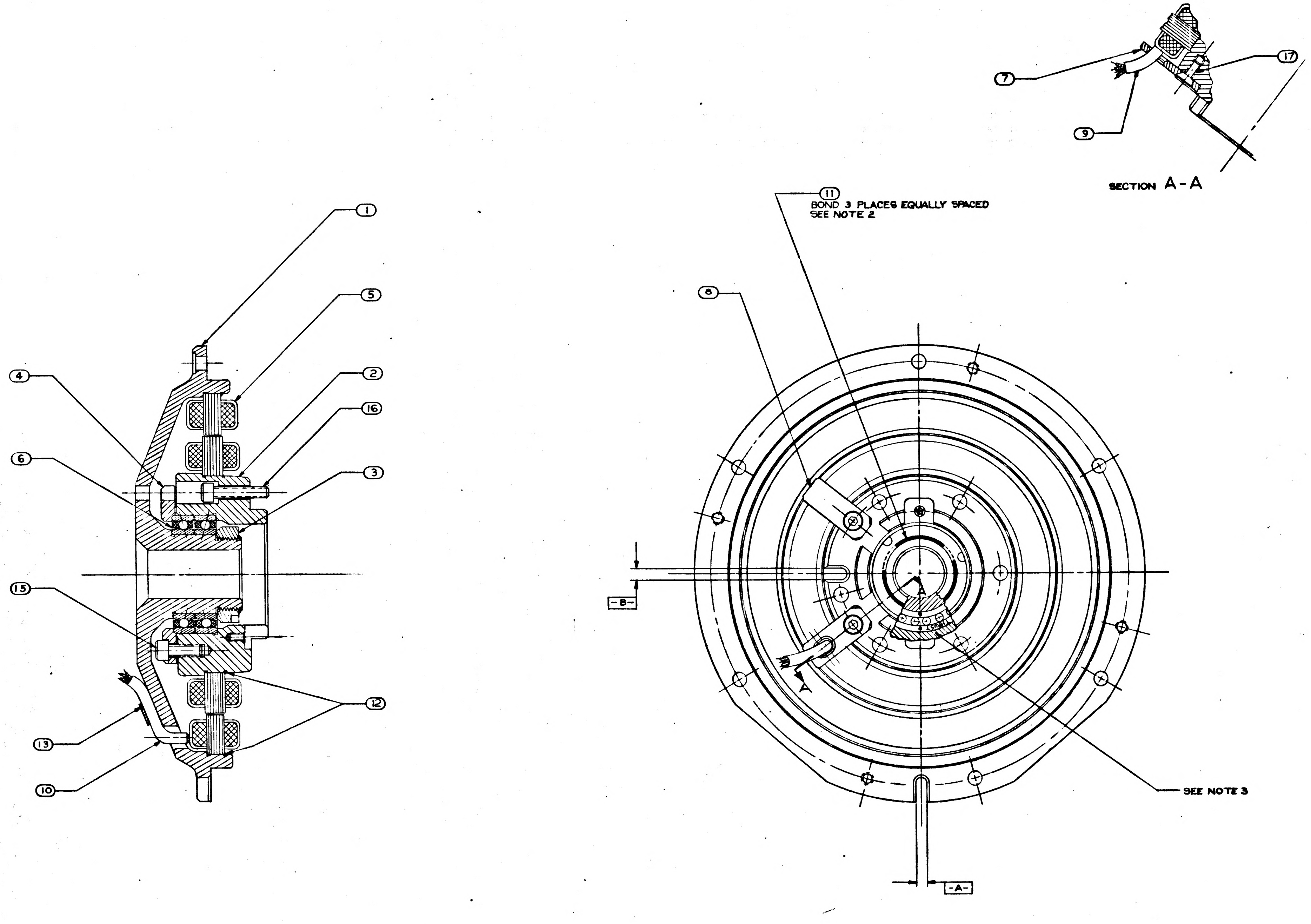
MASTER

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑪ TO ITEMS ① AND ③ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑥ TO BE ALIGNED WITHIN 5° OF $\boxed{-C-}$ AND IN THE DIRECTION OF ARROW WHEN ~~ITEMS~~ ① AND ② ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO. REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ① AT THE INDICATED LOCATION PER ND 1002023 AND ND1002019
5. SCREW TORQUE REQUIREMENTS ± 7%
   - ③ 400.0 IN-LB
   - ⑮ 10.0 IN-LB
   - ⑰ 5.0 IN-LB
6. WITH ~~SLOT~~ $\boxed{-A-}$ AND $\boxed{-B-}$ 90°00'00" ±0°00'12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSABLE) THE 16 X SECTION OF THE RESOLVER SHALL BE WITHIN ±0°2' OF ELECTRICAL ZERO REFERRED TO THE 1X SHAFT







2	2018635-13	SCREW, FLAT HD, HEX SOC S.L.	17
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6	1001488-18	SCREW, HEX, SOC HEAD S.L.	15
2	1010618-1	SCREW BUTTON HEAD S.L.	14
1	2018768	CLIP, WIRE RETAINER	13
AS REQ'D	1011754	INSULATION COMPOUND	12
AS REQ'D	MIL-A-13883	ADH GOODYEAR CPA 923 A	11
1	1006776-9	INSULATION SLEEVING - 3/8 LONG	10
1	1006776-15	INSULATION SLEEVING - 1/2 LONG	9
1	2018731	CLIP, WIRE RETAINER	8
1	2018732	CLIP, WIRE RETAINER	7
1	2018621	BEARING, BALL, DUPLEX	6
1	2018631	RESOLVER, MULTIPLE SPEED	5
1	2018733	PLATE, BRG RETAINER, RSVR M.A.&O.A.	4
1	2018723	NUT, BRG RETAINER	3
1	2018730	SHAFT, STUB, RESOLVER M.A.&O.A.	2
1	2018736	HOUSING, BRG, RSVR, MIDDLE AXIS	1
011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
QTY	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018613	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.W. CON[illegible] DATE 8-20-64
CHECKED
APPROVAL 25 Aug 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESOLVER
ASSEMBLY
MIDDLE AXIS

CODE IDENT NO. SIZE 2-1 NASA DRAWING NO. 2018607
SCALE 2-1 WT SHEET 1 OF 1

2018607 REV SHEET

F-2

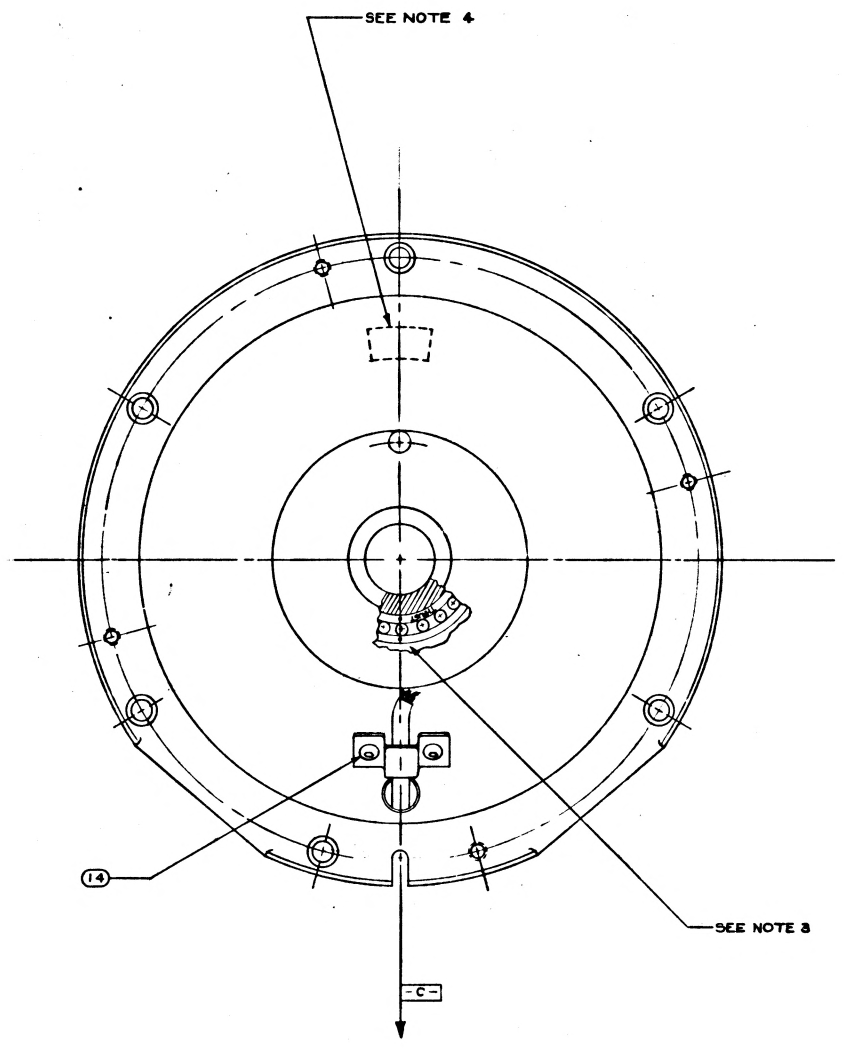
MASTER

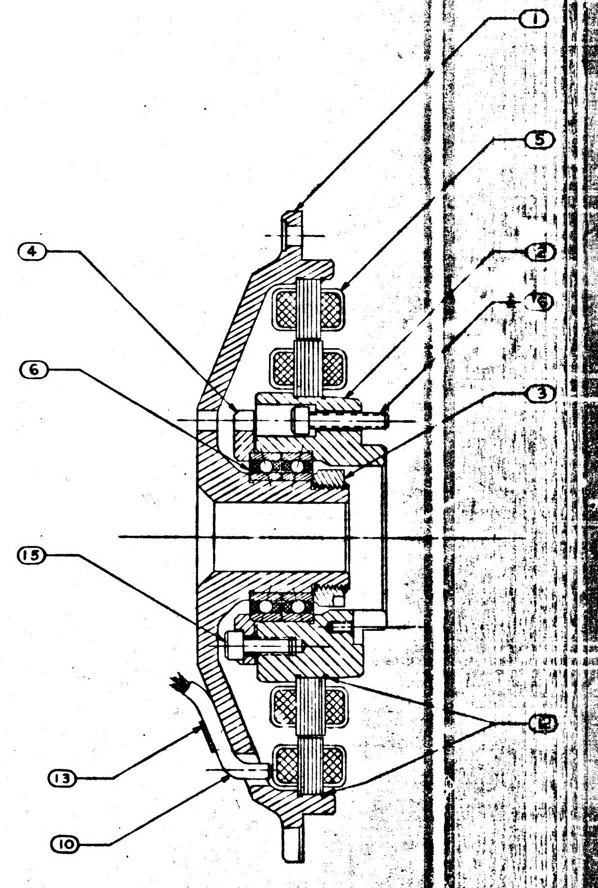
5 4 3 2 1

INCHES

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑪ TO ITEMS ① AND ③ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑥ TO BE ALIGNED WITHIN 5° OF $\boxed{\text{-C-}}$ AND IN THE DIRECTION OF ARROW WHEN ITEMS ① AND ② ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO. REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ① AT THE INDICATED LOCATION PER ND 1002023 AND ND1002019
5. SCREW TORQUE REQUIREMENTS ± 7%
   - ③ 400 IN
   - ⑮ 10.0 IN
   - ⑭⑰ 5.0 IN
6. WITH SLOT $\boxed{\text{-A-}}$ AND $\boxed{\text{-B-}}$ 90°00'00" ±0°00'12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSABLE) THE 16 X SECTION OF THE RESOLVER SHALL BE WITHIN ±0°2' OF ELECTRICAL ZERO REFERRED TO THE 1X SHAFT





2018607

REVISIONS TDRR 11990				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
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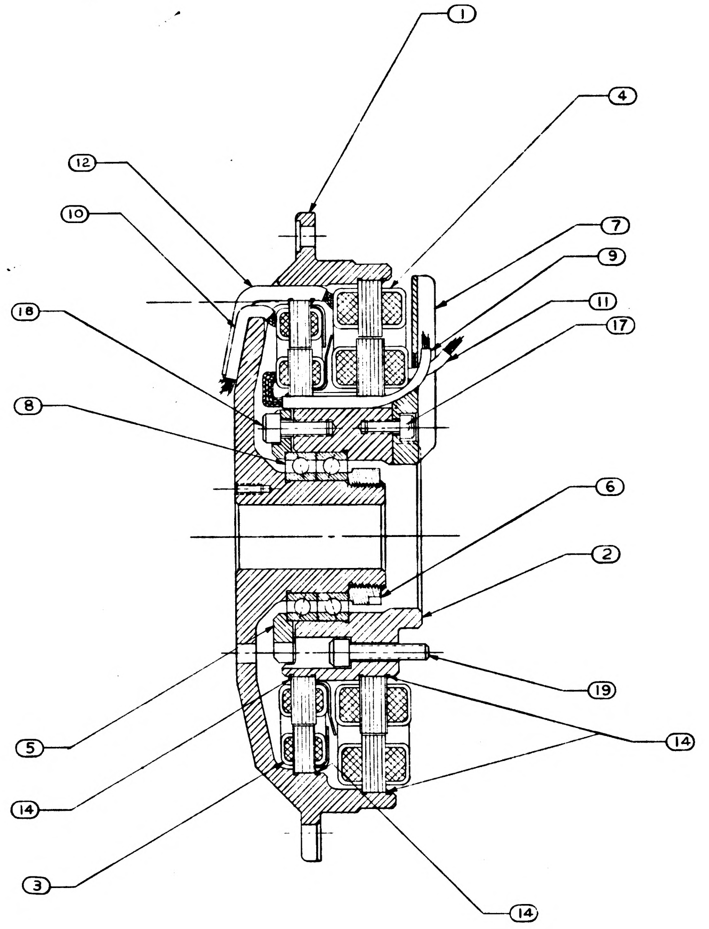

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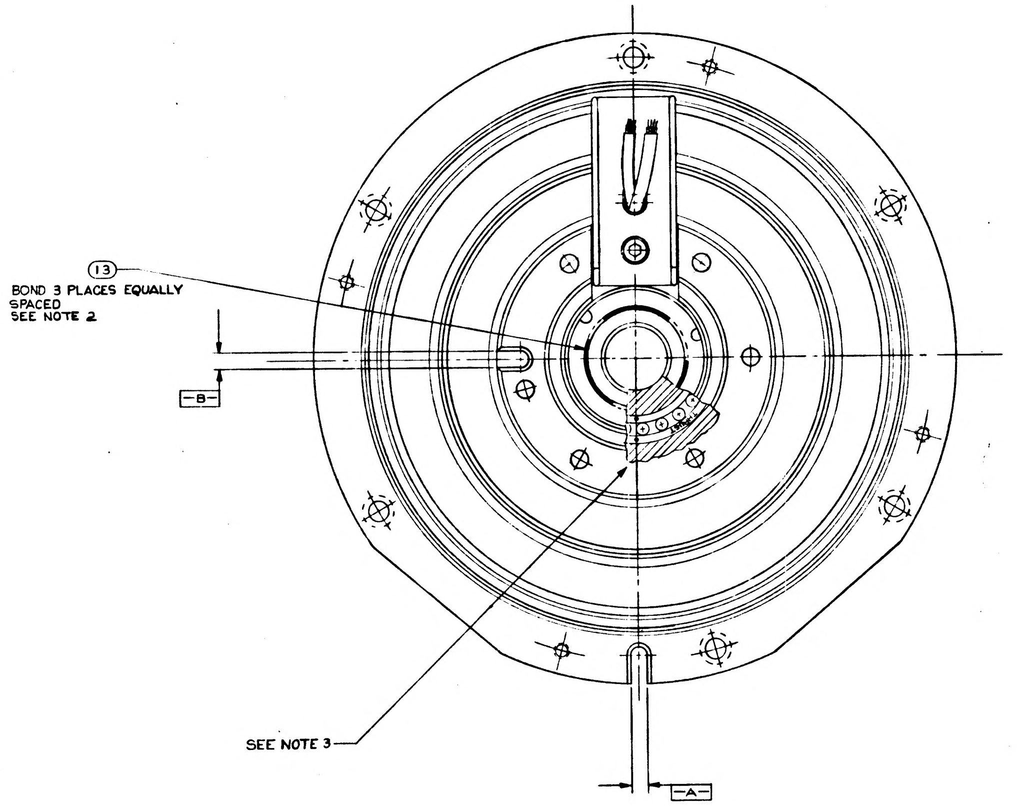

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6	SCREW, HEX SOC HEAD	1001489-22			19
6	SCREW, HEX SOC HEAD S.L.	1001488-18			18
1	SCREW, HEX SOC HEAD S.L.	1001488-2			17
					16
					15
AS REQ'D	INSULATING COMPOUND	1011754			14
AS REQ'D	ADH, GOODYEAR CPA 923A		MIL-A-13883		13
1	INSULATION SLEEVING	1006776-9		1¼ LONG	12
1	INSULATION SLEEVING	1006776-15		½ LONG	11
1	INSULATION SLEEVING	1006776-15		¾ LONG	10
1	INSULATION SLEEVING	1006776-15		1½ LONG	9
1	BEARING, BALL, DUPLEX	2018621			8
1	RETAINER, WIRE, I.A.	2018715			7
1	NUT, BRG, RETAINER	2018723			6
1	PLATE, BRG, RETAINER	2018722			5
1	RESOLVER, MULTIPLE SPEED	2018631			4
1	RESOLVER, GYRO ERROR	2018632			3
1	SHAFT, STUB, RSVR I.A.	2018713			2
1	HOUSING BRG, RSVR I.A.	2018729			1
011					

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018614	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ___ ANGLES ___
DO NOT SCALE THIS DRAWING
MATERIAL

MIT INSTRUMENTATION LAB
CONTRACT NAS 9 153
APPROVED | DATE
CHECKED
DRAWN RWC 5-18-64
APPROVED FOR MSC
MIT APPROVAL | DATE

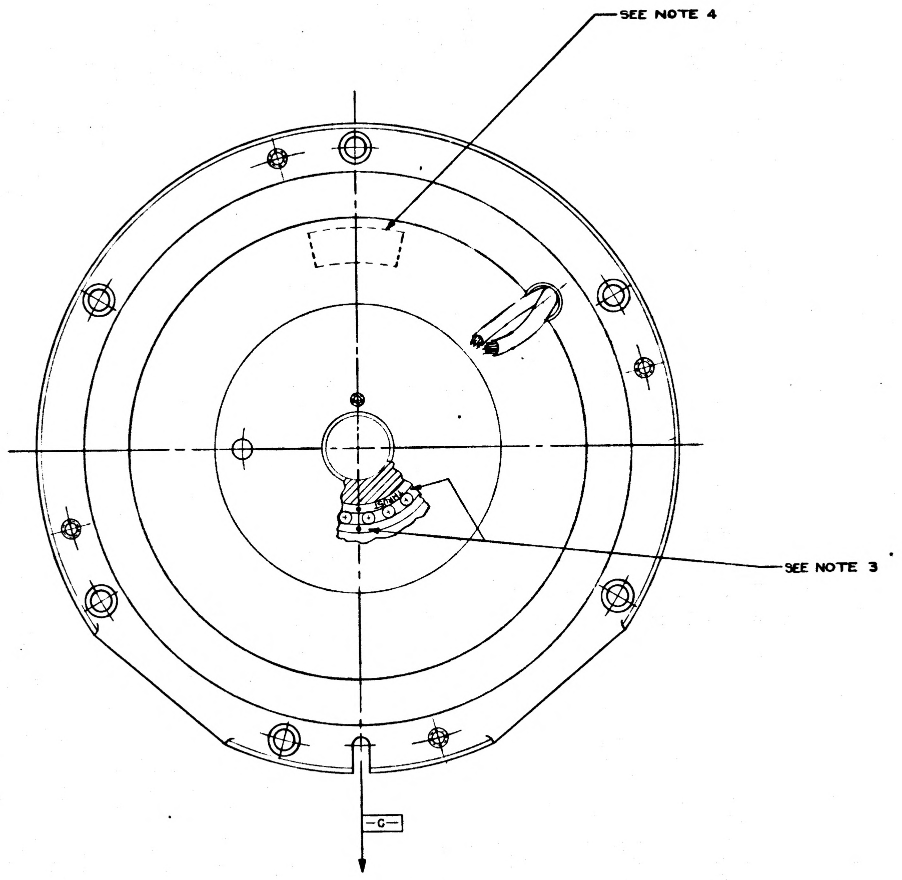
RESOLVER ASSEMBLY
INNER AXIS

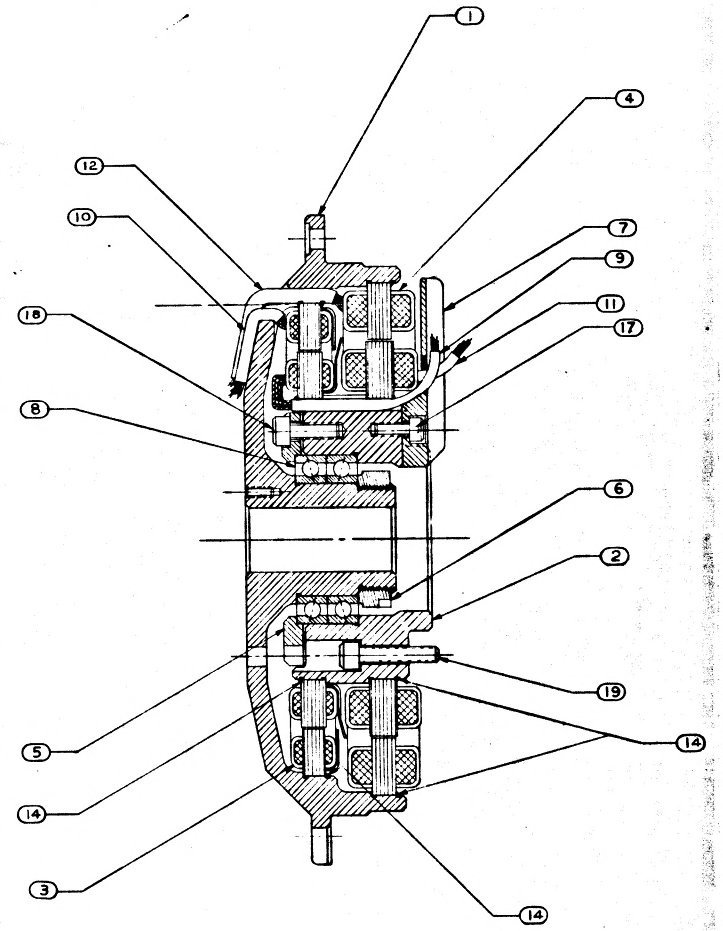
SCALE 2-1
UNIT WT
CODE IDENT

MIT INSTRUMENTATION LABORATORY
CAMBRIDGE MASS.
DWG NO
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018608
SHEET 1 OF 1

2018608

24





NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑬ TO ITEMS ① & ⑥ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑧ TO BE ALIGNED WITHIN 5° OF $\boxed{\text{-C-}}$ AND IN DIRECTION OF THE ARROW WHEN ITEMS ① & ② ARE IN THE POSITION SHOWN
LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO., REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ITEM ① AT THE INDICATED LOCATION PER ND1002023 AND ND1002019
5. ASSEMBLY TO MEET REQUIREMENTS OF PS 2018608
6. SCREW TORQUE REQUIREMENTS ± 7%

⑥ 400 IN LB
⑱ 10.0 IN LB
⑰ 5.0 IN LB

7. WITH SLOT $\boxed{\text{-A-}}$ AND SLOT $\boxed{\text{-B-}}$ 90°0'00" ± 12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSIBLE)
THE 16 X SECTION OF RESOLVER 2018631 SHALL BE WITHIN ± 0°2' OF ELECTRICAL ZERO REFERRED TO THE 1X SHAFT AND RESOLVER 2018632 SHALL BE WITHIN ± 0°10' OF ELECTRICAL ZERO

APOLLO G&N Specification
PS 2018608 A
Original Issue Date: 19 Jan'65
Release Authority: TDRR 15545
Class A Release
DATE:

PROCUREMENT SPECIFICATION

RESOLVER ASSEMBLY, MULTIPLE SPEED (16X and 1X)

AND

GYRO ERROR

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
6-2-65	A	19768	2, 10, 11, 12, 13 Total	WK	
			number pages now 12		

This specification consists of page 1 to 12 inclusive.

APPROVALS	W J Rhine 1-19-65 NASA/MSC	I. Halzel 1/19/65 MIT/IL	R.J. Therrien Staff Member 1-15-65	E.P. Armstrong 1-14-65

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
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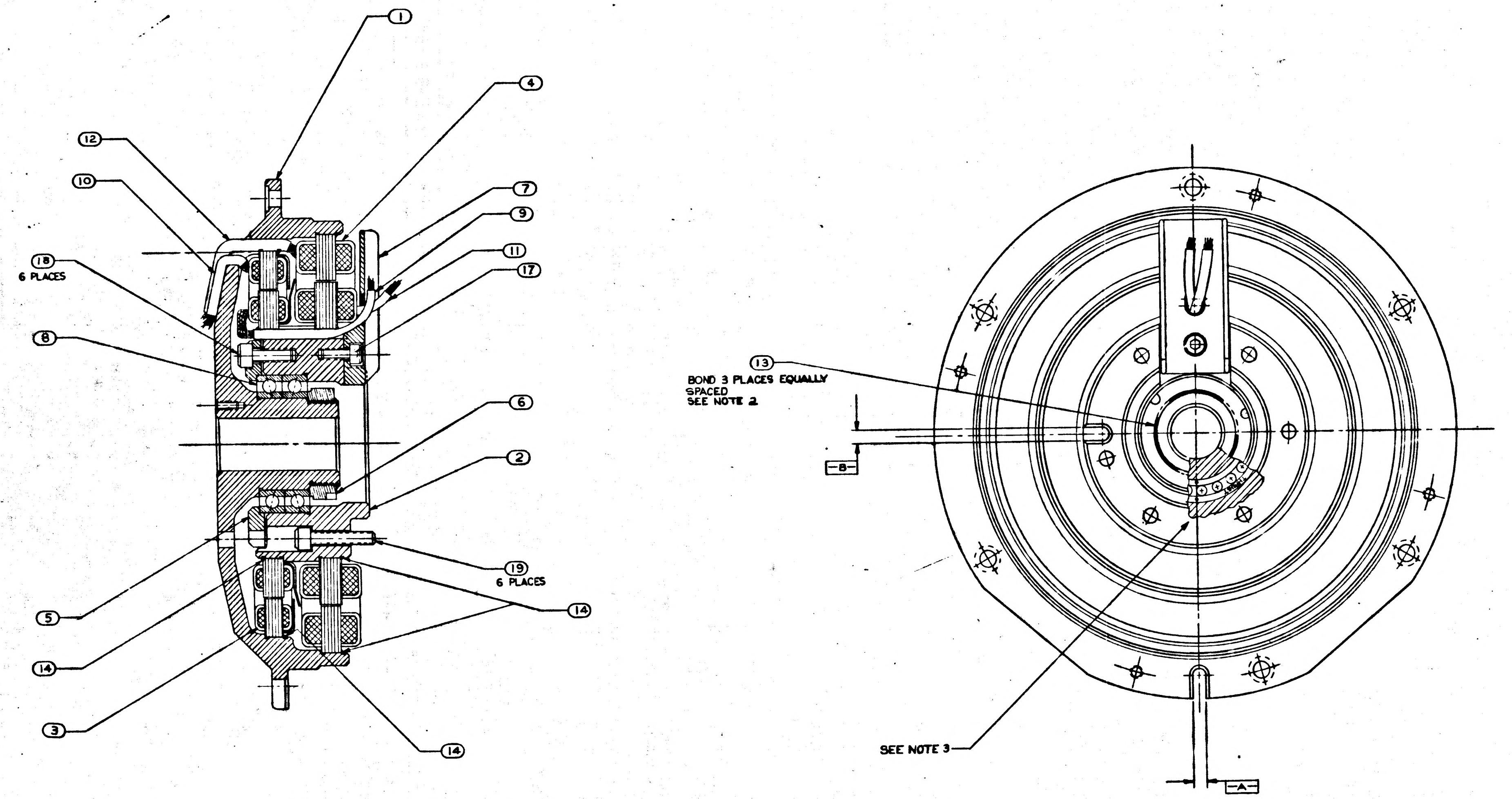
	A	REVISED TDRR 15715	1-25-65		
	B	REVISED TDRR 17753	4-13-65		



QTY REQD	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	SPECIFICATION	MATERIAL OR NOTES	FIND NO.
6	SCREW, HEX SOC HEAD	1001489-22			19
6	SCREW, HEX SOC HEAD S.L.	1001488-18			18
1	SCREW, HEX SOC HEAD S.L.	1001488-2			17
					16
					15
AS REQ'D	INSULATING COMPOUND	1011754			14
AS REQ'D	ADH, GOODYEAR CPA 923A		MIL-A-13883		13
1	INSULATION SLEEVING	1010490-286			12
1	INSULATION SLEEVING	1010490-110			11
1	INSULATION SLEEVING	1010490-170			10
1	INSULATION SLEEVING	1010490-550			9
1	BEARING, BALL, DUPLEX	2018621			8
1	RETAINER, WIRE, I.A.	2018715			7
1	NUT, BRG, RETAINER	2018723			6
1	PLATE, BRG, RETAINER	2018722			5
1	RESOLVER, MULTIPLE SPEED	2018631			4
1	RESOLVER, GYRO ERROR	2018632			3
1	SHAFT, STUB, RSVR I.A.	2018713			2
1	HOUSING BRG, RSVR I.A.	2018729			1

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018614	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

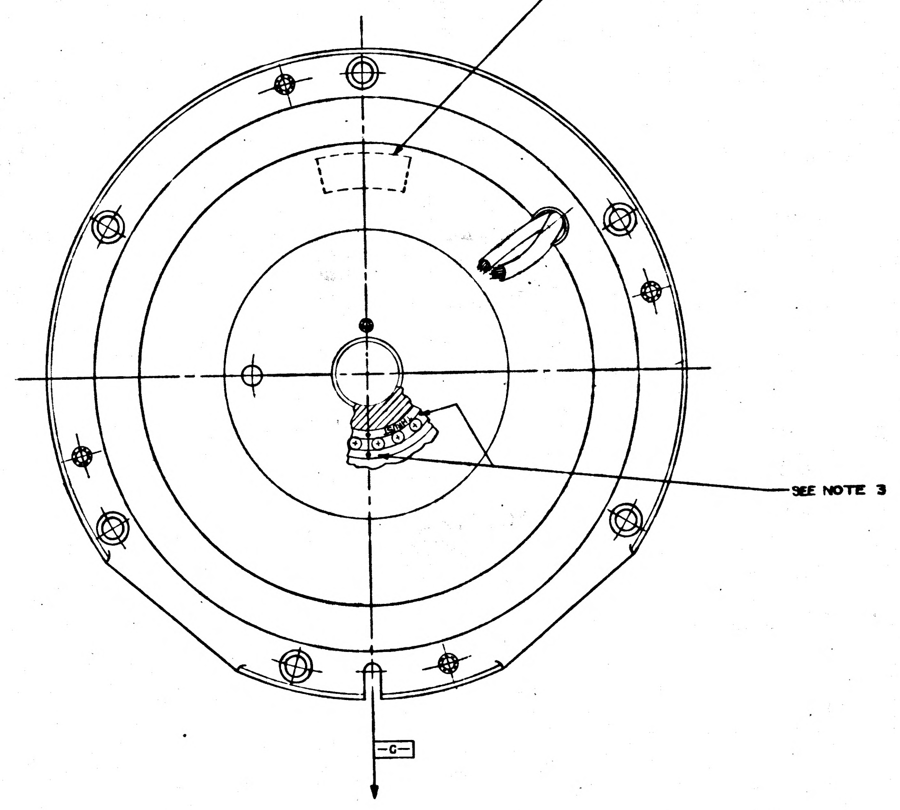
MIT INSTRUMENTATION LAB CONTRACT NAS 9-153
DRAWN RWC 6-18-64
APPROVED FOR MSC
MIT APPROVAL
DATE

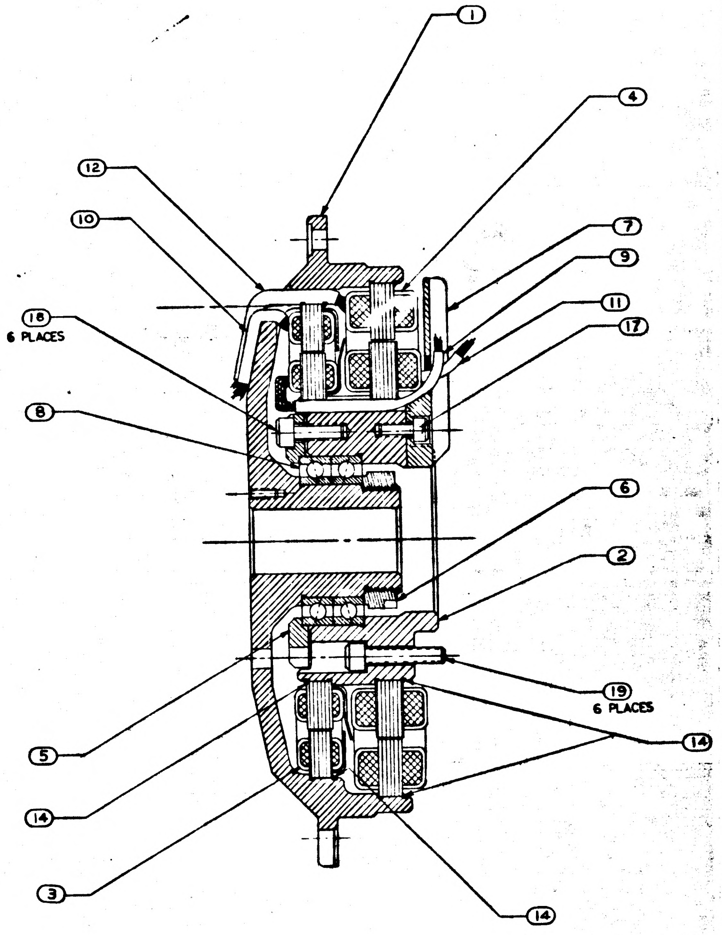
RESOLVER ASSEMBLY
INNER AXIS

SCALE 2-1
UNIT WT
CODE IDENT 80230

MIT INSTRUMENTATION LABORATORY
Cambridge, Mass.
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018608
SHEET 1 OF 1

2018608 B 1





NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑬ TO ITEMS ① & ⑥ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑧ TO BE ALIGNED WITHIN 5° OF $\boxed{-C-}$ AND IN DIRECTION OF THE ARROW WHEN ITEMS ① & ② ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
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5. ASSEMBLY TO MEET REQUIREMENTS OF PS 2018608
6. SCREW TORQUE REQUIREMENTS ± 7%
   - ⑯ 400 IN LB
   - ⑱ 10.0 IN LB
   - ⑰ 5.0 IN LB
7. WITH SLOT $\boxed{-A-}$ AND SLOT $\boxed{-B-}$ 90°0'00" ± 12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSIBLE) THE 16X SECTION OF RESOLVER 2018631 SHALL BE WITHIN ± 0°2' OF ELECTRICAL ZERO REFERRED TO THE 1X SHAFT AND RESOLVER 2018632 SHALL BE WITHIN ± 0°10' OF ELECTRICAL ZERO

APOLLO G&N Specification
PS 2018608 B
Original Issue Date: 19 Jan'65
Release Authority: TDRR 15545
Class A **Release**

PROCUREMENT SPECIFICATION

RESOLVER ASSEMBLY, MULTIPLE SPEED (16X and 1X)

AND

GYRO ERROR

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
6-2-65	A	19768	2, 10, 11, 12, 13 Total	WK	
			number pages now 12		
4/26/66	B	28332	4, 8	WK	—

This specification consists of page 1 **to** 12 **inclusive.**

APPROVALS	1-19-65 NASA/MSC	1/19/65 MIT/IL	R.J. Thurrien Staff Member 1-15-65	E.P. Armstrong 1-14-65

3. REQUIREMENTS

3.1 GENERAL

3.1.1 Prior Compliance. The subassemblies comprising the resolver assembly under test shall have met the requirements of their applicable test specifications prior to testing of the resolver assembly.

3.1.2 Qualification Sample. When specified by the procuring activity, representative samples of the resolver assembly shall be manufactured using the methods and procedures proposed for the production lot. These shall be submitted to the NASA inspector for qualification tests at an activity designated in the contract or by the procuring activity.

These qualification tests are conducted to determine whether or not the resolver assemblies are being produced in compliance with the requirements of the contract, specification, and drawings. Further production of the item by the contractor prior to approval of the procuring activity or the completion of the qualification tests shall be at the contractor's risk. The qualification tests shall be conducted in accordance with the procedures specified in Section 4.

3.1.3 Requalification Samples. When specified by the procuring activity, the contractor shall submit one or more resolver assemblies to a designated testing activity to determine compliance of the sample (s) with the requirements of the contract, specification, and drawings. The resolver assemblies constituting the sample shall be selected from production lots by the procuring activity.

3.1.4 Electrical. The resolver assembly shall meet the following electrical requirement. All requirements specified herein shall apply to the resolver assemblies by this specification.

3.1.4.1 Cross Coupling. With the unit tested in accordance with 4.2.2.3, the null voltages measured shall not exceed the following values:

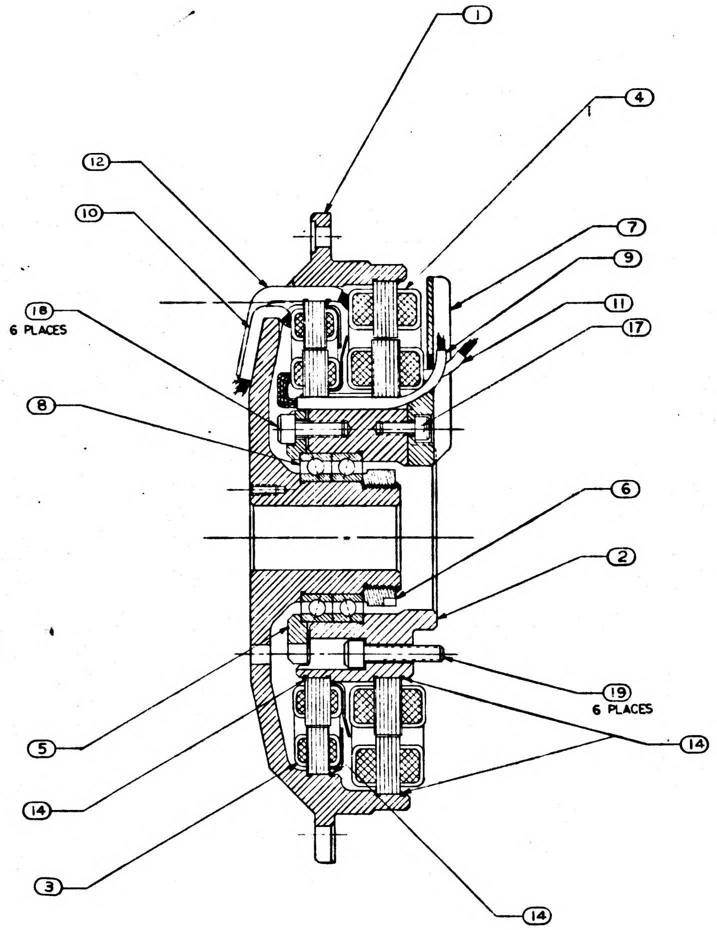
		Total
a.	16X transmitter output	10mv
b.	1X transmitter output	65 mv
c.	Gyro Error Output	65 mv

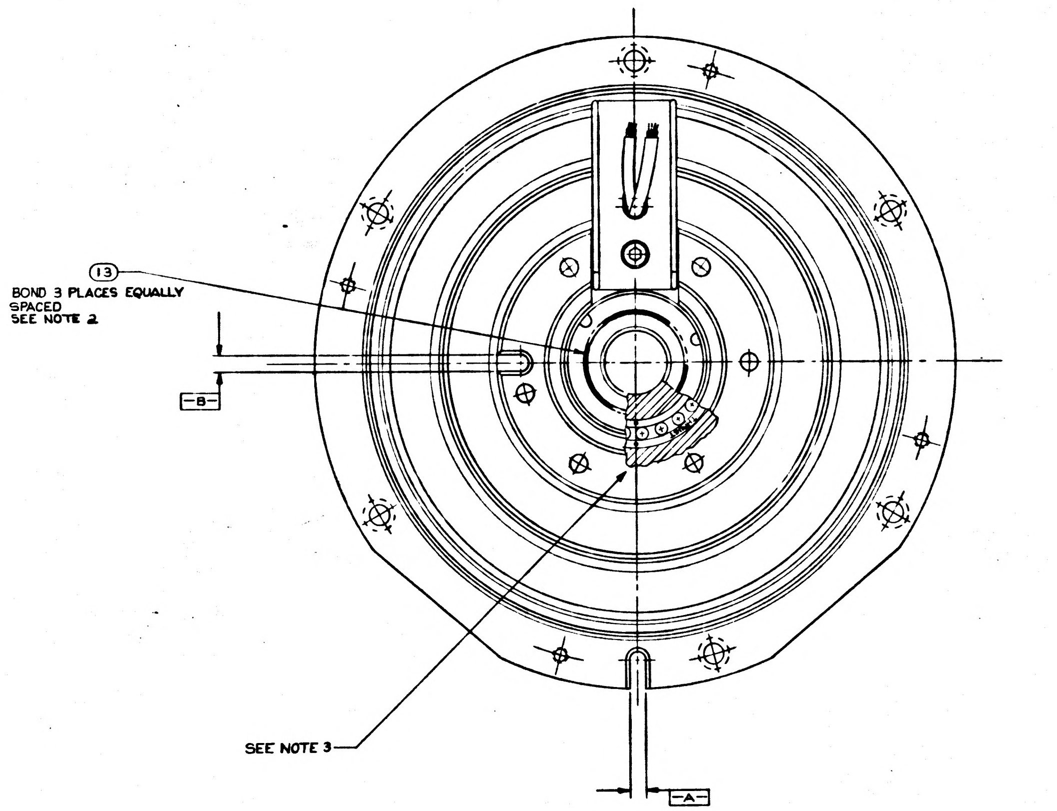
3.1.5 Qualification. The resolver assembly shall meet the following qualification requirements.

3.1.5.1 Vibration, Operating Condition. The resolver assemblies shall withstand the vibration requirements specified in 4.2.3.3.

3.1.5.1.1 Angular Deviation. With the resolver assembly tested as specified, the angular deviation shall not exceed ±0.5 minute.

REVISIONS TDRR 11990				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED TDRR 15713	1-25-65	WK
	B	REVISED TDRR 17753	4-13-65	WK
	C	REVISED TDRR 21806	31 Aug 65	WK





SEE NOTE 3

QTY	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	SPECIFICATION	MATERIAL OR NOTES	FIND NO
6	SCREW, HEX SOC HEAD	1001489-22			19
6	SCREW, HEX SOC HEAD S.L.	1001488-18			18
1	SCREW, HEX SOC HEAD S.L.	1001488-2			17
					16
					15
AS REQ'D	ADHESIVE	1010996			14
AS REQ'D	ADH, 3M EC1099		MIL-A-13883	TYPE I	13
1	INSULATION SLEEVING	1010490-286			12
1	INSULATION SLEEVING	1010490-110			11
1	INSULATION SLEEVING	1010490-170			10
1	INSULATION SLEEVING	1010490-350			9
1	BEARING, BALL, DUPLEX	2018621			8
1	RETAINER, WIRE, I.A.	2018715			7
1	NUT, BRG, RETAINER	2018723			6
1	PLATE, BRG, RETAINER	2018722			5
1	RESOLVER, MULTIPLE SPEED	2018631			4
1	RESOLVER, GYRO ERROR	2018632			3
1	SHAFT, STUB, RSVR I.A.	2018713			2
1	HOUSING BRG, RSVR I.A.	2018729			1
011					

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018614	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS $\pm\frac{1}{64}$ DECIMALS — ANGLES —
DO NOT SCALE THIS DRAWING
MATERIAL: ~

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9 153
APPROVED
CHECKED
DRAWN RWC 6-18-64
APPROVED FOR MSC
MIT/IL APPROVAL WKupfer
DATE 28 Aug 64

RESOLVER
ASSEMBLY
INNER AXIS

SCALE 2-1
UNIT WT
CODE IDENT 80230

MIT
INSTRUMENTATION
LABORATORY
Cambridge, Mass

DWG NO
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO
2018608
SHEET 1 OF 1

2018608 C

2018608 | REV C | SHEET 1

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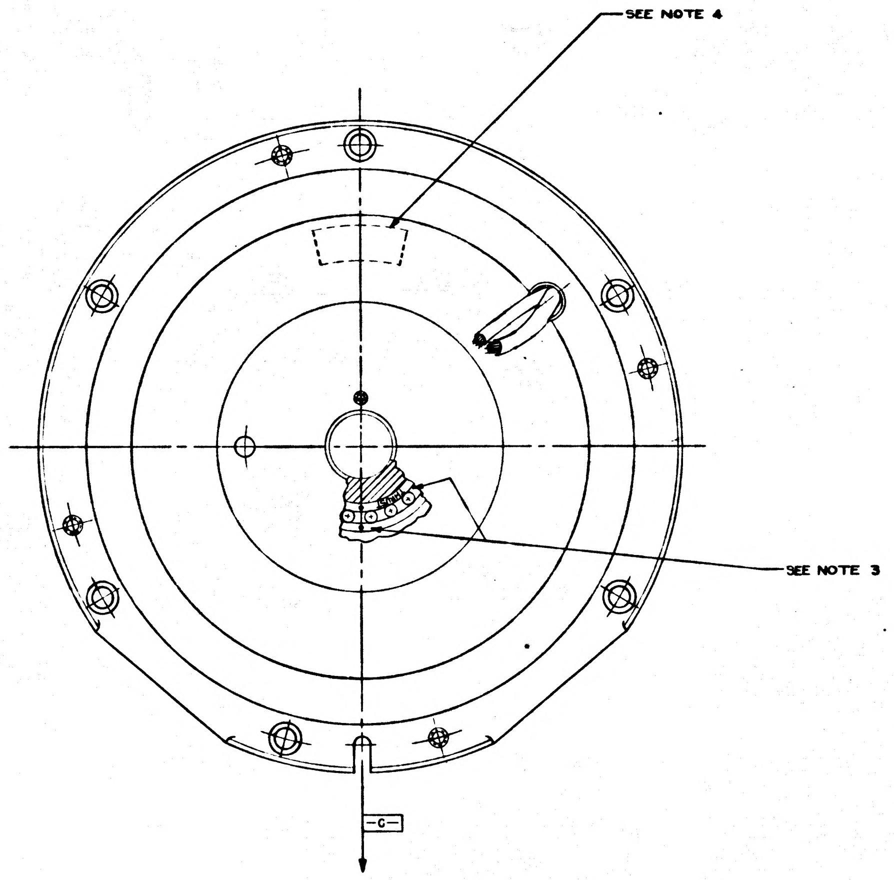
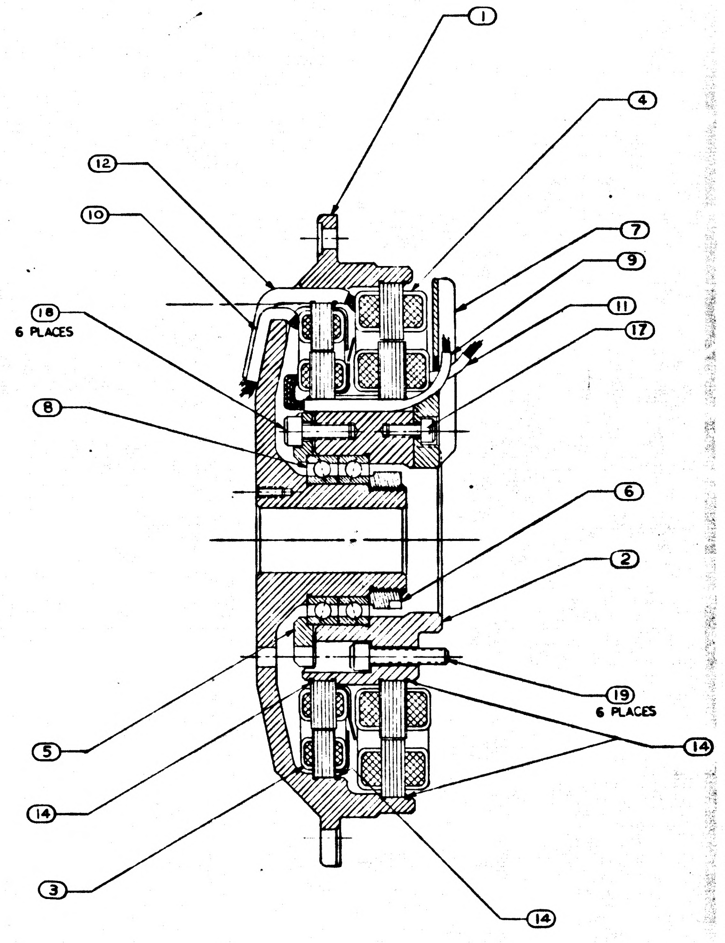


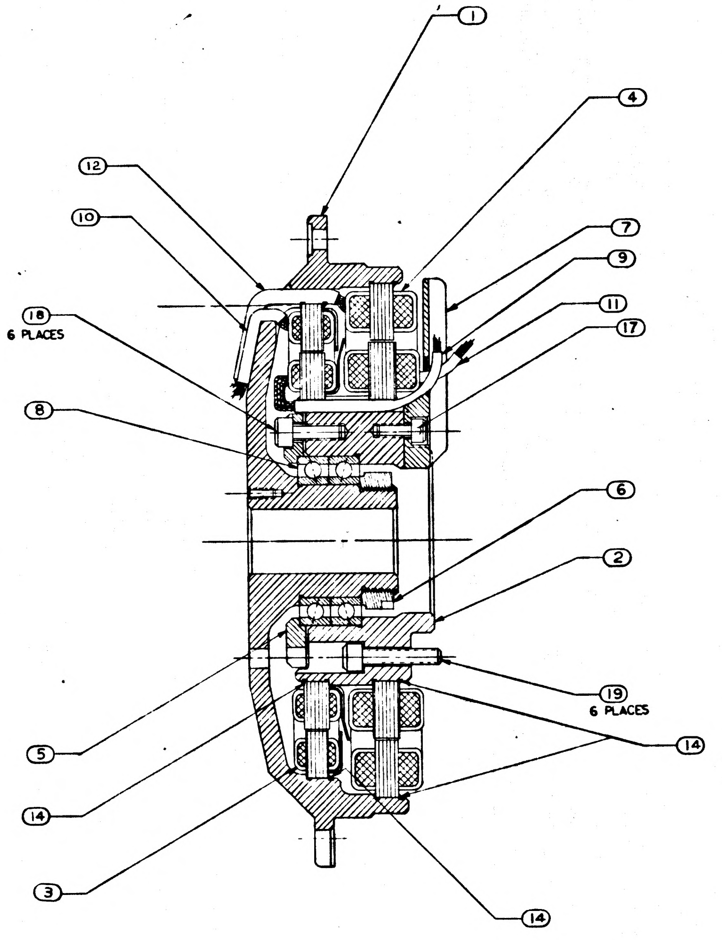


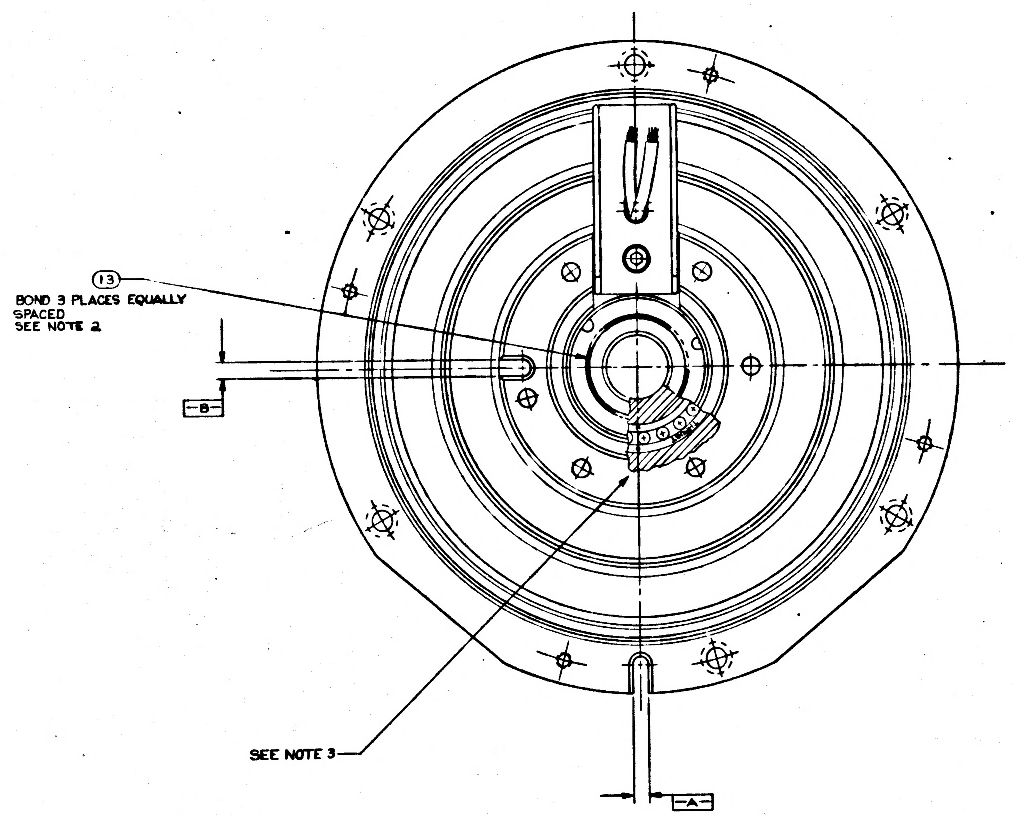
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑬ TO ITEMS ① & ⑥ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑧ TO BE ALIGNED WITHIN 5° OF -C- AND IN DIRECTION OF THE ARROW WHEN ITEMS ① & ② ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO., REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ITEM ① AT THE INDICATED LOCATION PER ND 1002023 AND ND1002019
5. ASSEMBLY TO MEET REQUIREMENTS OF PS 2018608
6. SCREW TORQUE REQUIREMENTS ± 7%
   - ⑥ 400 IN LB
   - ⑱ 10.0 IN LB
   - ⑰ 5.0 IN LB
7. WITH SLOT -A- AND SLOT -B- 90°0'00" ± 12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSIBLE) THE 16 X SECTION OF RESOLVER 2018631 SHALL BE WITHIN ± 0°2' OF ELECTRICAL ZERO REFERRED TO THE 1X SHAFT AND RESOLVER 2018632 SHALL BE WITHIN ± 0°10' OF ELECTRICAL ZERO

REVISIONS TDRR 11990

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	A	REVISED TDRR 15713	1-25-65	[illegible]	WR
	B	REVISED TDRR 17753	4-13-65	[illegible]	WR
	C	REVISED TDRR 21806	31 Aug 65	[illegible]	WR
	D	REVISED TDRR 22331	21 Sep 65	[illegible]	WR





QTY	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	SPECIFICATION	MATERIAL OR NOTES	FIND NO.
6	SCREW, HEX SOC HEAD	1001489-22			19
6	SCREW, HEX SOC HEAD S.L.	1001488-18			18
1	SCREW, HEX SOC HEAD S.L.	1001488-2			17
					16
					15
AS REQ'D	ADHESIVE	1010996			14
AS REQ'D	ADH, 3M EC1099		MIL-A-13883	TYPE I	13
1	INSULATION SLEEVING	1010490-286			12
1	INSULATION SLEEVING	1010490-110			11
1	INSULATION SLEEVING	1010490-170			10
1	INSULATION SLEEVING	1010490-350			9
1	BEARING, BALL, DUPLEX	2018621			8
1	RETAINER, WIRE, I.A.	2018822			7
1	NUT, BRG, RETAINER	2018723			6
1	PLATE, BRG, RETAINER	2018722			5
1	RESOLVER, MULTIPLE SPEED	2018631			4
1	RESOLVER, GYRO ERROR	2018632			3
1	SHAFT, STUB, RSVR I.A.	2018713			2
1	HOUSING BRG, RSVR I.A.	2018729			1
011					

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018614	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
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TOLERANCES ON
FRACTIONS DECIMALS ANGLES
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CONTRACT
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APPROVED
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DRAWN RWC 5-18-64
APPROVED FOR MSC
MIT/IL APPROVAL
DATE
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RESOLVER
ASSEMBLY
INNER AXIS

SCALE 2-1
UNIT WT.
CODE IDENT 80230

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS
DWG NO
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018608
SHEET 1 OF 1

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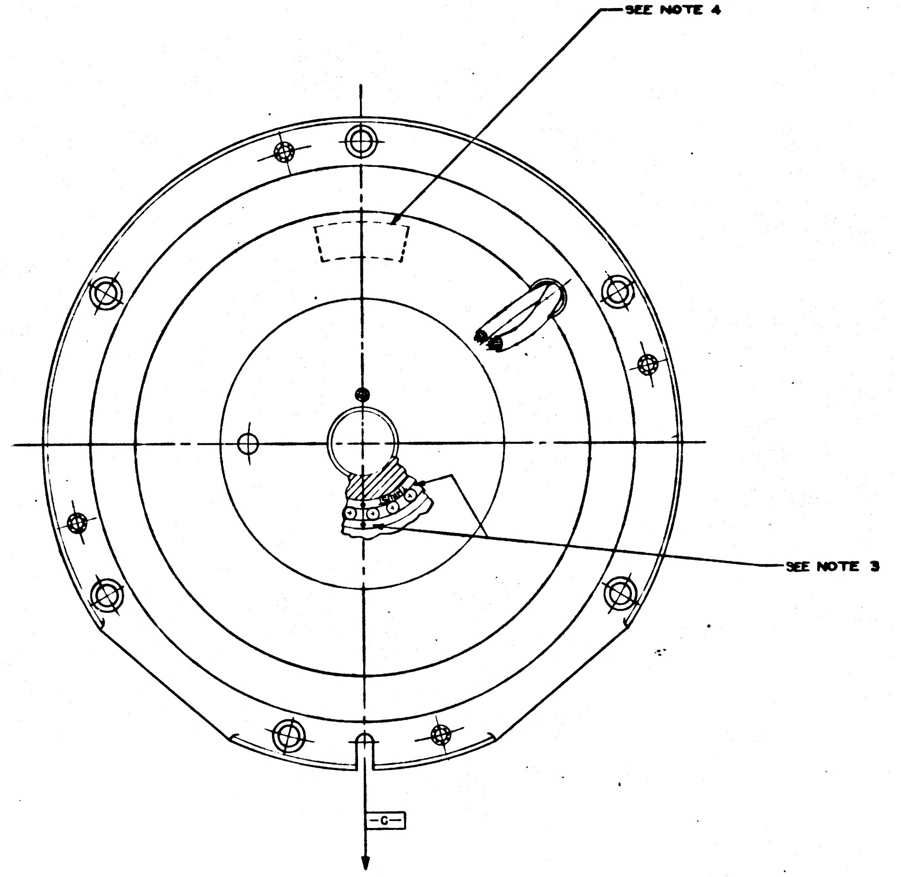

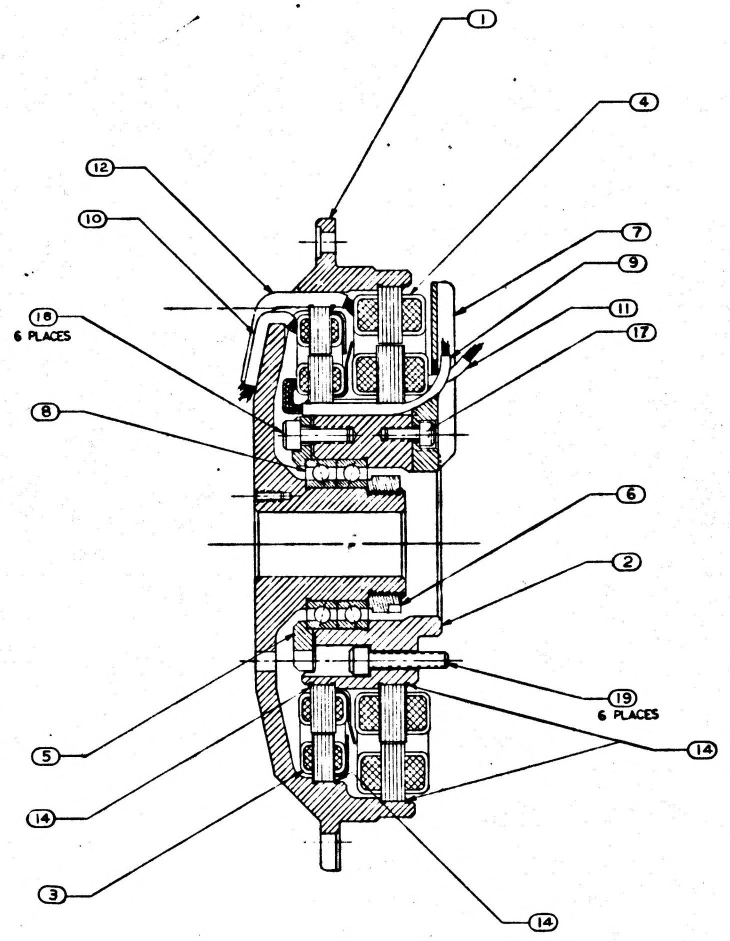

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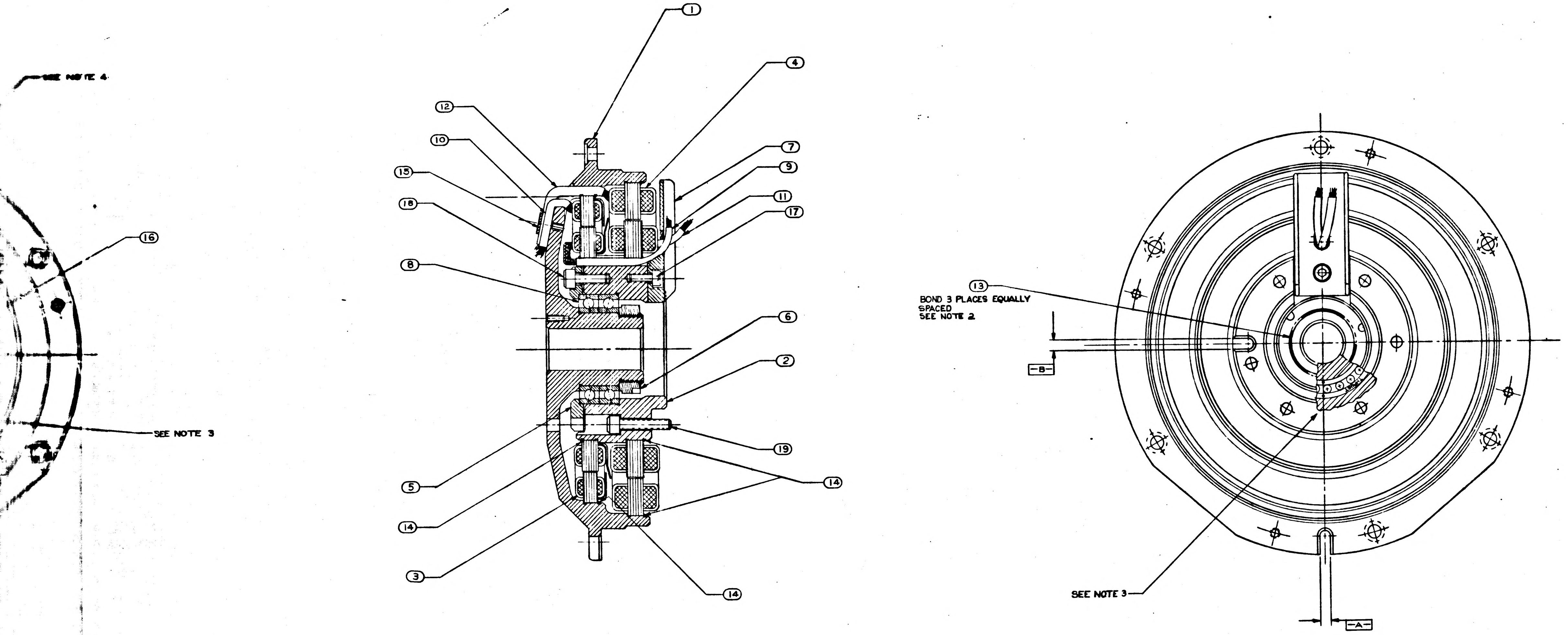
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM (13) TO ITEMS (1) & (6) AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM (8) TO BE ALIGNED WITHIN 5° OF -C- AND IN DIRECTION OF THE ARROW WHEN ITEMS (1) & (2) ARE IN THE POSITION SHOWN LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO., REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ITEM (1) AT THE INDICATED LOCATION PER ND1002023 AND ND1002019
5. ASSEMBLY TO MEET REQUIREMENTS OF PS 2018608
6. SCREW TORQUE REQUIREMENTS ± 7%

(6) 400 IN LB
(18) 10.0 IN LB
(17) 5.0 IN LB

7. WITH SLOT -A- AND SLOT -B- 90°0'00"± 12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSIBLE) THE 16 X SECTION OF RESOLVER 2018631 SHALL BE WITHIN ± 0°2' OF ELECTRICAL ZERO REFERRED TO THE 1X SHAFT AND RESOLVER 2018632 SHALL BE WITHIN ± 0°10' OF ELECTRICAL ZERO

2018608 REV D SHEET 1



F2

QTY	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.
6	SCREW, HEX SOC HEAD	1001489-22			19
6	SCREW, HEX SOC HEAD S.L.	1001488-18			18
1	SCREW, HEX SOC HEAD S.L.	1001488-2			17
2	SCREW, BUTTON HEAD S.L.	1010618-1			16
1	CLIP, WIRE RETAINER	2018767			15
AS REQ'D	INSULATING COMPOUND	1011754			14
AS REQ'D	ADH, GOODYEAR CPA 923A		MIL-A-13883		13
1	INSULATION SLEEVING	1006776-9		1¼ LONG	12
1	INSULATION SLEEVING	1006776-15		½ LONG	11
1	INSULATION SLEEVING	1006776-15		¾ LONG	10
1	INSULATION SLEEVING	1006776-15		1½ LONG	9
1	BEARING, BALL, DUPLEX	2018621			8
1	RETAINER, WIRE, I.A.	2018715			7
1	NUT, BRG, RETAINER	2018723			6
1	PLATE, BRG, RETAINER	2018722			5
1	RESOLVER, MULTIPLE SPEED	2018631			4
1	RESOLVER, GYRO ERROR	2018632			3
1	SHAFT, STUB, RSVR I.A.	2018713			2
1	HOUSING BRG, RSVR I.A.	2018729			1

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018600	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS $\pm\frac{1}{64}$ DECIMALS —— ANGLES ——
DO NOT SCALE THIS DRAWING
MATERIAL ~

MIT INSTRUMENTATION LAB CONTRACT NAS 9-153
CHECKED
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APPROVED FOR MSC
MIT/IL APPROVAL
W Kopf DATE

RESOLVER ASSEMBLY
INNER AXIS

SCALE 2-1
UNIT WT.
CODE IDENT.

MIT INSTRUMENTATION LABORATORY
CAMBRIDGE, MASS.
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
2018608
SHEET 1 OF 1

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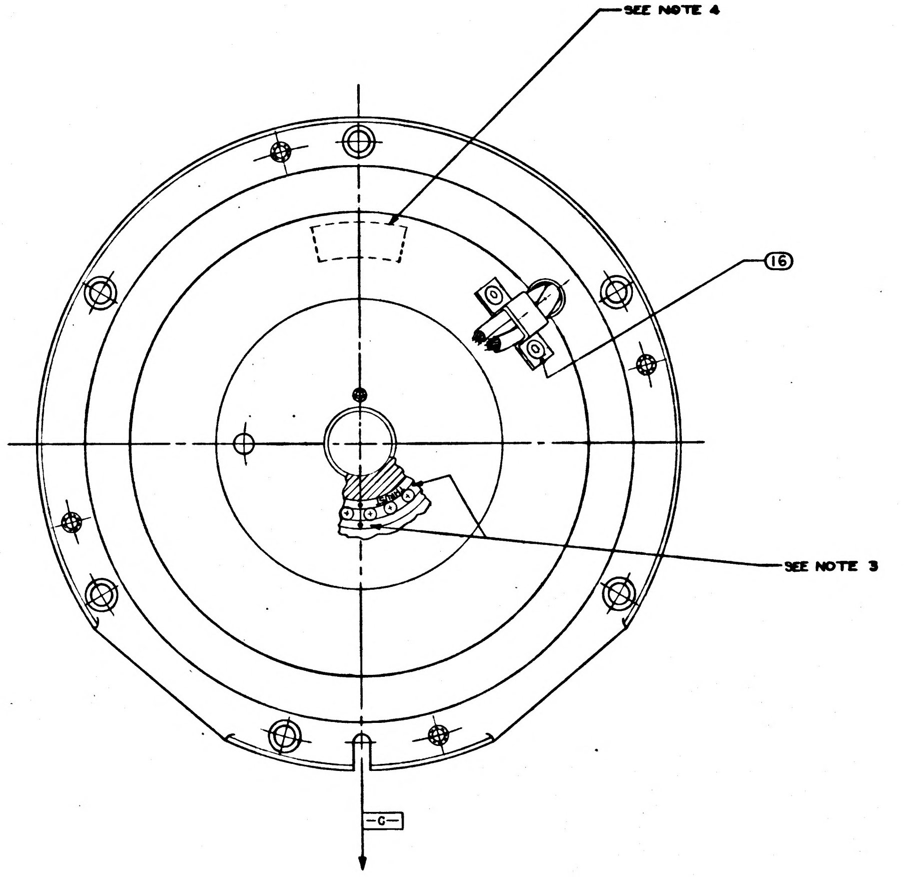
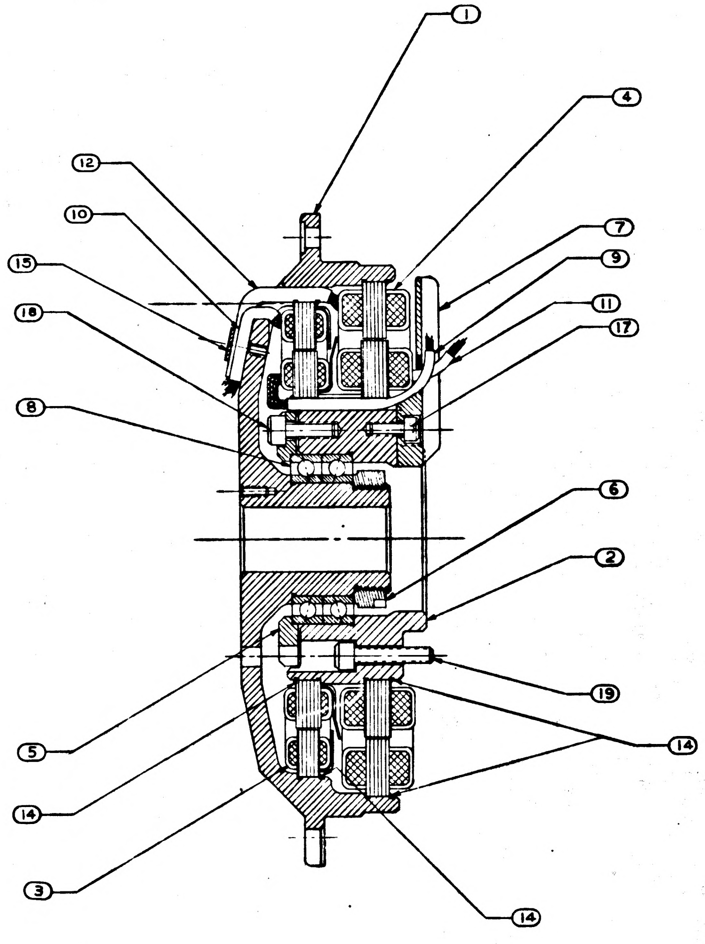
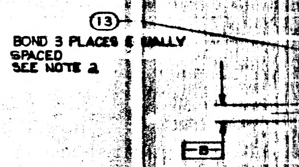






NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. APPLY ITEM ⑬ TO ITEMS ① & ⑥ AFTER ASSEMBLY
3. ECCENTRICITY MARKS ON BOTH RACES OF ITEM ⑧ TO BE ALIGNED WITHIN 5° OF -C- AND IN DIRECTION OF THE ARROW WHEN ITEMS ① & ② ARE IN THE POSITION SHOWN
   LOCATE "THRUST" SURFACES OF BOTH BEARINGS AS SHOWN
4. IDENTIFY USING DRAWING NO., REVISION LETTER MANUFACTURERS SYMBOL AND SERIAL NO. ON ITEM ① AT THE INDICATED LOCATION PER ND 1002023 AND ND1002019
5. ASSEMBLY TO MEET REQUIREMENTS OF PS 2018608
6. SCREW TORQUE REQUIREMENTS ± 7%
   - ⑥ 400 IN LB
   - ⑱ 10.0 IN LB
   - ⑰ 5.0 IN LB
7. WITH SLOT -A- AND SLOT -B- 90°0'00"± 12" APART AS SHOWN (CORRECTION FOR FIXTURE ERROR PERMISSIBLE)
   THE 16 X SECTION OF RESOLVER 2018631 SHALL BE WITHIN ±0°2' OF ELECTRICAL ZERO REFERRED TO THE 1X SHAFT AND RESOLVER 2018632 SHALL BE WITHIN ± 0°10' OF ELECTRICAL ZERO

F-1

APOLLO G&N Specification

PS 2018608
Original Issue Date:
Release Authority: TDRR 15545
Class A Release

PROCUREMENT SPECIFICATION

RESOLVER ASSEMBLY, MULTIPLE SPEED (16X and 1X)

AND

GYRO ERROR

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 **to** 13 **inclusive.**

APPROVALS	W J Rhine 1-19-65 NASA/MSC		I. Halzel 1/19/65 MIT/IL	R.J. Therrien Staff Member 1-15-65		E.P. Armstrong 1-14-65

Apollo G&N Specification
PS 2018608
[illegible]

PROCUREMENT SPECIFICATION

RESOLVER ASSEMBLY, MULTIPLE SPEED (16X and 1X) AND GYRO ERROR

1. SCOPE

1.1 This specification establishes the requirements for the procurement of the Resolver Assembly, Multiple Speed (16X and 1X) and Gyro Error hereinafter called resolver assembly.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on the date of invitation for bids form a part of this specification to the extent specified herein.

SPECIFICATIONS

Military

MIL-P-116	Preservation, Method of
MIL-E-17555	Electronic and Electrical Equipment and Associated Repair Parts, Preparation for Delivery of

Apollo G&N

ND-1015404	General Specification, Configuration, Process and Quality Control Requirements for Suppliers of High Reliability Articles for use in Spacecraft and Supporting Equipment

STANDARDS

Military

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

MIL-STD-810	Environmental Test Methods for Aerospace and Ground Equipment

DRAWINGS

Apollo G&N

2018608	Resolver Assembly, Multiple Speed (16X and 1X) and Gyro Error, Specification Control Drawing.
2018631	Resolver, Multiple Speed (16X and 1X), Specification Control Drawing
2018632	Resolver, Gyro Error, Specification Control Drawing

3. REQUIREMENTS

3.1 GENERAL

3.1.1 Prior Compliance. The subassemblies comprising the resolver assembly under test shall have met the requirements of their applicable test specifications prior to testing of the resolver assembly.

3.1.2 Qualification Sample. When specified by the procuring activity, representative samples of the resolver assembly shall be manufactured using the methods and procedures proposed for the production lot. These shall be submitted to the NASA inspector for qualification tests at an activity designated in the contract or by the procuring activity.

These qualification tests are conducted to determine whether or not the resolver assemblies are being produced in compliance with the requirements of the contract, specification, and drawings. Further production of the item by the contractor prior to approval of the procuring activity or the completion of the qualification tests shall be at the contractor's risk. The qualification tests shall be conducted in accordance with the procedures specified in Section 4.

3.1.3 Requalification Samples. When specified by the procuring activity, the contractor shall submit one or more resolver assemblies to a designated testing activity to determine compliance of the sample (s) with the requirements of the contract, specification, and drawings. The resolver assemblies constituting the sample shall be selected from production lots by the procuring activity.

3.1.4 Electrical. The resolver assembly shall meet the following electrical requirement. All requirements specified herein shall apply to the resolver assemblies by this specification.

3.1.4.1 Cross Coupling. With the unit tested in accordance with 4.2.2.3, the null voltages measured shall not exceed the following values:

		Total
a.	16X transmitter output	10mv
b.	1X transmitter output	60 mv
c.	Gyro Error Output	50mv

3.1.5 Qualification. The resolver assembly shall meet the following qualification requirements.

3.1.5.1 Vibration, Operating, Condition. The resolver assemblies shall withstand the vibration requirements specified in 4.2.3.3.

3.1.5.1.1 Angular Deviation. With the resolver assembly tested as specified, the angular deviation shall not exceed ±0.5 minute.

3.1.5.2 Shock, Operating Condition. The resolver assemblies shall withstand the shock requirements specified in 4.2.3.4.

3.1.5.2.1. Angular Deviation. With the resolver assembly tested as specified, the angular deviation shall not exceed ±0.5 minute.

3.1.5.3 Humidity, Operating Condition. The resolver assemblies shall exhibit the capability of performing as specified herein, with no damage or evidence of rust, blistering, varnish condensates or corrosion when tested in accordance with the requirements of 4.2.3.5.

3.1.5.3.1 Cross Coupling. With the resolver assembly tested as specified, the cross coupling shall be as indicated in 3.1.4.1

3.1.5.4 Temperature.

3.1.5.4.1 Low. The resolver assembly shall be subjected to the temperature condition specified in 4.2.3.6.1 and upon completion, shall successfully meet the requirements of 3.1.4.

3.1.5.4.2 High. The resolver assembly shall be subjected to the temperature condition specified in 4.2.3.6.2 and upon completion, shall successfully meet the requirements of 3.1.4.

3.2 DETAIL. Additional detail requirements or exceptions applicable to the resolver assemblies are specified on the NASA drawing. All resolver assemblies procured under this specification shall meet the requirements of the applicable drawing.

3.3 PERFORMANCE AND PRODUCT CHARACTERISTICS. The following requirements are stated to inform the supplier of the goals that were considered in the design. Inclusion of this information shall not be construed by the supplier as authorization to modify the design.

If the design of any part is not completely specified by the contractual documents, the supplier may submit a suggested design document for approval which will support these requirements.

If, in the opinion of the contractor, any design or testing shall impose undue time delay or expense, he shall so state, in detail, in a counterproposal, substantiating all contributing factors when submitting a bid, proposal, or change request in connection with this specification.

Requests for changes or deviations to this specification or to applicable drawings, specifications, materials, or processes specified herein shall be accompanied by written justification.

3.3.1 Design.

3.3.1.1 Reliability. Design objectives require maximum reliability of these resolver assemblies during their periods of useful life. Every effort shall be made to design and produce units capable of meeting a maximum failure rate of 5 per 1,000,000 hours.

3.3.1.2 Workmanship. The fabrication and finish of the resolver assembly parts shall be such as to produce units free from any defect that would affect proper functioning in service. Particular care and attention shall be paid to neatness and thoroughness of soldering, wiring, marking of parts and assemblies, and freedom of parts from burrs and sharp edges.

3.3.1.3 Parts and Materials. The parts and materials used in fabricating the resolver assembly shall be in strict accordance with the applicable drawings and specifications referenced herein. Substitute materials shall be selected with such quality as to ensure that the equipment will meet the requirements of this specification and shall be subject to prior approval of the procuring activity.

3.3.1.4 Flammable Materials. Materials which may be ignited or cause an explosion shall not be used for construction applications where sparking or arcing could cause ignition. Materials which may inadvertently support combustion shall not be used. Flammable impregnating, potting or embedding compounds, when enclosed in fire-resistance containers, shall be acceptable.

3.3.1.5 Toxic Materials. Materials which produce harmful toxic effects during service usage shall not be used. Where a suitable nontoxic material is not available, preventive measures shall be provided, subject to the approval of NASA. Materials which, when ignited, produce toxic substances or vapors shall be avoided whenever practicable.

3.3.1.6 Unstable Materials. Materials which are unstable or become unstable to the extent that they emit or deposit corrosive substances capable of causing corrosion or producing electrical leakage paths within an assembly under possible operating and storage conditions shall not be used during manufacture or recommended for use during maintenance.

3.3.1.7 Corrosion, Moisture, and Fungus-Resistant Materials. Materials shall be selected for noncorrosive and nonhygroscopic characteristics and ability to resist the effects of corrosion, moisture and fungus. Preference shall be given to materials with inherent fungus resistance rather than reliance upon the application of surface fungistatic or fungicidal treatments.

3.3.1.8 Dissimilar Metals. The use of dissimilar metals shall be avoided whenever practicable. Magnesium shall not be used except with the prior approval of the procuring agency or when so called for on the applicable drawings.

3.3.2 Radio Interference Suppression. The suppression of radio noise and interference shall be considered in the design of the resolver assembly.

3.3.3 Shelf Life. The resolver assembly shall have a shelf life of at least 5 years, without operation, at ambient room temperature, after final acceptance at the vendor's plant.

4. QUALITY ASSURANCE PROVISIONS

4.1 GENERAL. Unless otherwise specified herein, the supplier is responsible for the performance of all inspection requirements prior to submission for NASA inspection and acceptance. Unless otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to NASA. Inspection records of the examinations and tests shall be kept complete and available to NASA as specified in the contract or order. The supplier shall conform to the quality assurance provisions in Specification ND-1015404, Class 1.

4.2 TESTS

4.2.1 TEST CONDITIONS. Unless otherwise specified herein, the resolver assemblies shall be subjected to the tests under the following conditions:

a. Temperature	25° ± 10°C
b. Relative Humidity	Not more than 90%
c. Barometric pressure	28 to 30 inches Hg

4.2.2 DESCRIPTION OF TESTS. The inspection and testing of the resolver assembly shall be classified as follows:

4.2.2.1 Acceptance Tests. Each resolver assembly being submitted for acceptance under the contract shall be tested by the supplier as stated below. Only those resolver assemblies meeting all of these requirements shall be considered acceptable. Those failing must be rejected. Acceptance test data on each unit accepted must accompany shipment to the purchaser. Acceptance tests shall be witnessed by the cognizant government inspector, a representative of the purchaser, or as the purchaser may direct in the procurement order.

4.2.2.2 Visual and Mechanical Inspection. A comprehensive inspection shall be made of the resolver assembly to determine the extent of compliance with the requirements of this specification and drawing 2018608 and shall at least include determination of the following:

a. Size, dimensions, tolerances, weight, appearance and markings.

b. Adequacy of materials, parts, and subassemblies; compliance with specific ratings, and conformance to applicable specifications.

c. Finish, coatings, construction, markings, and nameplates as applicable.

d. Wiring, cabling, welding, soldering, color coding, and terminals, as applicable.

e. Workmanship and cleanup.

4.2.2.3 Cross Coupling. During these tests, the specified loads shall be applied to all resolvers.

4.2.2.3.1 Multiple Speed Transmitters to Gyro Error. With the sixteen and one speed resolver transmitters excited by applying 28 volts ±2 per cent, 800 cps ±0.5 per cent between P3(Hi) and P1(lo) and the primary windings of the gyro error resolver shorted P2(brn) to P4(Green) and P1(Orn) to P3(White), the total voltage measured at either output phase of the gyro error resolver shall not exceed the values specified in 3.1.4.2.

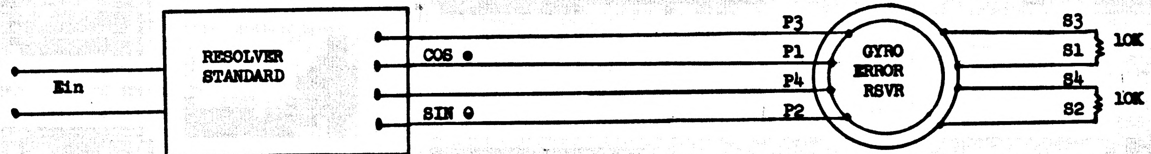
4.2.2.3.2 Gyro Error to Multiple Speed Resolvers. With the gyro error resolver connected as per Fig. 1 and the primary windings of the sixteen and one speed transmitters shorted P2(Yel/Wht) to P4(Blu/Wht) and P3(Blk/Wht) to P1(Rd/Wht), the total null voltage measured at either output phase of the sixteen or one speed resolver shall not exceed the values specified in 3.1.4.1 as the electrical angle of the resolver standard is varied in 30 steps from 0° to 360°.

4.2.3 Qualification Tests. Qualification tests shall be accomplished by the supplier or other activity pursuant to the recommendations of NASA or the purchaser. Initial qualification tests will be conducted after the award of the contract to determine that the production will meet the requirements of this specification. Failure of the resolver assembly to meet these requirements may result in disqualification of the supplier as determined by NASA or the purchaser. Requalification will be required at the discretion of NASA or the purchaser in the event that (a) the supplier has modified the item; (b) the supplier has instituted a change in the materials used or in his processing and (c) the specification requirements for the item have been amended or revised sufficiently to affect the character of the item.

4.2.3.1 Samples. Not less than 5 samples shall be submitted for initial qualification of this item. One or more specimens may be adequate for requalification tests as determined by NASA or the purchaser. Specimens submitted for these tests shall have been produced under conditions representative of the supplier's normal production and shall have passed the acceptance tests listed above.

4.2.3.2 Initial Conditions. During the qualification tests, the locating slots shall be aligned as specified on drawing 2018608. The individual resolvers shall be energized at rated test voltage and frequency and the output windings connected to their respective loads as specified in the individual detail specifications.

4.2.3.3 Vibration, Operating Condition. With the resolver assembly mounted in a suitable test fixture, it shall be subjected to the following vibration requirements: 20g (0 to peak) 5 to 2000 to 5 cps at 1 min/oct logarithmic sweep once along each of three orthogonal axes. 0.12 inch maximum amplitude. Throughout these tests, both resolvers shall be locked at the position defined in 4.2.3.2 and the gyro error resolver monitored with a resolver bridge and null meter. During and after the test, the angular deviation shall not exceed ±0.5 minutes. The angle of the resolver may be reset each time the fixture is remounted to vibrate on another axis.


Ein
RESOLVER
STANDARD
COS θ
SIN θ
P3
P1
P4
P2
GYRO
ERROR
RSVR
S3
S1
S4
S2
10K
10K

NOTE: Ein = 14 volts ± 2%, 3200 cps ± 0.5%

CROSS COUPLING (GYRO ERROR TO 16X and 1X TRANSMITTERS)

Figure 1

4.2.3.4 Shock, Operating Condition. With the resolver assembly mounted in a suitable test fixture, it shall be subjected to two shock pulses along each axis in each direction. The shock pulses shall have a 50g, 6 ±1 msec sawtooth wave shape. Throughout these tests, both resolvers shall be locked at the position defined in 4.2.3.2 and the gyro error resolver monitored with a resolver bridge and null meter to indicate any deviations in electrical angle. Angular deviation shall not exceed ±0.5 minute.

4.2.3.5 Humidity, Operating Condition. The resolver assembly shall be subjected to the humidity conditions of Standard MIL-STD-810, method 507 for five cycles only. During and after this test, the resolver assembly shall be checked according to 4.2.2.3 and shall meet the requirements specified therein.

4.2.3.6 Temperature.

4.2.3.6.1 Low. The resolver assembly shall be maintained at a temperature of 0° ±3°C for 48 hours at nonoperating conditions. Upon completion of the test, the unit shall successfully meet the acceptance test requirements.

4.2.3.6.2 High. The resolver assembly shall be maintained at a temperature of 93° ±3°C for 48 hours at nonoperating conditions. Upon completion of the test, the unit shall meet the acceptance test requirements.

4.2.3.7 Disposition of Samples. Samples used in test shall not be shipped to the purchaser in compliance with a procurement order.

4.2.3.8 Reliability. The reliability requirements contained in Section 3 of this specification are design objectives. Unless specifically called for in the procurement contract, it shall not be necessary for the supplier to demonstrate his compliance with requirements. The supplier will furnish the purchaser or NASA such data as he may have available for establishing the current reliability of these units. Additional data shall be accumulated to as great a degree as possible from the tests specified herein or any other tests the supplier may conduct which will tend to support or verify attainment of the reliability objectives specified.

5. PREPARATION FOR DELIVERY.

5.1 PRESERVATION AND PACKAGING. The resolver assembly shall be preserved and packaged in accordance with Specification MIL-E-17555, level B, as specified in the contract or purchase order.

5.1.1 Unit Protection. The resolver assembly shall be individually afforded unit protection in accordance with method III of Specification MIL-P-116. In addition, equipment packaged for level B protection shall be sealed against water and dust by means of suitable wrapping.

5.1.2 Vibration and Shock, Shipping Condition. Equipment packaging for shipment shall provide adequate protection from all anticipated shipping environments.

5.2 **MARKING.** In addition to any special marking required by the contractor or order, the marking of unit, interior packages, and exterior shipping containers shall be in accordance with level B of Specification MIL-E-17555.

6. NOTES

6.1 Terminology

6.1.1 Environmental Terms. Terms and descriptions applicable to the environmental requirements of this specification are set forth in Standard MIL-STD-202.

6.2 DEFINITIONS

6.2.1 Direction of Rotation. The direction of rotation is viewed from the shaft extension end of the resolvers or of the mounting end in the case where no shaft extension exists.

6.2.2 Angular Position. The angular position of the resolver is the angular displacement of its secondary about the axis of the secondary from the resolver's zero position measured as an increasing positive angle in the ccw direction.

6.2.3 Resolver or Electrical Zero. Resolver or electrical zero is defined as the position of the secondary produced under the following conditions: That position of the secondary for which windings (P1 - P3) and S2-S4) experience minimum coupling (null) and for which established vector convention is in accordance with Figure 2 and the equations specified herein for positive (ccw) rotation.

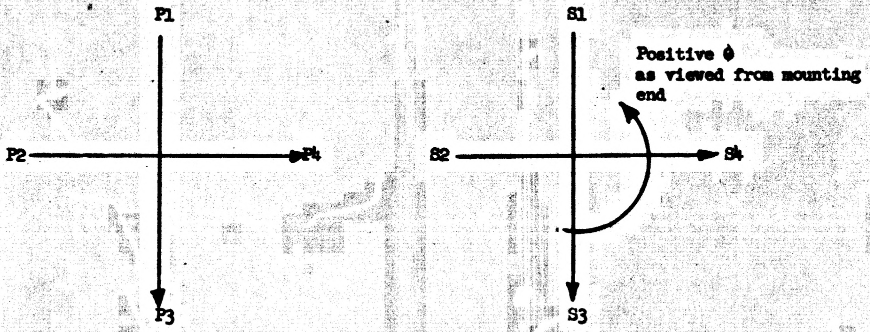
Resolver Equations

$$E\,(S1\text{-}S3) = KE\,(P1\text{-}P3)\cos\theta + KE\,(P2\text{-}P4)\sin\theta$$

$$E\,(S2\text{-}S4) = KE\,(P2\text{-}P4)\cos\theta - KE\,(P1\text{-}P3)\sin\theta$$

6.2.4 Total Null Voltage. Total null voltage is the minimum secondary voltage including harmonics.

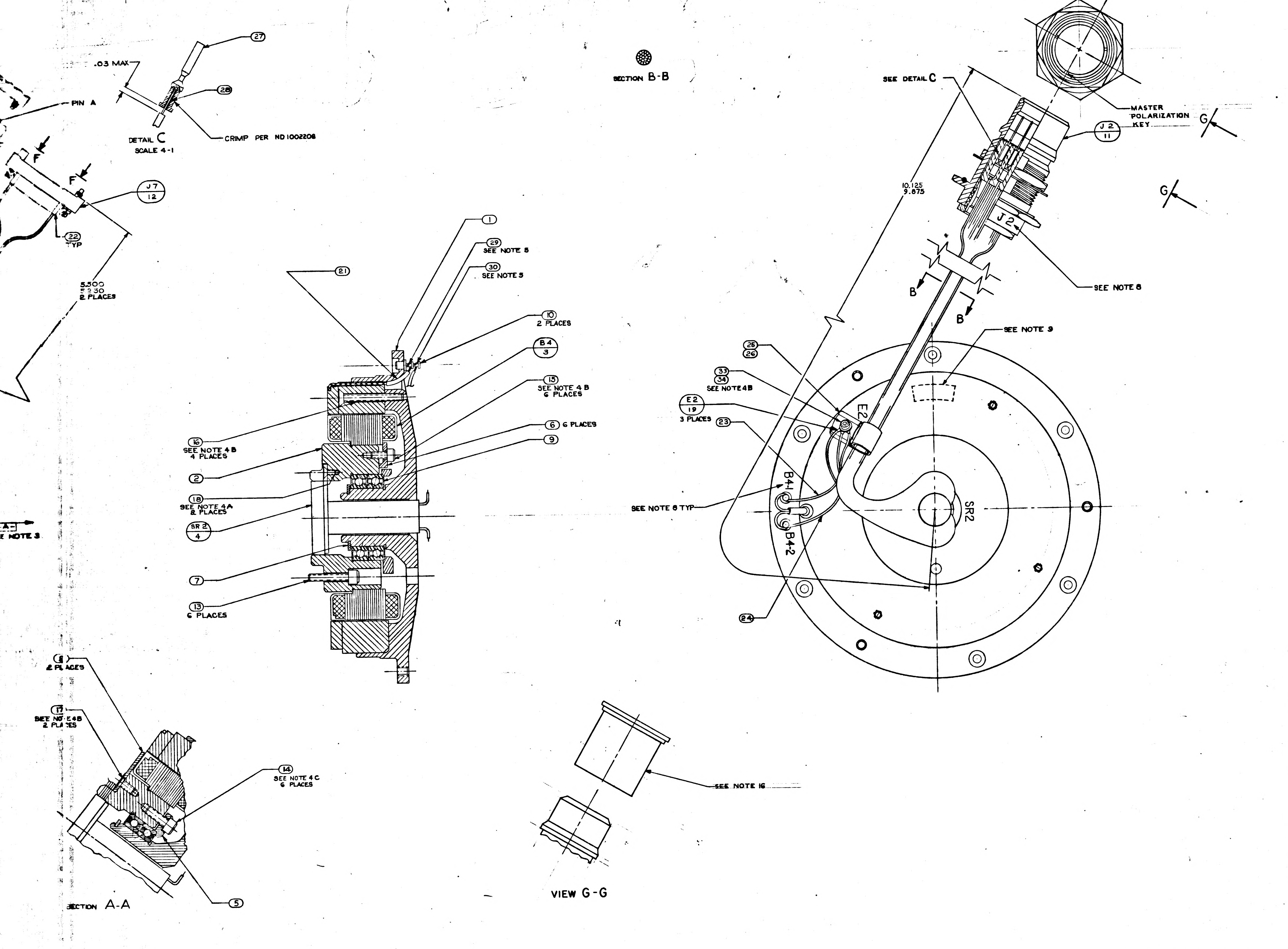
NOTICE: When Apollo G&N drawings, specifications or other data are used for any purpose other than in connection with a definitely related NASA procurement operation, NASA thereby incurs no responsibility nor any obligation whatsoever, and the fact that NASA may have formulated, furnished or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.


P1
P2
P4
P3
S1
S2
S4
S3
Positive φ
as viewed from mounting end

Established Vector Convention

Figure 2

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 16813			
A	REVISED TDRR 17687		


.03 MAX
PIN A
27
28
DETAIL C
SCALE 4-1
CRIMP PER ND 1002206
F
F
J7
12
22
TYP
5.500
5.230
2 PLACES
A-
E NOTE 3
SECTION B-B
21
1
29
SEE NOTE 5
30
SEE NOTE 5
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6 6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR 2
4
7
13
6 PLACES
SEE DETAIL C
MASTER
POLARIZATION
KEY
G
G
J2
11
10.125
9.875
J2
SEE NOTE 8
B
B
SEE NOTE 9
26
26
33
34
SEE NOTE 4B
E2
19
3 PLACES
23
E2
B4-1
B4-2
SR2
SEE NOTE 8 TYP
24
8
2 PLACES
17
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4C
6 PLACES
5
SECTION A-A
SEE NOTE 16
VIEW G-G

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	MS15795-303	WASHER, FLAT, METAL, ROUND	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	1010870	GREASE, LUBRICATING	31
A/R	QQ-S-571 SN60	SOLDER	30
A/R	QQ-S-571 SN10	SOLDER	29
61	1010862	BUSHING, SLEEVE	28
61	1010781-1	CONTACT, ELEC	27
1	1000223	WASHER, CABLE CLAMP	26
1	1000220-7	CLAMP, CABLE	25
1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	1000020-8	SHIELD & GRD ASS'Y	20
3	1000020-9	SHIELD & GRD ASS'Y	19
2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	1001489-22	SCREW, HEX SOC HD	13
2	1000122	CONNECTOR, ELEC, RECEPTACLE	12
1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	1000100-1	TERMINAL, INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	2018766	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1
011	LIST OF MATERIALS		

2018609 A

A

2018601	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± // DECIMALS ± // ANGLES ± // DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS
NEXT ASSY	USED ON	MATERIAL //	DRAWN R.W. Cantwell DATE 2-20-65
APPLICATION		HEAT TREATMENT //	CHECKED G. QUINN 2-24-65
		FINAL FINISH //	APPROVAL 24 Feb 65
			APPROVAL
			NASA APPROVAL
			MIT APPROVAL

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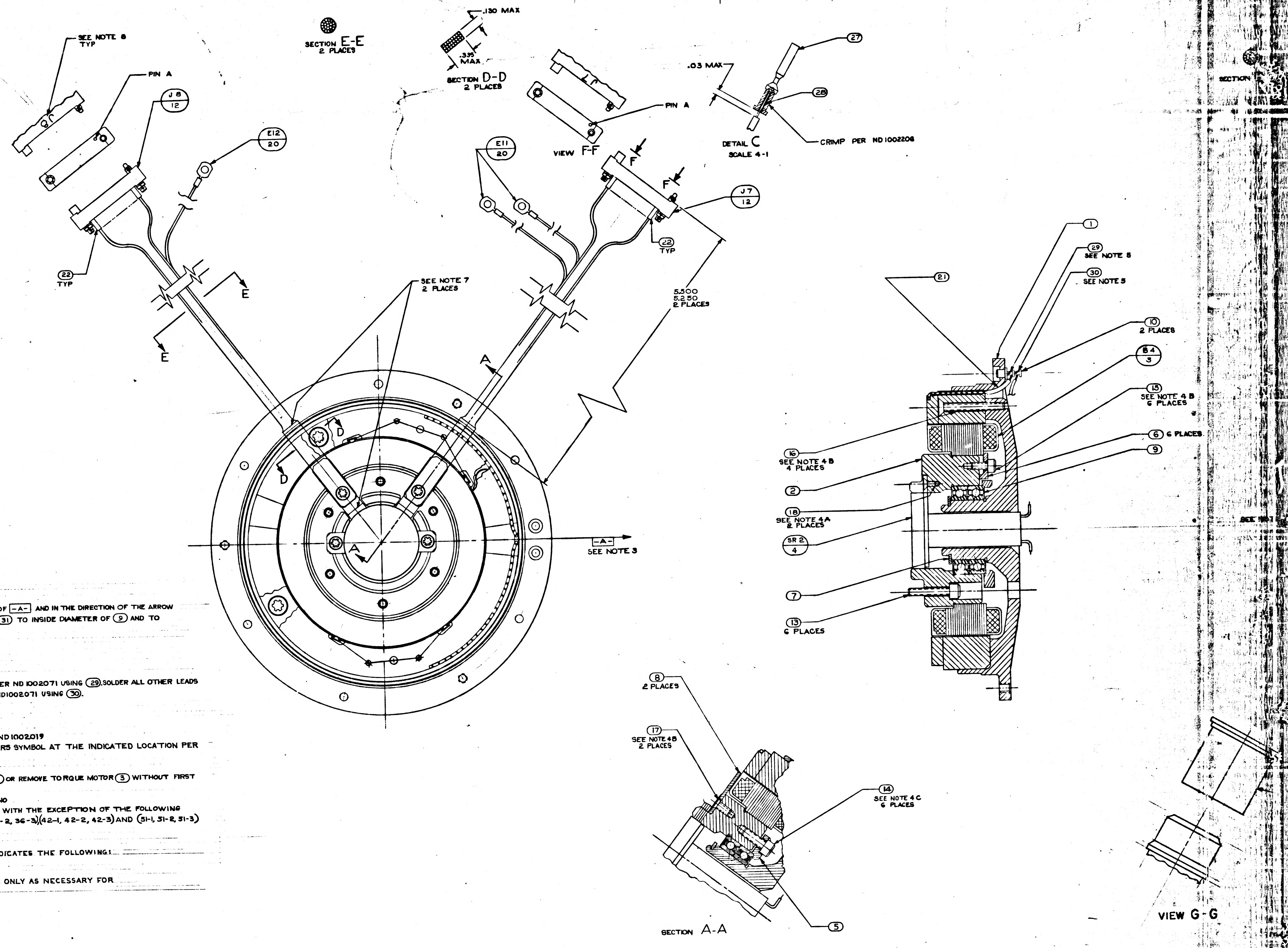
INTER GIMBAL
SUB-ASSEMBLY
TORQUE MOTOR END
OUTER AXIS

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018609
SCALE 2-1
WT
SHEET 1 OF 8

24

F-2

2018609 REV A 1


SEE NOTE 8 TYP
PIN A
J8 12
E12 20
22 TYP
E
E
SECTION E-E 2 PLACES
.130 MAX
.335 MAX
SECTION D-D 2 PLACES
VIEW F-F
PIN A
E11 20
F
F
J7 12
22 TYP
.03 MAX
27
28
DETAIL C SCALE 4-1
CRIMP PER ND1002206
SEE NOTE 7 2 PLACES
5.300 5.250 2 PLACES
A
A
D
D
-A-
SEE NOTE 3
1
29 SEE NOTE 5
30 SEE NOTE 5
21
10 2 PLACES
E4 3
15 SEE NOTE 4 B 6 PLACES
6 6 PLACES
9
16 SEE NOTE 4 B 4 PLACES
2
18 SEE NOTE 4A 2 PLACES
SR 2 4
7
13 6 PLACES
8 2 PLACES
17 SEE NOTE 4B 2 PLACES
14 SEE NOTE 4 C 6 PLACES
5
SECTION A-A
VIEW G-G

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS 2007203
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ±5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
   - A - SHIELD GROUND ON "FROM END"
   - B - SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION

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NASA DRAWING NO.
2018609
SHEET 2 of 8

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	TO NO.
1						19						
1-B			E2					SHLD 1				
1-1			J2-1	13	N			SR2-1				
1-2			J2-2	13	N			SR2-2				
1-3			J2-3	13	N			SR2-3				
2			J2-4	13	N			SR2-4				
3			J2-5	13	N			SR2-5				
4-1			J2-6	13	N			SR2-6				
4-2			J2-7	13	N			SR2-7				
5-1			J2-8	13	N			SR2-8				
5-2			J2-9	13	N			SR2-9				
6-1			J2-10	13	N			SR2-10				
6-2			J2-11	13	N			SR2-11				
7						19						
7-B			E2					SHLD 7				
7-1			J2-12	13	N			SR2-12				
7-2			J2-13	13	N			SR2-13				
7-3			J2-14	13	N			SR2-14				

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NASA DRAWING NO.
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SHEET 3 of 8

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	TO NO.
8			J2-15	13	N			SR2-15				
9			J2-16	13	N			SR2-16				
10-1			J2-17	13	N			SR2-17				
10-2			J2-18	13	N			SR2-18				
11-1			J2-19	13	N			SR2-19				
11-2			J2-20	13	N			SR2-20				
11-3			J2-21	13	N			SR2-21				
11-4			J2-22	13	N			SR2-22				
11-5			J2-23	13	N			SR2-23				
11-6			J2-24	13	N			SR2-24				
12			J2-25	13	N			SR2-25				
13			J2-26	13	N			SR2-26				
14			J2-27	13	N			SR2-27				
15			J2-28	13	N			SR2-28				
16			J2-32	13	N			SR2-32				
17			J2-33	13	N			SR2-33				
18			J2-34	13	N			SR2-34				

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SHEET 4 of 8

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	TO NO.
19-1			J2-35	13	N			SR2-35				
19-2			J2-36	13	N			SR2-36				
20-1			J2-37	13	N			SR2-37				
20-2			J2-38	13	N			SR2-38				
21-1			J2-39	13	N			SR2-39				
21-2			J2-40	13	N			SR2-40				
22-1			J2-41	13	N			SR2-41				
22-2			J2-42	13	N			SR2-42				
23			J2-43	13	N			SR2-43				
24			J2-44	13	N			SR2-44				
25			J2-45	13	N			SR2-45				
26			J2-46	13	N			SR2-46				
27			J2-47	13	N			SR2-47				
28			J2-48	13	N			SR2-48				
29			J2-49	13	N			SR2-49				
30			J2-50	13	N			SR2-50				

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NASA DRAWING NO.
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SHEET 5 of 8

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	TO NO.
31	23		J2-51	13	N			B4-1	13	Y		
32	24		J2-52	13	N			B4-2	13	Y		
33			B4-BLK					B4-1	13	Y		
34			B4-WHT					B4-2	13	Y		
35						19						
35-B			E2					SHLD 35				
35-1			J2-59	13	N			SR2-29				
35-2			J2-60	13	N			SR2-30				
35-3			J2-61	13	N			SR2-31				
36						20						
36-A			SHLD-36					E11				
36-1			J7-A	13	Y	22		SR2-1				
36-2			J7-B	13	Y	22		SR2-2				
36-3			J7-C	13	Y	22		SR2-3				
37			J7-D	13	Y	22		SR2-4				
38			J7-E	13	Y	22		SR2-5				
39-1			J7-F	13	Y	22		SR2-6				
39-2			J7-H	13	Y	22		SR2-7				

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SHEET 6 of 8

CONDUCTOR			FROM						TO					
FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD: CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD: CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
40-1			J7-J	13	Y	22			SR2-8					
40-2			J7-K	13	Y	22			SR2-9					
41-1			J7-L	13	Y	22			SR2-10					
41-2			J7-M	13	Y	22			SR2-11					
42						20								
42-A			SHLD-42						E11					
42-1			J7-N	13	Y	22			SR2-12					
42-2			J7-P	13	Y	22			SR2-13					
42-3			J7-R	13	Y	22			SR2-14					
43			J7-S	13	Y	22			SR2-15					
44			J7-T	13	Y	22			SR2-16					
45-1			P7-U	13	Y	22			SR2-17					
45-2			J7-V	13	Y	22			SR2-18					
46-1			J7-W	13	Y	22			SR2-19					
46-2			J7-X	13	Y	22			SR2-20					
46-3			J7-Y	13	Y	22			SR2-21					
46-4			J7-Z	13	Y	22			SR2-22					
46-5			J7-a	13	Y	22			SR2-23					

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NASA DRAWING NO.
2018609
SHEET 7 of 8

CONDUCTOR			FROM						TO					
FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD: CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD: CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
46-6			J7-b	13	Y	22			SR2-24					
47			J7-c	13	Y	22			SR2-25					
48			J8-A	13	Y	22			SR2-26					
49			J8-B	13	Y	22			SR2-27					
50			J8-C	13	Y	22			SR2-28					
51						20								
51-A			SHLD-51						E12					
51-1			J8-D	13	Y	22			SR2-29					
51-2			J8-E	13	Y	22			SR2-30					
51-3			J8-F	13	Y	22			SR2-31					
52			J8-H	13	Y	22			SR2-32					
53			J8-J	13	Y	22			SR2-33					
54			J8-K	13	Y	22			SR2-34					
55-1			J8-L	13	Y	22			SR2-35					
55-2			J8-M	13	Y	22			SR2-36					
56-1			J8-N	13	Y	22			SR2-37					
56-2			J8-P	13	Y	22			SR2-38					

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NASA DRAWING NO.
2018609
SHEET 8 of 8

CONDUCTOR			FROM						TO					
FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD: CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD: CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
57-1			J8-R	13	Y	22			SR2-39					
57-2			J8-S	13	Y	22			SR2-40					
58-1			J8-T	13	Y	22			SR2-41					
58-2			J8-U	13	Y	22			SR2-42					
59			J8-V	13	Y	22			SR2-43					
60			J8-W	13	Y	22			SR2-44					
61			J8-X	13	Y	22			SR2-45					
62			J8-Y	13	Y	22			SR2-46					
63			J8-Z	13	Y	22			SR2-47					
64			J8-a	13	Y	22			SR2-48					
65			J8-b	13	Y	22			SR2-49					
66			J8-c	13	Y	22			SR2-50					

APOLLO G&N Specification
PS2018609 Rev A
Original Issue Date: 6/28/65
Release Authority: TDRR 20443
Class A Release

PROCUREMENT SPECIFICATION
PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS
INTERGIMBAL SUBASSEMBLY, TORQUE MOTOR, OUTER AXIS

Drawing No. 2018609

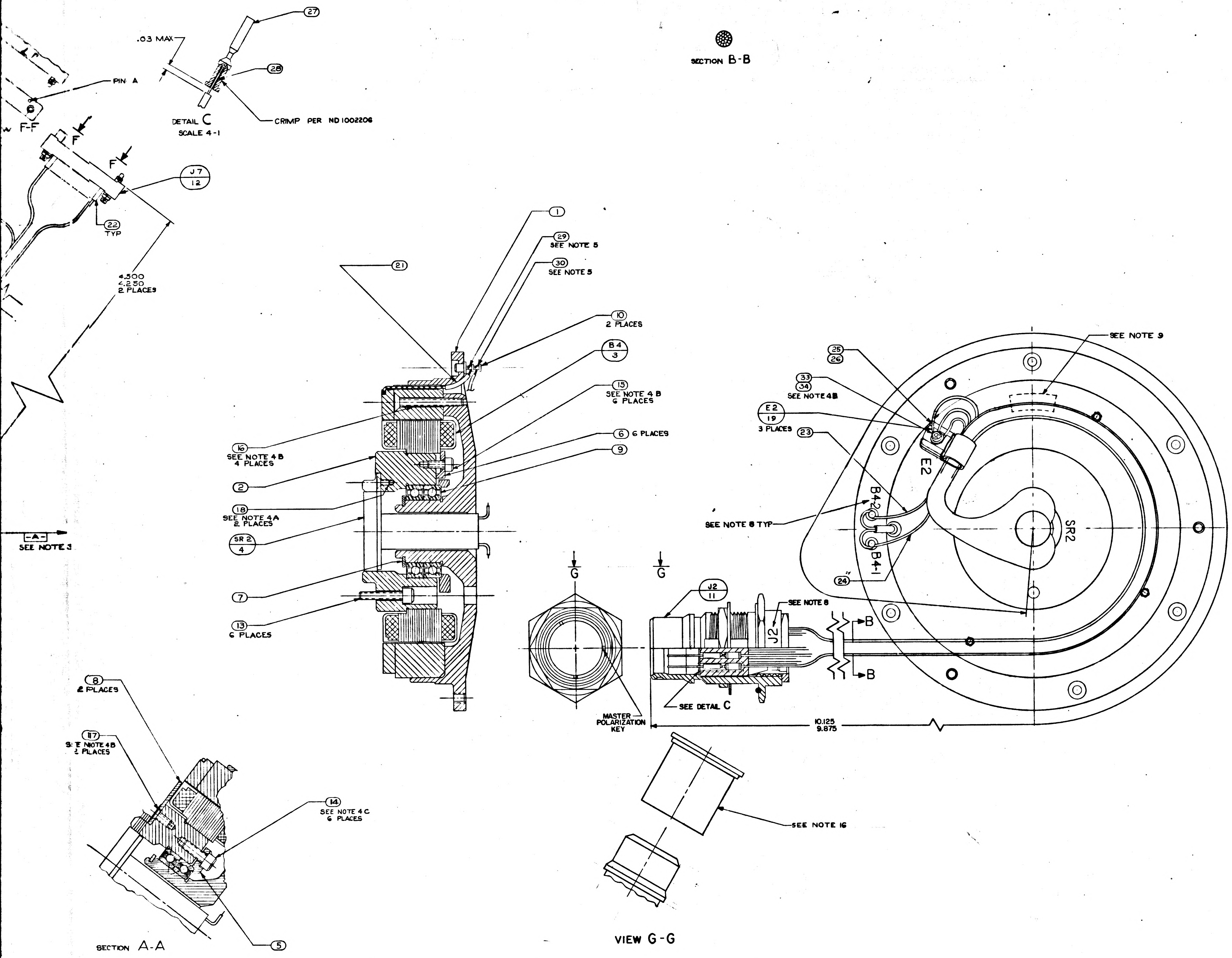
Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
7, 21/65	A	21020	4	WK	ACM

This specification consists of page 1 to 7 inclusive.

APPROVALS	NASA/MSC	23 Jun 65 MIT/IL	ACSP

REVISIONS TDRR 16813			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 17687	18 Mar 65	
B	REVISED PER TDRR 19276	2 Jun 65	



27
28
.03 MAX
PIN A
DETAIL C
SCALE 4-1
CRIMP PER ND 1002206
F-F
F
F
J7 / 12
22 TYP
4.300 / 4.250 2 PLACES
SECTION B-B
A
SEE NOTE 3
1
29 SEE NOTE 5
30 SEE NOTE 5
21
10 2 PLACES
B4 / 3
15 SEE NOTE 4 B 6 PLACES
6 6 PLACES
9
16 SEE NOTE 4 B 4 PLACES
2
18 SEE NOTE 4A 2 PLACES
SR 2 / 4
7
13 6 PLACES
8 2 PLACES
17 SEE NOTE 4B 2 PLACES
14 SEE NOTE 4 C 6 PLACES
5
SECTION A-A
G
G
J2 / 11
SEE NOTE 8
J2
MASTER POLARIZATION KEY
SEE DETAIL C
10.125 / 9.875
SEE NOTE 16
VIEW G-G
B
B
25
26
33
34
SEE NOTE 4B
E2 / 19 3 PLACES
23
SEE NOTE 8 TYP
24
E2
B4-2
B4-1
SR2
SEE NOTE 9

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	MS15795-303	WASHER, FLAT, METAL, ROUND	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	1010870	GREASE, LUBRICATING	31
A/R	QQ-S-571 SN60	SOLDER	30
A/R	QQ-S-571 SN10	SOLDER	29
61	1010862	BUSHING, SLEEVE	28
61	1010781-1	CONTACT, ELEC	27
1	1000223	WASHER, CABLE CLAMP	26
1	1000220-7	CLAMP, CABLE	25
1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	1000020-4	SHIELD & GRD ASS'Y	20
3	1000020-10	SHIELD & GRD ASS'Y	19
2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	1001489-22	SCREW, HEX SOC HD	13
2	1000122	CONNECTOR, ELEC, RECEPTACLE	12
1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	1000100-1	TERMINAL INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	2018766	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1

011 LIST OF MATERIALS

2018609 B

9h

MASTER

2018601	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	
NEXT ASSY	USED ON	MATERIAL	
APPLICATION		HEAT TREATMENT	
		FINAL FINISH	

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN R.W. Contant DATE 2-20-65
CHECKED G. QUINN 2-24-65
APPROVAL 24 Feb 65
APPROVAL
NASA APPROVAL
MIT APPROVAL 2/24/65

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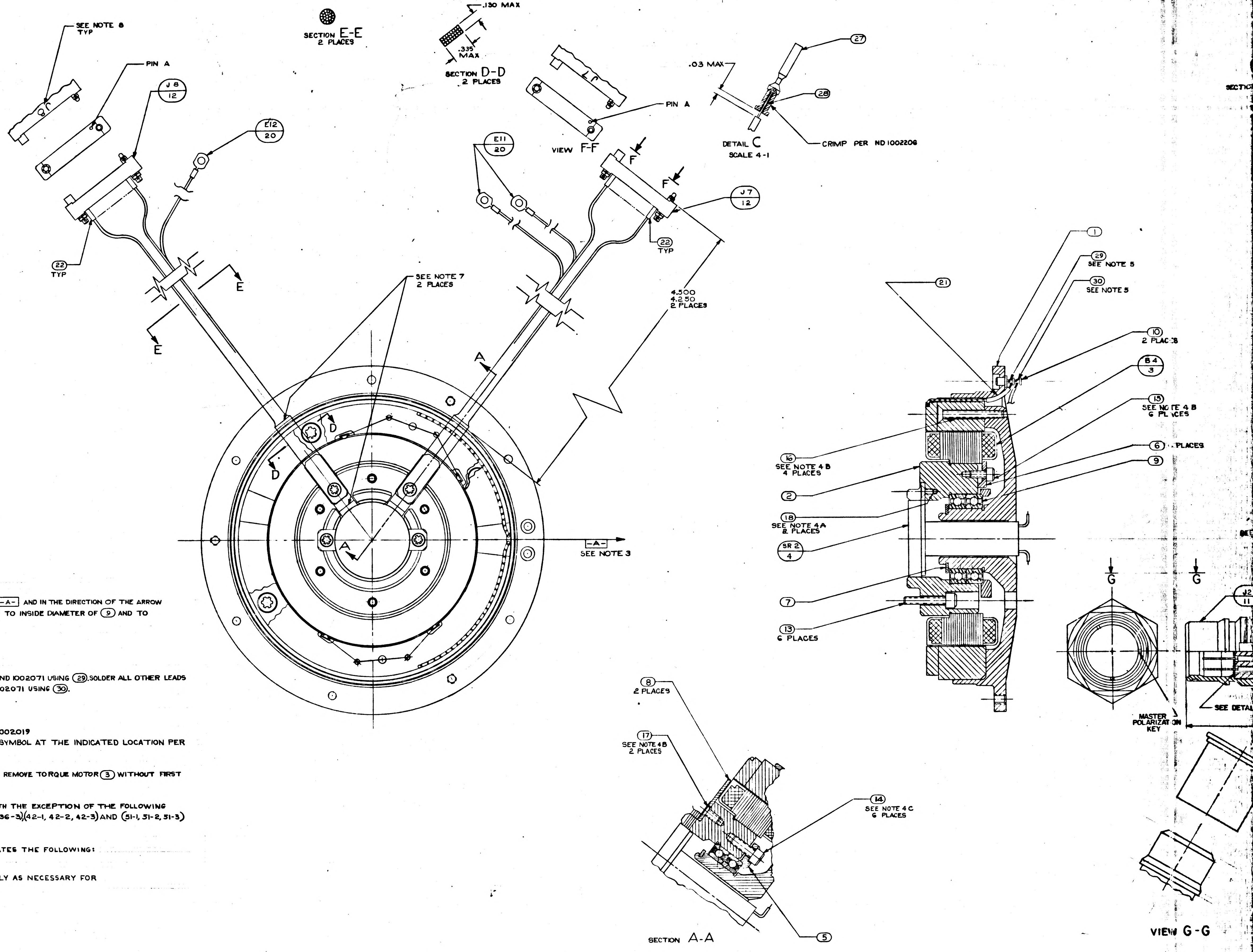
HOUSTON, TEXAS

INTER GIMBAL
SUB - ASSEMBLY
TORQUE MOTOR END
OUTER AXIS

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	J	2018609

SCALE 2-1 WT SHEET 1 OF 8

2018609 REV B SHEET 1


SEE NOTE 8 TYP
PIN A
J8 12
E12 20
22 TYP
E
E
SECTION E-E 2 PLACES
.130 MAX
.335 MAX
SECTION D-D 2 PLACES
E11 20
VIEW F-F
PIN A
F
F
J7 12
22 TYP
SEE NOTE 7 2 PLACES
4.300 4.250 2 PLACES
A
D
D
A
-A-
SEE NOTE 3
27
.03 MAX
28
DETAIL C SCALE 4-1
CRIMP PER ND1002206
1
29 SEE NOTE 5
30 SEE NOTE 5
21
10 2 PLACES
B4 3
15 SEE NOTE 4 B 6 PLACES
6 2 PLACES
9
16 SEE NOTE 4 B 4 PLACES
2
18 SEE NOTE 4A 2 PLACES
SR2 4
7
13 6 PLACES
G
G
J2 11
MASTER POLARIZATION KEY
SEE DETAIL
8 2 PLACES
17 SEE NOTE 4B 2 PLACES
14 SEE NOTE 4C 6 PLACES
5
SECTION A-A
VIEW G-G
7
6
5
4
D
C
B
A

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS 2018609
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N ~~TN~~ TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH ~~THE SAME~~ NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
   - A - SHIELD GROUND ON "FROM END"
   - B - SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION

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NASA DRAWING NO.
2018609
SHEET 2 of 8

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
1						19								
1-B			E2						SHLD 1					
1-1			J2-1	13	N				SR2-1					
1-2			J2-2	13	N				SR2-2					
1-3			J2-3	13	N				SR2-3					
2			J2-4	13	N				SR2-4					
3			J2-5	13	N				SR2-5					
4-1			J2-6	13	N				SR2-6					
4-2			J2-7	13	N				SR2-7					
5-1			J2-8	13	N				SR2-8					
5-2			J2-9	13	N				SR2-9					
6-1			J2-10	13	N				SR2-10					
6-2			J2-11	13	N				SR2-11					
7						19								
7-B			E2						SHLD 7					
7-1			J2-12	13	N				SR2-12					
7-2			J2-13	13	N				SR2-13					
7-3			J2-14	13	N				SR2-14					

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NASA DRAWING NO.
2018609
SHEET 3 of 8

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
8			J2-15	13	N				SR2-15					
9			J2-16	13	N				SR2-16					
10-1			J2-17	13	N				SR2-17					
10-2			J2-18	13	N				SR2-18					
11-1			J2-19	13	N				SR2-19					
11-2			J2-20	13	N				SR2-20					
11-3			J2-21	13	N				SR2-21					
11-4			J2-22	13	N				SR2-22					
11-5			J2-23	13	N				SR2-23					
11-6			J2-24	13	N				SR2-24					
12			J2-25	13	N				SR2-25					
13			J2-26	13	N				SR2-26					
14			J2-27	13	N				SR2-27					
15			J2-28	13	N				SR2-28					
16			J2-32	13	N				SR2-32					
17			J2-33	13	N				SR2-33					
18			J2-34	13	N				SR2-34					

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NASA DRAWING NO.
2018609
SHEET 4 of 8

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
19-1			J2-35	13	N				SR2-35					
19-2			J2-36	13	N				SR2-36					
20-1			J2-37	13	N				SR2-37					
20-2			J2-38	13	N				SR2-38					
21-1			J2-39	13	N				SR2-39					
21-2			J2-40	13	N				SR2-40					
22-1			J2-41	13	N				SR2-41					
22-2			J2-42	13	N				SR2-42					
23			J2-43	13	N				SR2-43					
24			J2-44	13	N				SR2-44					
25			J2-45	13	N				SR2-45					
26			J2-46	13	N				SR2-46					
27			J2-47	13	N				SR2-47					
28			J2-48	13	N				SR2-48					
29			J2-49	13	N				SR2-49					
30			J2-50	13	N				SR2-50					

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NASA DRAWING NO.
2018609
SHEET 5 of 8

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
31	23		J2-51	13	N				B4-1	19	Y			
32	24		J2-52	13	N				B4-2	19	Y			
33			B4-BLK						B4-1	19	Y			
34			B4-WHT						B4-2	19	Y			
35						19								
35-B			E2						SHLD 35					
35-1			J2-59	13	N				SR2-29					
35-2			J2-60	13	N				SR2-30					
35-3			J2-61	13	N				SR2-31					
36						20								
36-A			SHLD-36						E11					
36-1			J7-A	13	Y	22			SR2-1					
36-2			J7-B	13	Y	22			SR2-2					
36-3			J7-C	13	Y	22			SR2-3					
37			J7-D	13	Y	22			SR2-4					
38			J7-E	13	Y	22			SR2-5					
39-1			J7-F	13	Y	22			SR2-6					
39-2			J7-H	13	Y	22			SR2-7					

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REVISION

NASA DRAWING NO.
2018609
SHEET 6 of 8

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.
40-1			J7-J	13	Y	22		SR2-8				
40-2			J7-K	13	Y	22		SR2-9				
41-1			J7-L	13	Y	22		SR2-10				
41-2			J7-M	13	Y	22		SR2-11				
42						20						
42-A			SHLD-42					E11				
42-1			J7-N	13	Y	22		SR2-12				
42-2			J7-P	13	Y	22		SR2-13				
42-3			J7-R	13	Y	22		SR2-14				
43			J7-S	13	Y	22		SR2-15				
44			J7-T	13	Y	22		SR2-16				
45-1			J7-U	13	Y	22		SR2-17				
45-2			J7-V	13	Y	22		SR2-18				
46-1			J7-W	13	Y	22		SR2-19				
46-2			J7-X	13	Y	22		SR2-20				
46-3			J7-Y	13	Y	22		SR2-21				
46-4			J7-Z	13	Y	22		SR2-22				
46-5			J7-a	13	Y	22		SR2-23				

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REVISION

NASA DRAWING NO.
2018609
SHEET 7 of 8

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.
46-6			J7-b	13	Y	22		SR2-24				
47			J7-c	13	Y	22		SR2-25				
48			J8-A	13	Y	22		SR2-26				
49			J8-B	13	Y	22		SR2-27				
50			J8-C	13	Y	22		SR2-28				
51						20						
51-A			SHLD-51					E12				
51-1			J8-D	13	Y	22		SR2-29				
51-2			J8-E	13	Y	22		SR2-30				
51-3			J8-F	13	Y	22		SR2-31				
52			J8-H	13	Y	22		SR2-32				
53			J8-J	13	Y	22		SR2-33				
54			J8-K	13	Y	22		SR2-34				
55-1			J8-L	13	Y	22		SR2-35				
55-2			J8-M	13	Y	22		SR2-36				
56-1			J8-N	13	Y	22		SR2-37				
56-2			J8-P	13	Y	22		SR2-38				

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REVISION

NASA DRAWING NO.
2018609
SHEET 8 of 8

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.
57-1			J8-R	13	Y	22		SR2-39				
57-2			J8-S	13	Y	22		SR2-40				
58-1			J8-T	13	Y	22		SR2-41				
58-2			J8-U	13	Y	22		SR2-42				
59			J8-V	13	Y	22		SR2-43				
60			J8-W	13	Y	22		SR2-44				
61			J8-X	13	Y	22		SR2-45				
62			J8-Y	13	Y	22		SR2-46				
63			J8-Z	13	Y	22		SR2-47				
64			J8-a	13	Y	22		SR2-48				
65			J8-b	13	Y	22		SR2-49				
66			J8-c	13	Y	22		SR2-50				

APOLLO G&N Specification
PS2018609 Rev B
Original Issue Date: 6/28/65
Release Authority: TDRR 20443
Class A **Release**

PROCUREMENT SPECIFICATION
PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS
INTERGIMBAL SUBASSEMBLY, TORQUE MOTOR, OUTER AXIS

Drawing No. 2018609

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
7/21/65	A	21020	4	WK	ACM
11/9/65	B	23921	3, 7	WK	TM

This specification consists of page 1 **to** 7 **inclusive.**

APPROVALS	6/21/ NASA/MSC	28 June 65 MIT/IL	ACSP

4.2.6 Torque Motor Output.

a. With an excitation current of 0.900 ± 1% amps applied, the torque output shall be 128 in.-oz. min.

b. With an excitation current of 0.100 ± 1% amps applied, the torque output shall be 10 in.-oz. min.

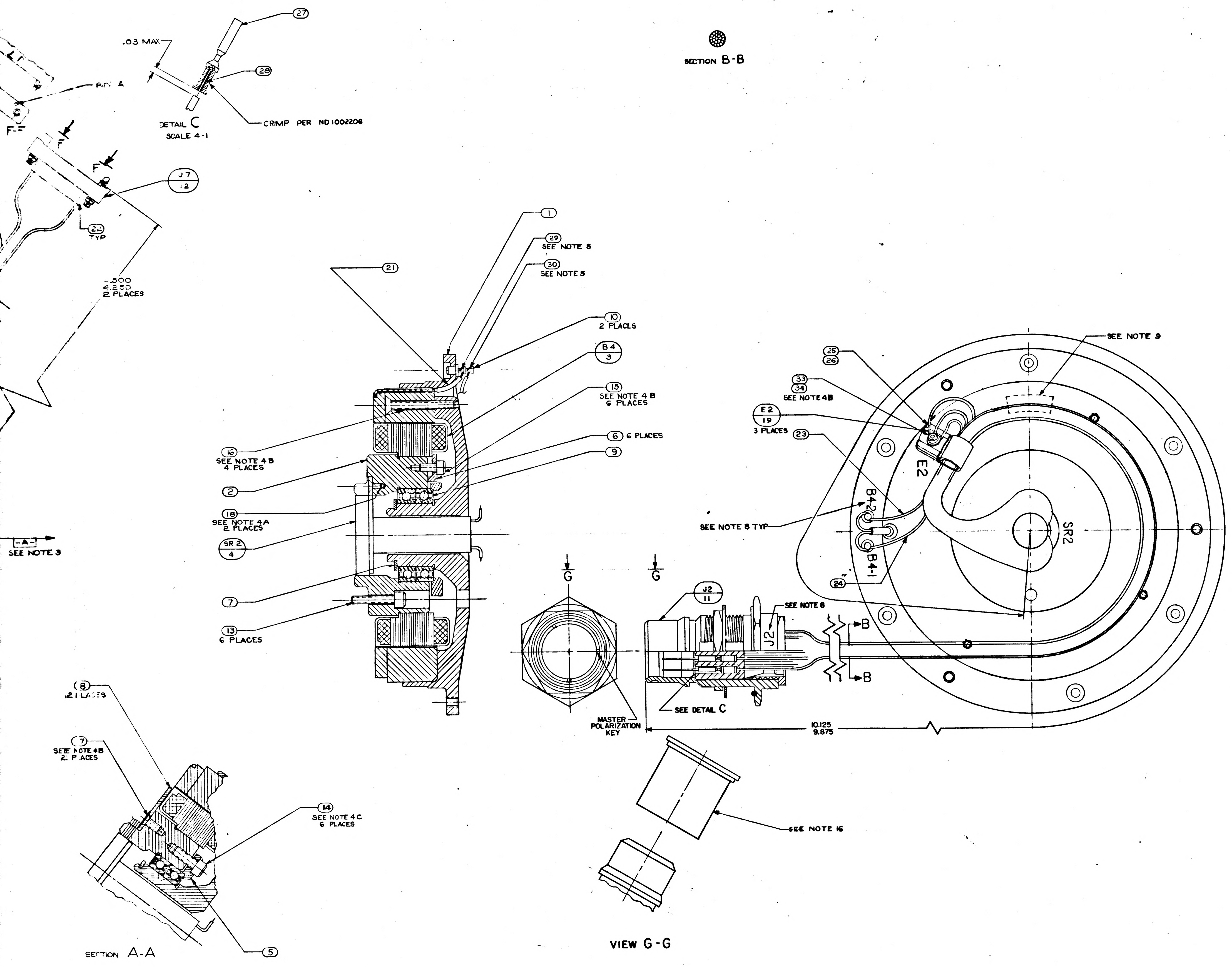
4.2.7 Torque Motor Phasing. With a minimum voltage (0 to 28 vdc) applied to pins J2-51 (hi) and J2-52 (Lo), the bearing housing shall rotate in a ccw direction as viewed from the bearing housing end.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

REVISIONS TDRR 16813			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 17687	10 Mar 65	
B	REVISED PER TDRR 19276	2 Jun 65	
C	REVISED PER TDRR 21673	31 Aug 65	



27
.03 MAX
28
PIN A
DETAIL C
SCALE 4-1
CRIMP PER ND 1002206
F
F-F
J7
12
22
TYP
.500
.250
2 PLACES
SECTION B-B
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6
6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR 2
4
A
SEE NOTE 3
7
13
6 PLACES
G
G
J2
11
SEE NOTE 8
J2
B
B
SEE DETAIL C
MASTER POLARIZATION KEY
10.125
9.875
SEE NOTE 9
25
26
33
34
SEE NOTE 4B
E2
19
3 PLACES
23
E2
B4-2
B4-1
SR2
SEE NOTE 8 TYP
24
8
2 PLACES
7
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4C
6 PLACES
5
SECTION A-A
SEE NOTE 16
VIEW G-G

1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	MS15795-303	WASHER, FLAT, METAL, ROUND	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	1010870	GREASE, LUBRICATING	31
A/R	QQ-S-571 SN60	SOLDER	30
A/R	QQ-S-571 SN10	SOLDER	29
61	1010862	BUSHING, SLEEVE	28
61	1010781-1	CONTACT, ELEC	27
1	1000223	WASHER, CABLE CLAMP	26
1	1000220-7	CLAMP, CABLE	25
1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	1000020-4	SHIELD & GRD ASS'Y	20
3	1000020-10	SHIELD & GRD ASS'Y	19
2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	1001489-22	SCREW, HEX SOC HD	13
2	1010917-106	CONNECTOR, ELEC, RECEPTACLE	12
1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	1000100-1	TERMINAL INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	2018766	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
011	LIST OF MATERIALS		

2018601	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN R.W. Contant DATE 5-20-64
CHECKED G QUINN 2-23-65
APPROVAL 24 Feb 65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

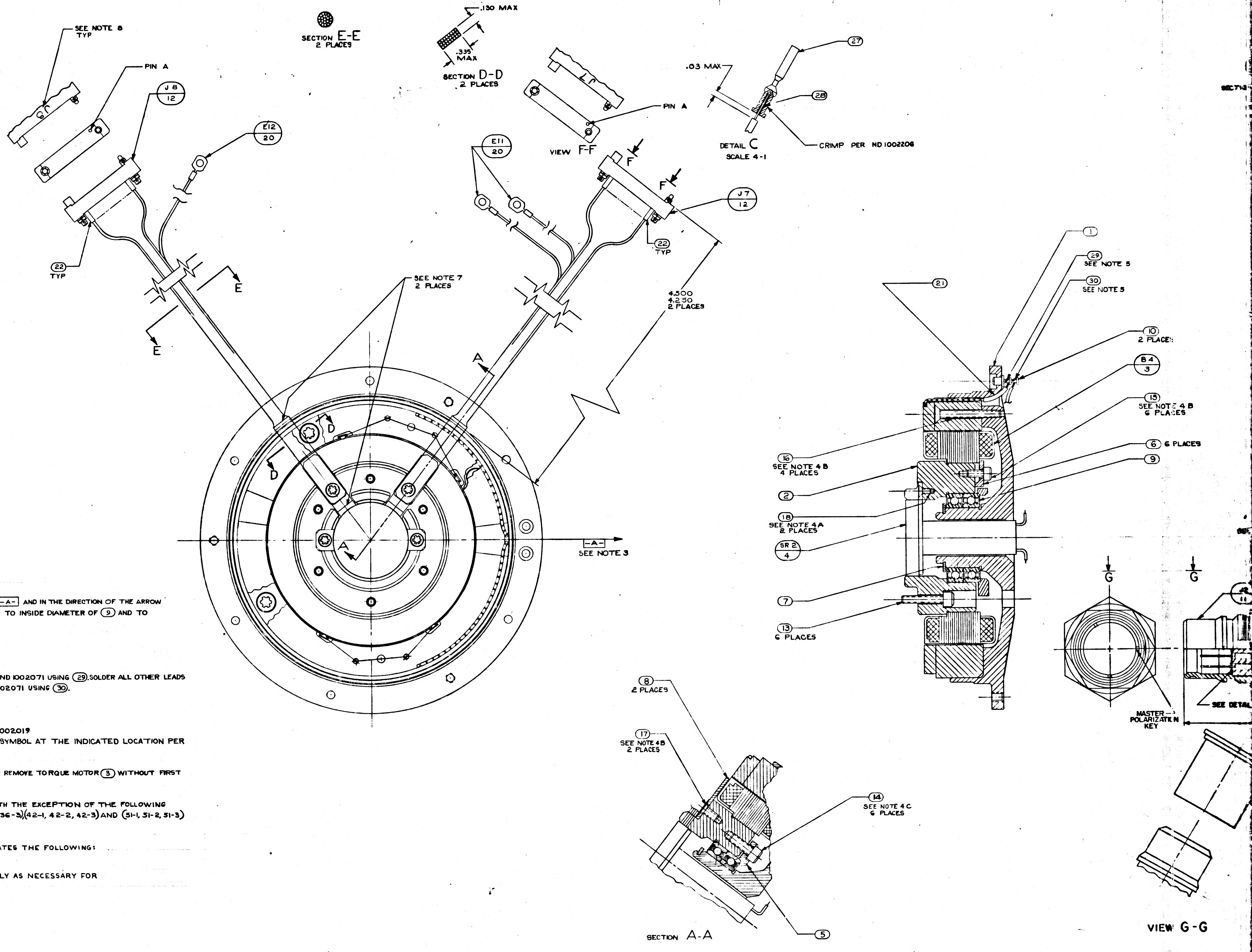
INTER GIMBAL
SUB-ASSEMBLY
TORQUE MOTOR END
OUTER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018609
SCALE 2-1
WT
SHEET 1 OF 8

2018609 C

JH

MASTER


SEE NOTE 8 TYP
PIN A
J8 12
E12 20
22 TYP
E
E
SECTION E-E 2 PLACES
.130 MAX
.335 MAX
SECTION D-D 2 PLACES
VIEW F-F
PIN A
F
F
E11 20
J7 12
22 TYP
27
.03 MAX
28
DETAIL C SCALE 4-1
CRIMP PER ND1002208
SEE NOTE 7 2 PLACES
4.300 4.250 2 PLACES
A
A
D
D
-A-
SEE NOTE 3
1
29 SEE NOTE 5
30 SEE NOTE 5
21
10 2 PLACES
B4 3
15 SEE NOTE 4B 6 PLACES
6 6 PLACES
9
16 SEE NOTE 4B 4 PLACES
2
18 SEE NOTE 4A 2 PLACES
SR2 4
7
13 6 PLACES
8 2 PLACES
17 SEE NOTE 4B 2 PLACES
14 SEE NOTE 4C 6 PLACES
5
SECTION A-A
G
G
MASTER POLARIZATION KEY
SEE DETAIL
VIEW G-G

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS 2018609
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH ~~THE SAME~~ NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION

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NASA DRAWING NO.
2018609
SHEET 2 of 8

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	FROM CIRCUIT POINT	NO.	T/N	FROM TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	NO.	T/N	TO TERMINATION SPEC FIND NO.
1		[illegible]			19				
1-B		E2				SHLD 1			
1-1		J2-1	13	N		SR2-1			
1-2		J2-2	13	N		SR2-2			
1-3		J2-3	13	N		SR2-3			
2		J2-4	13	N		SR2-4			
3		J2-5	13	N		SR2-5			
4-1		J2-6	13	N		SR2-6			
4-2		J2-7	13	N		SR2-7			
5-1		J2-8	13	N		SR2-8			
5-2		J2-9	13	N		SR2-9			
6-1		J2-10	13	N		SR2-10			
6-2		J2-11	13	N		SR2-11			
7					19				
7-B		E2				SHLD 7			
7-1		J2-12	13	N		SR2-12			
7-2		J2-13	13	N		SR2-13			
7-3		J2-14	13	N		SR2-14			

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NASA DRAWING NO.
2018609
SHEET 3 of 8

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	FROM CIRCUIT POINT	NO.	T/N	FROM TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	NO.	T/N	TO TERMINATION SPEC FIND NO.
8		J2-15	13	N		SR2-15			
9		J2-16	13	N		SR2-16			
10-1		J2-17	13	N		SR2-17			
10-2		J2-18	13	N		SR2-18			
11-1		J2-19	13	N		SR2-19			
11-2		J2-20	13	N		SR2-20			
11-3		J2-21	13	N		SR2-21			
11-4		J2-22	13	N		SR2-22			
11-5		J2-23	13	N		SR2-23			
11-6		J2-24	13	N		SR2-24			
12		J2-25	13	N		SR2-25			
13		J2-26	13	N		SR2-26			
14		J2-27	13	N		SR2-27			
15		J2-28	13	N		SR2-28			
16		J2-32	13	N		SR2-32			
17		J2-33	13	N		SR2-33			
18		J2-34	13	N		SR2-34			

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NASA DRAWING NO.
2018609
SHEET 4 of 8

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	FROM CIRCUIT POINT	NO.	T/N	FROM TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	NO.	T/N	TO TERMINATION SPEC FIND NO.
19-1		J2-35	13	N		SR2-35			
19-2		J2-36	13	N		SR2-36			
20-1		J2-37	13	N		SR2-37			
20-2		J2-38	13	N		SR2-38			
21-1		J2-39	13	N		SR2-39			
21-2		J2-40	13	N		SR2-40			
22-1		J2-41	13	N		SR2-41			
22-2		J2-42	13	N		SR2-42			
23		J2-43	13	N		SR2-43			
24		J2-44	13	N		SR2-44			
25		J2-45	13	N		SR2-45			
26		J2-46	13	N		SR2-46			
27		J2-47	13	N		SR2-47			
28		J2-48	13	N		SR2-48			
29		J2-49	13	N		SR2-49			
30		J2-50	13	N		SR2-50			

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NASA DRAWING NO.
2018609
SHEET 5 of 8

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	FROM CIRCUIT POINT	NO.	T/N	FROM TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	NO.	T/N	TO TERMINATION SPEC FIND NO.
31	23	J2-51	13	N		B4-1	19	Y	
32	24	J2-52	13	N		B4-2	19	Y	
33		B4-BLK				B4-1	19	Y	
34		B4-WHT				B4-2	19	Y	
35					19				
35-B		E2				SHLD 35			
35-1		J2-59	13	N		SR2-29			
35-2		J2-60	13	N		SR2-30			
35-3		J2-61	13	N		SR2-31			
36					20				
36-A		SHLD-36				E11			
36-1		J7-A	13	Y	22	SR2-1			
36-2		J7-B	13	Y	22	SR2-2			
36-3		J7-C	13	Y	22	SR2-3			
37		J7-D	13	Y	22	SR2-4			
38		J7-E	13	Y	22	SR2-5			
39-1		J7-F	13	Y	22	SR2-6			
39-2		J7-H	13	Y	22	SR2-7			

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
40-1		J7-J	13	Y	22		SR2-8				
40-2		J7-K	13	Y	22		SR2-9				
41-1		J7-L	13	Y	22		SR2-10				
41-2		J7-M	13	Y	22		SR2-11				
42					20						
42-A		SHLD-42					E11				
42-1		J7-N	13	Y	22		SR2-12				
42-2		J7-P	13	Y	22		SR2-13				
42-3		J7-R	13	Y	22		SR2-14				
43		J7-S	13	Y	22		SR2-15				
44		J7-T	13	Y	22		SR2-16				
45-1		J7-U	13	Y	22		SR2-17				
45-2		J7-V	13	Y	22		SR2-18				
46-1		J7-W	13	Y	22		SR2-19				
46-2		J7-X	13	Y	22		SR2-20				
46-3		J7-Y	13	Y	22		SR2-21				
46-4		J7-Z	13	Y	22		SR2-22				
46-5		J7-a	13	Y	22		SR2-23				

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NASA DRAWING NO.
2018609
SHEET 6 of 8

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
46-6		J7-b	13	Y	22		SR2-24				
47		J7-c	13	Y	22		SR2-25				
48		J8-A	13	Y	22		SR2-26				
49		J8-B	13	Y	22		SR2-27				
50		J8-C	13	Y	22		SR2-28				
51					20						
51-A		SHLD-51					E12				
51-1		J8-D	13	Y	22		SR2-29				
51-2		J8-E	13	Y	22		SR2-30				
51-3		J8-F	13	Y	22		SR2-31				
52		J8-H	13	Y	22		SR2-32				
53		J8-J	13	Y	22		SR2-33				
54		J8-K	13	Y	22		SR2-34				
55-1		J8-L	13	Y	22		SR2-35				
55-2		J8-M	13	Y	22		SR2-36				
56-1		J8-N	13	Y	22		SR2-37				
56-2		J8-P	13	Y	22		SR2-38				

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NASA DRAWING NO.
2018609
SHEET 7 of 8

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
57-1		J8-R	13	Y	22		SR2-39				
57-2		J8-S	13	Y	22		SR2-40				
58-1		J8-T	13	Y	22		SR2-41				
58-2		J8-U	13	Y	22		SR2-42				
59		J8-V	13	Y	22		SR2-43				
60		J8-W	13	Y	22		SR2-44				
61		J8-X	13	Y	22		SR2-45				
62		J8-Y	13	Y	22		SR2-46				
63		J8-Z	13	Y	22		SR2-47				
64		J8-a	13	Y	22		SR2-48				
65		J8-b	13	Y	22		SR2-49				
66		J8-c	13	Y	22		SR2-50				

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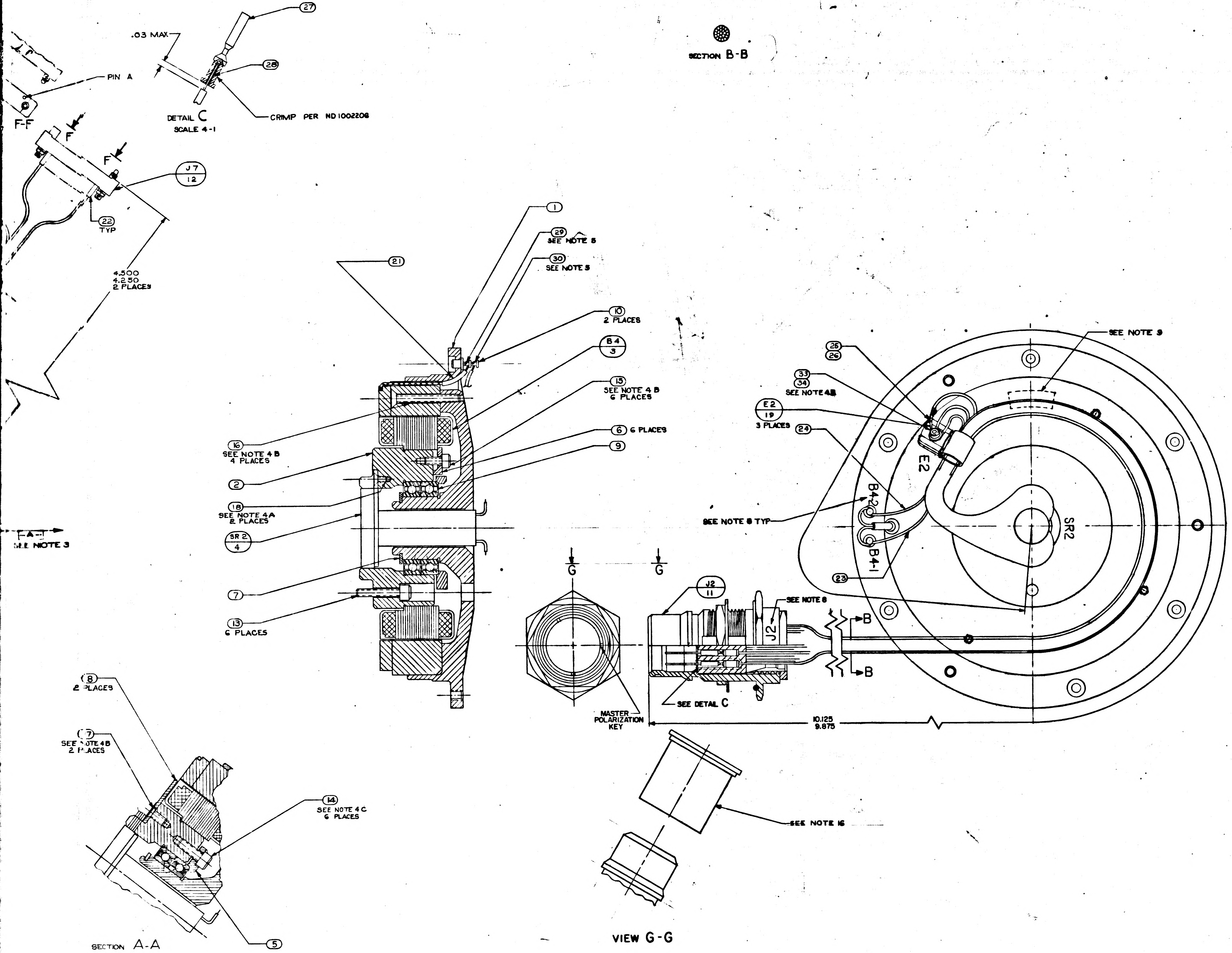
REVISION

NASA DRAWING NO.
2018609
SHEET 8 of 8

REVISIONS TDRR 16813			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 17687	18Mar65	
B	REVISED PER TDRR 19276	2Jun65	
C	REVISED PER TDRR 21673	31Aug65	
D	REVISED PER TDRR 22595	28Sep65	



SECTION B-B
27
.03 MAX
PIN A
28
DETAIL C
SCALE 4-1
CRIMP PER ND 1002206
F-F
F
F
J7
12
22
TYP
4.500
4.250
2 PLACES
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6
6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
A
SEE NOTE 3
SR 2
4
7
13
6 PLACES
SEE NOTE 9
26
26
33
34
SEE NOTE 4B
E2
19
3 PLACES
24
E2
B4-2
B4-1
SR2
SEE NOTE 8 TYP
23
G
G
J2
11
SEE NOTE 8
J2
B
B
SEE DETAIL C
MASTER POLARIZATION KEY
10.125
9.875
8
2 PLACES
17
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4 C
6 PLACES
SEE NOTE 16
5
SECTION A-A
VIEW G-G

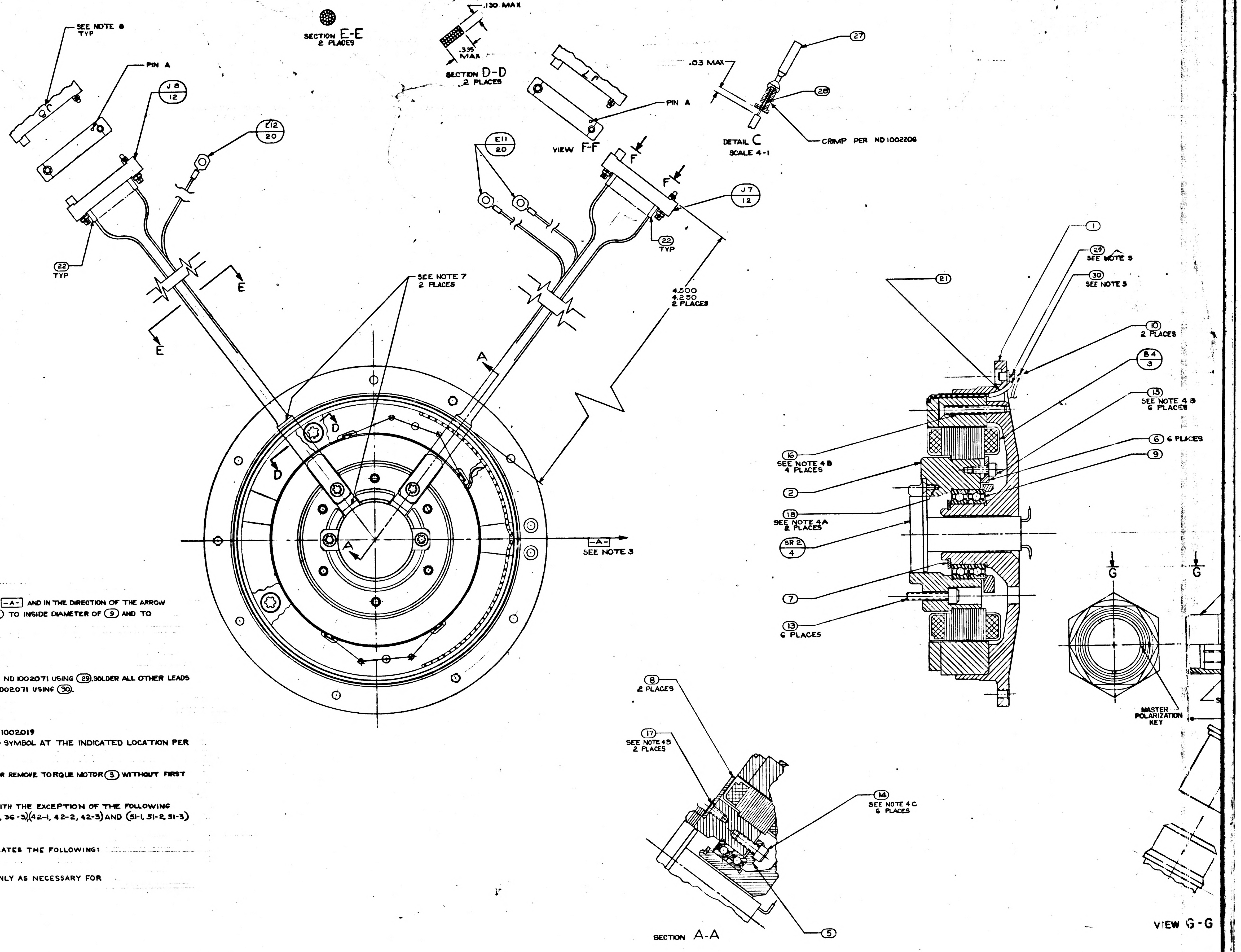
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	MS15795-303	WASHER, FLAT, METAL, ROUND	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	1010870	GREASE, LUBRICATING	31
A/R	QQ-S-571 SN60	SOLDER	30
A/R	QQ-S-571 SN10	SOLDER	29
61	1010862	BUSHING, SLEEVE	28
61	1010781-1	CONTACT, ELEC	27
1	1000223	WASHER, CABLE CLAMP	26
1	1000220-7	CLAMP, CABLE	25
1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	1000020-4	SHIELD & GRD ASS'Y	20
3	1000020-10	SHIELD & GRD ASS'Y	19
2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	1001489-22	SCREW, HEX SOC HD	13
2	1010917-106	CONNECTOR, ELEC, RECEPTACLE	12
1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	1000100-1	TERMINAL INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	2018768	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1
011	LIST OF MATERIALS		

2018601	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± // DECIMALS ± // ANGLES ± // DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB Cambridge, Mass DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	MATERIAL //	DRAWN R.W. Cournoyer DATE 5-29-64 CHECKED G QUINN 2-24-65 APPROVAL 24Feb65 APPROVAL	INTER GIMBAL SUB-ASSEMBLY TORQUE MOTOR END OUTER AXIS
APPLICATION		HEAT TREATMENT // FINAL FINISH //	NASA APPROVAL MIT APPROVAL	CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018609 SCALE 2-1 WT SHEET 1 OF 8

MASTER

2018609 REV D SHEET 1

2018609 D


SEE NOTE 8
TYP
PIN A
J8
12
E12
20
22
TYP
E
E
SECTION E-E
2 PLACES
.130 MAX
.335
MAX
SECTION D-D
2 PLACES
PIN A
VIEW F-F
E11
20
F
F
J7
12
22
TYP
.03 MAX
27
28
DETAIL C
SCALE 4-1
CRIMP PER ND1002206
SEE NOTE 7
2 PLACES
4.500
4.250
2 PLACES
A
D
D
A
-A-
SEE NOTE 3
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6 6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR2
4
7
13
6 PLACES
G
G
MASTER
POLARIZATION
KEY
8
2 PLACES
17
SEE NOTE 4 B
2 PLACES
14
SEE NOTE 4 C
6 PLACES
5
SECTION A-A
VIEW G-G

NOTES
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS 2018609
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N ~~IN~~ TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH ~~THE SAME~~ NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION

2018609	REV D	SHEET 1

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NASA DRAWING NO.
2018609
SHEET 2 of 8

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM: CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.	TO: CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.
1					19						
1-B		E2					SHLD 1				
1-1		J2-1	13	N			SR2-1				
1-2		J2-2	13	N			SR2-2				
1-3		J2-3	13	N			SR2-3				
2		J2-4	13	N			SR2-4				
3		J2-5	13	N			SR2-5				
4-1		J2-6	13	N			SR2-6				
4-2		J2-7	13	N			SR2-7				
5-1		J2-8	13	N			SR2-8				
5-2		J2-9	13	N			SR2-9				
6-1		J2-10	13	N			SR2-10				
6-2		J2-11	13	N			SR2-11				
7					19						
7-B		E2					SHLD 7				
7-1		J2-12	13	N			SR2-12				
7-2		J2-13	13	N			SR2-13				
7-3		J2-14	13	N			SR2-14				

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SHEET 3 of 8

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM: CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.	TO: CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.
8		J2-15	13	N			SR2-15				
9		J2-16	13	N			SR2-16				
10-1		J2-17	13	N			SR2-17				
10-2		J2-18	13	N			SR2-18				
11-1		J2-19	13	N			SR2-19				
11-2		J2-20	13	N			SR2-20				
11-3		J2-21	13	N			SR2-21				
11-4		J2-22	13	N			SR2-22				
11-5		J2-23	13	N			SR2-23				
11-6		J2-24	13	N			SR2-24				
12		J2-25	13	N			SR2-25				
13		J2-26	13	N			SR2-26				
14		J2-27	13	N			SR2-27				
15		J2-28	13	N			SR2-28				
16		J2-32	13	N			SR2-32				
17		J2-33	13	N			SR2-33				
18		J2-34	13	N			SR2-34				

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SHEET 4 of 8

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM: CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.	TO: CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.
19-1		J2-35	13	N			SR2-35				
19-2		J2-36	13	N			SR2-36				
20-1		J2-37	13	N			SR2-37				
20-2		J2-38	13	N			SR2-38				
21-1		J2-39	13	N			SR2-39				
21-2		J2-40	13	N			SR2-40				
22-1		J2-41	13	N			SR2-41				
22-2		J2-42	13	N			SR2-42				
23		J2-43	13	N			SR2-43				
24		J2-44	13	N			SR2-44				
25		J2-45	13	N			SR2-45				
26		J2-46	13	N			SR2-46				
27		J2-47	13	N			SR2-47				
28		J2-48	13	N			SR2-48				
29		J2-49	13	N			SR2-49				
30		J2-50	13	N			SR2-50				

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NASA DRAWING NO.
2018609
SHEET 5 of 8

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM: CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.	TO: CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.
31	23	J2-51	13	N			B4-1	19	Y		
32	24	J2-52	13	N			B4-2	19	Y		
33		B4-BLK					B4-1	19	Y		
34		B4-WHT					B4-2	19	Y		
35					19						
35-B		E2					SHLD 35				
35-1		J2-59	13	N			SR2-29				
35-2		J2-60	13	N			SR2-30				
35-3		J2-61	13	N			SR2-31				
36					20						
36-A		SHLD-36					E11				
36-1		J7-A	13	Y	22		SR2-1				
36-2		J7-B	13	Y	22		SR2-2				
36-3		J7-C	13	Y	22		SR2-3				
37		J7-D	13	Y	22		SR2-4				
38		J7-E	13	Y	22		SR2-5				
39-1		J7-F	13	Y	22		SR2-6				
39-2		J7-H	13	Y	22		SR2-7				

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NASA DRAWING NO.
2018609
SHEET 6 of 8

CONDUCTOR			FROM							TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION FIND	NO.	SPEC	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TERMINATION FIND	NO.	SPEC	NO.
40-1			J7-J	13Y			22			SR2-8					
40-2			J7-K	13Y			22			SR2-9					
41-1			J7-L	13Y			22			SR2-10					
41-2			J7-M	13Y			22			SR2-11					
42							20								
42-A			SHLD-42							E11					
42-1			J7-N	13Y			22			SR2-12					
42-2			J7-P	13Y			22			SR2-13					
42-3			J7-R	13Y			22			SR2-14					
43			J7-S	13Y			22			SR2-15					
44			J7-T	13Y			22			SR2-16					
45-1			J7-U	13Y			22			SR2-17					
45-2			J7-V	13Y			22			SR2-18					
46-1			J7-W	13Y			22			SR2-19					
46-2			J7-X	13Y			22			SR2-20					
46-3			J7-Y	13Y			22			SR2-21					
46-4			J7-Z	13Y			22			SR2-22					
46-5			J7-a	13Y			22			SR2-23					

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NASA DRAWING NO.
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SHEET 7 of 8

CONDUCTOR			FROM							TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION FIND	NO.	SPEC	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TERMINATION FIND	NO.	SPEC	NO.
46-6			J7-b	13Y			22			SR2-24					
47			J7-c	13Y			22			SR2-25					
48			J8-A	13Y			22			SR2-26					
49			J8-B	13Y			22			SR2-27					
50			J8-C	13Y			22			SR2-28					
51							20								
51-A			SHLD-51							E12					
51-1			J8-D	13Y			22			SR2-29					
51-2			J8-E	13Y			22			SR2-30					
51-3			J8-F	13Y			22			SR2-31					
52			J8-H	13Y			22			SR2-32					
53			J8-J	13Y			22			SR2-33					
54			J8-K	13Y			22			SR2-34					
55-1			J8-L	13Y			22			SR2-35					
55-2			J8-M	13Y			22			SR2-36					
56-1			J8-N	13Y			22			SR2-37					
56-2			J8-P	13Y			22			SR2-38					

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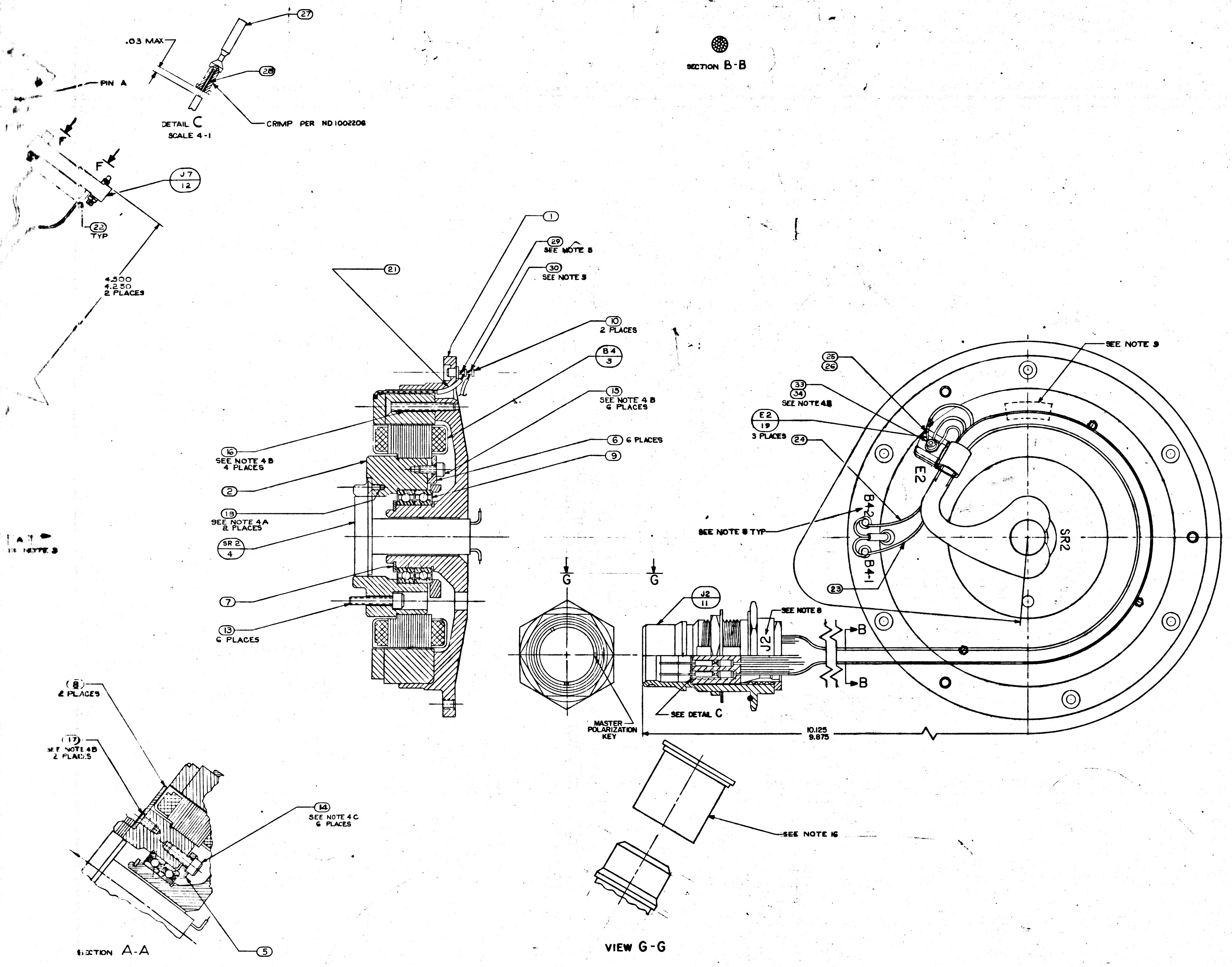
NASA DRAWING NO.
2018609
SHEET 8 of 8

CONDUCTOR			FROM							TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION FIND	NO.	SPEC	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TERMINATION FIND	NO.	SPEC	NO.
57-1			J8-R	13Y			22			SR2-39					
57-2			J8-S	13Y			22			SR2-40					
58-1			J8-T	13Y			22			SR2-41					
58-2			J8-U	13Y			22			SR2-42					
59			J8-V	13Y			22			SR2-43					
60			J8-W	13Y			22			SR2-44					
61			J8-X	13Y			22			SR2-45					
62			J8-Y	13Y			22			SR2-46					
63			J8-Z	13Y			22			SR2-47					
64			J8-a	13Y			22			SR2-48					
65			J8-b	13Y			22			SR2-49					
66			J8-c	13Y			22			SR2-50					

SYM	REVISIONS TDRR 16613 DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 17687	18 May 65		WK
B	REVISED PER TDRR 19276	2 Jun 65		WK
C	REVISED PER TDRR 21673	31 Aug 65		WK
D	REVISED PER TDRR 22595	28 Sep 65		WK
E	REVISED PER TDRR 26249	2-1-66		WK
F	REVISED PER TDRR 26254	23 Feb 66		WK



27
.03 MAX
28
PIN A
DETAIL C
SCALE 4-1
CRIMP PER ND 1002206
SECTION B-B
F
F
J7
12
22
TYP
4.500
4.250
2 PLACES
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6 6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
19
SEE NOTE 4 A
8 PLACES
SR 2
4
7
13
6 PLACES
G
G
J2
11
SEE NOTE 8
B
B
J2
MASTER
POLARIZATION
KEY
SEE DETAIL C
10.125
9.875
SEE NOTE 9
25
26
33
34
SEE NOTE 4 B
E2
19
3 PLACES
24
E2
B4-2
B4-1
SR2
SEE NOTE 8 TYP
23
8
2 PLACES
17
SEE NOTE 4 B
2 PLACES
14
SEE NOTE 4 C
6 PLACES
5
SECTION A-A
SEE NOTE 16
VIEW G-G

A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
1	1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	1	MS15795-303	WASHER, FLAT, METAL, ROUND	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	A/R	1010870	GREASE, LUBRICATING	31
A/R	A/R	QQ-S-571 SN60	SOLDER	30
A/R	A/R	QQ-S-571 SN10	SOLDER	29
61	61	1010862	BUSHING, SLEEVE	28
61	61	1010781-1	CONTACT, ELEC	27
1	1	1000223	WASHER, CABLE CLAMP	26
1	1	1000220-7	CLAMP, CABLE	25
1	1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	3	1000020-4	SHIELD & GRD ASS'Y	20
3	3	1000020-10	SHIELD & GRD ASS'Y	19
2	2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	6	1001489-22	SCREW, HEX SOC HD	13
2	2	1010917-106	CONNECTOR, ELEC, RECEPTACLE	12
1	1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	2	1000100-1	TERMINAL, INSULATED	10
1	1	2018621	BALL BEARING DUPLEX	9
2	2	2018731	CLIP WIRE RETAINER	8
1	1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	1	2018768	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

2018601	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± -/- DECIMALS ± -/- ANGLES ± -/-
DO NOT SCALE THIS DRAWING
MATERIAL -/-
HEAT TREATMENT -/-
FINAL FINISH -/-

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.W. Connolly DATE 2-20-65
CHECKED G. QUINN 2-24-65
APPROVAL 24 Feb 65
APPROVAL -

NASA APPROVAL
MIT APPROVAL

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INTER GIMBAL SUB-ASSEMBLY
TORQUE MOTOR END
OUTER AXIS

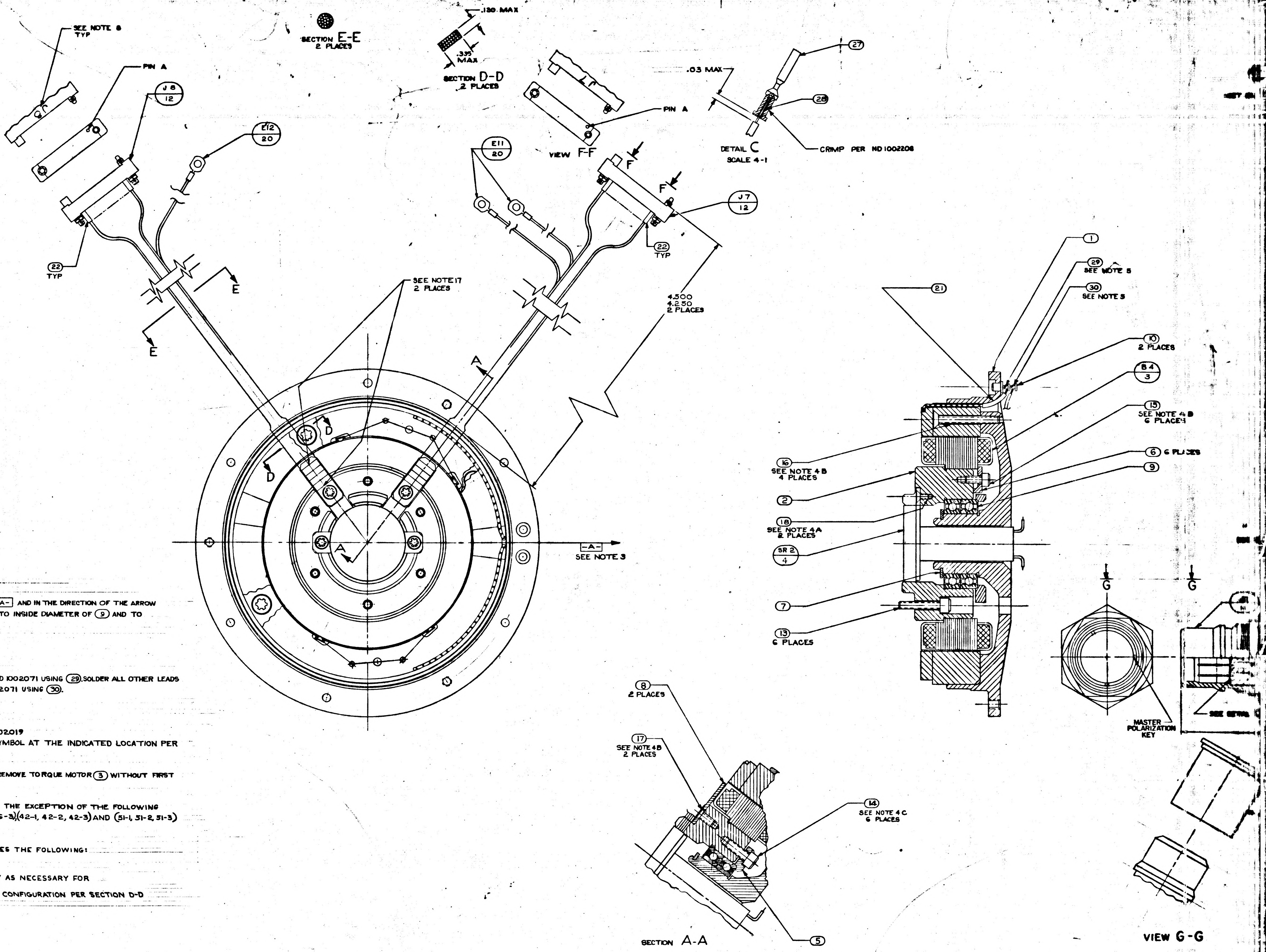
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018609
SCALE 2-1
WT
SHEET 1 OF 15

MASTER

JH

2018609 REV F SHEET 1

E-2


SEE NOTE 8 TYP
PIN A
J8
12
E12
20
SECTION E-E
2 PLACES
.130 MAX
.335 MAX
SECTION D-D
2 PLACES
.03 MAX
㉗
㉘
DETAIL C
SCALE 4-1
CRIMP PER ND1002208
PIN A
VIEW F-F
E11
20
F
F
J7
12
㉒ TYP
㉒ TYP
SEE NOTE 17
2 PLACES
4.500
4.250
2 PLACES
E
E
A
D
D
A
-A-
SEE NOTE 3
①
㉙ SEE NOTE 5
㉚ SEE NOTE 5
㉑
⑩ 2 PLACES
B4
3
⑮ SEE NOTE 4 B 6 PLACES
⑥ 6 PLACES
⑨
⑯ SEE NOTE 4 B 4 PLACES
②
⑱ SEE NOTE 4A 2 PLACES
SR 2
4
⑦
⑬ 6 PLACES
G
G
MASTER POLARIZATION KEY
⑧ 2 PLACES
⑰ SEE NOTE 4B 2 PLACES
⑭ SEE NOTE 4 C 6 PLACES
⑤
SECTION A-A
VIEW G-G

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS 2018609 FOR -011 CONFIGURATION OR PS 2016146 FOR -021 CONFIGURATION
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N ~~TN~~ TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH ~~THE SAME~~ NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION
17. TAPE HARNESS IN AREA INDICATED USING ITEM ㉟ TO MAINTAIN HARNESS CONFIGURATION PER SECTION D-D AND SECURE HARNESS TO ITEM ⑧ WITH ITEM ㉟

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REVISION F

NASA DRAWING NO. 2018609-011
SHEET 2 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION FIND NO.	SPEC	NO.
1						19								
1-B			E2						SHLD 1					
1-1			J2-1	13	N				SR2-1					
1-2			J2-2	13	N				SR2-2					
1-3			J2-3	13	N				SR2-3					
2			J2-4	13	N				SR2-4					
3			J2-5	13	N				SR2-5					
4-1			J2-6	13	N				SR2-6					
4-2			J2-7	13	N				SR2-7					
5-1			J2-8	13	N				SR2-8					
5-2			J2-9	13	N				SR2-9					
6-1			J2-10	13	N				SR2-10					
6-2			J2-11	13	N				SR2-11					
7						19								
7-B			E2						SHLD 7					
7-1			J2-12	13	N				SR2-12					
7-2			J2-13	13	N				SR2-13					
7-3			J2-14	13	N				SR2-14					

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REVISION F

NASA DRAWING NO. 2018609-011
SHEET 3 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION FIND NO.	SPEC	NO.
8			J2-15	13	N				SR2-15					
9			J2-16	13	N				SR2-16					
10-1			J2-17	13	N				SR2-17					
10-2			J2-18	13	N				SR2-18					
11-1			J2-19	13	N				SR2-19					
11-2			J2-20	13	N				SR2-20					
11-3			J2-21	13	N				SR2-21					
11-4			J2-22	13	N				SR2-22					
11-5			J2-23	13	N				SR2-23					
11-6			J2-24	13	N				SR2-24					
12			J2-25	13	N				SR2-25					
13			J2-26	13	N				SR2-26					
14			J2-27	13	N				SR2-27					
15			J2-28	13	N				SR2-28					
16			J2-32	13	N				SR2-32					
17			J2-33	13	N				SR2-33					
18			J2-34	13	N				SR2-34					

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REVISION F

NASA DRAWING NO. 2018609-011
SHEET 4 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION FIND NO.	SPEC	NO.
19-1			J2-35	13	N				SR2-35					
19-2			J2-36	13	N				SR2-36					
20-1			J2-37	13	N				SR2-37					
20-2			J2-38	13	N				SR2-38					
21-1			J2-39	13	N				SR2-39					
21-2			J2-40	13	N				SR2-40					
22-1			J2-41	13	N				SR2-41					
22-2			J2-42	13	N				SR2-42					
23			J2-43	13	N				SR2-43					
24			J2-44	13	N				SR2-44					
25			J2-45	13	N				SR2-45					
26			J2-46	13	N				SR2-46					
27			J2-47	13	N				SR2-47					
28			J2-48	13	N				SR2-48					
29			J2-49	13	N				SR2-49					
30			J2-50	13	N				SR2-50					

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REVISION F

NASA DRAWING NO. 2018609-011
SHEET 5 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION FIND NO.	SPEC	NO.
31	23		J2-51	13	N				B4-1	19	Y			
32	24		J2-52	13	N				B4-2	19	Y			
33			B4-BLK						B4-1	19	Y			
34			B4-WHT						B4-2	19	Y			
35						19								
35-B			E2						SHLD 35					
35-1			J2-59	13	N				SR2-29					
35-2			J2-60	13	N				SR2-30					
35-3			J2-61	13	N				SR2-31					
36						20								
36-A			SHLD-36						E11					
36-1			J7-A	13	Y	22			SR2-1					
36-2			J7-B	13	Y	22			SR2-2					
36-3			J7-C	13	Y	22			SR2-3					
37			J7-D	13	Y	22			SR2-4					
38			J7-E	13	Y	22			SR2-5					
39-1			J7-F	13	Y	22			SR2-6					
39-2			J7-H	13	Y	22			SR2-7					

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NASA DRAWING NO. 2018609-011
SHEET 6 of 15

CONDUCTOR FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	STRIP	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT
40-1		J7-J	13	Y	22	SR2-8
40-2		J7-K	13	Y	22	SR2-9
41-1		J7-L	13	Y	22	SR2-10
41-2		J7-M	13	Y	22	SR2-11
42					20	
42-A		SHLD-42				E11
42-1		J7-N	13	Y	22	SR2-12
42-2		J7-P	13	Y	22	SR2-13
42-3		J7-R	13	Y	22	SR2-14
43		J7-S	13	Y	22	SR2-15
44		J7-T	13	Y	22	SR2-16
45-1		J7-U	13	Y	22	SR2-17
45-2		J7-V	13	Y	22	SR2-18
46-1		J7-W	13	Y	22	SR2-19
46-2		J7-X	13	Y	22	SR2-20
46-3		J7-Y	13	Y	22	SR2-21
46-4		J7-Z	13	Y	22	SR2-22
46-5		J7-a	13	Y	22	SR2-23

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NASA DRAWING NO. 2018609-011
SHEET 7 of 15

CONDUCTOR FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	STRIP	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT
46-6		J7-b	13	Y	22	SR2-24
47		J7-c	13	Y	22	SR2-25
48		J8-A	13	Y	22	SR2-26
49		J8-B	13	Y	22	SR2-27
50		J8-C	13	Y	22	SR2-28
51					20	
51-A		SHLD-51				E12
51-1		J8-D	13	Y	22	SR2-29
51-2		J8-E	13	Y	22	SR2-30
51-3		J8-F	13	Y	22	SR2-31
52		J8-H	13	Y	22	SR2-32
53		J8-J	13	Y	22	SR2-33
54		J8-K	13	Y	22	SR2-34
55-1		J8-L	13	Y	22	SR2-35
55-2		J8-M	13	Y	22	SR2-36
56-1		J8-N	13	Y	22	SR2-37
56-2		J8-P	13	Y	22	SR2-38

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NASA DRAWING NO. 2018609-011
SHEET 8 of 15

CONDUCTOR FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	STRIP	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT
57-1		J8-R	13	Y	22	SR2-39
57-2		J8-S	13	Y	22	SR2-40
58-1		J8-T	13	Y	22	SR2-41
58-2		J8-U	13	Y	22	SR2-42
59		J8-V	13	Y	22	SR2-43
60		J8-W	13	Y	22	SR2-44
61		J8-X	13	Y	22	SR2-45
62		J8-Y	13	Y	22	SR2-46
63		J8-Z	13	Y	22	SR2-47
64		J8-a	13	Y	22	SR2-48
65		J8-b	13	Y	22	SR2-49
66		J8-c	13	Y	22	SR2-50

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NASA DRAWING NO. 2018609-011
SHEET 9 of 15

CONDUCTOR FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	STRIP	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT
1					19	
1-B		E2				SHLD 1
1-1		J2-1	13	N		SR2-1
1-2		J2-2	13	N		SR2-2
1-3		J2-3	13	N		SR2-3
2		J2-4	13	N		SR2-4
3		J2-5	13	N		SR2-5
4-1		J2-8	13	N		SR2-6
4-2		J2-9	13	N		SR2-7
5-1		J2-6	13	N		SR2-8
5-2		J2-7	13	N		SR2-9
6-1		J2-11	13	N		SR2-10
6-2		J2-10	13	N		SR2-11
7					19	
7-B		E2				SHLD 7
7-1		J2-12	13	N		SR2-12
7-2		J2-13	13	N		SR2-13
7-3		J2-14	13	N		SR2-14

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NASA DRAWING NO.
2018609-021
SHEET 10 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN	TO TERMINATION SPEC FIND NO.	TO NO.
8		J2-15	13	N			SR2-15				
9		J2-16	13	N			SR2-16				
10-1		J2-17	13	N			SR2-17				
10-2		J2-18	13	N			SR2-18				
11-1		J2-20	13	N			SR2-19				
11-2		J2-19	13	N			SR2-20				
11-3		J2-21	13	N			SR2-21				
11-4		J2-22	13	N			SR2-22				
11-5		J2-23	13	N			SR2-23				
11-6		J2-24	13	N			SR2-24				
12		J2-25	13	N			SR2-25				
13		J2-26	13	N			SR2-26				
14		J2-27	13	N			SR2-27				
15		J2-28	13	N			SR2-28				
16		J2-32	13	N			SR2-32				
17		J2-33	13	N			SR2-33				
18		J2-34	13	N			SR2-34				

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NASA DRAWING NO.
2018609-021
SHEET 11 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN	TO TERMINATION SPEC FIND NO.	TO NO.
19-1		J2-35	13	N			SR2-35				
19-2		J2-36	13	N			SR2-36				
20-1		J2-37	13	N			SR2-37				
20-2		J2-38	13	N			SR2-38				
21-1		J2-39	13	N			SR2-39				
21-2		J2-40	13	N			SR2-40				
22-1		J2-41	13	N			SR2-41				
22-2		J2-42	13	N			SR2-42				
23		J2-43	13	N			SR2-43				
24		J2-44	13	N			SR2-44				
25		J2-45	13	N			SR2-45				
26		J2-46	13	N			SR2-46				
27		J2-47	13	N			SR2-47				
28		J2-48	13	N			SR2-48				
29		J2-49	13	N			SR2-49				
30		J2-50	13	N			SR2-50				

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NASA DRAWING NO.
2018609-021
SHEET 12 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN	TO TERMINATION SPEC FIND NO.	TO NO.
31	23	J2-51	13	N			B4-1	19	Y		
32	24	J2-52	13	N			B4-2	19	Y		
33		B4-BLK					B4-1	19	Y		
34		B4-WHT					B4-2	19	Y		
35					19						
35-B		E2					SHLD 35				
35-1		J2-59	13	N			SR2-29				
35-2		J2-60	13	N			SR2-30				
35-3		J2-61	13	N			SR2-31				
36					20						
36-A		SHLD-36					E11				
36-1		J7-A	13	Y	22		SR2-1				
36-2		J7-B	13	Y	22		SR2-2				
36-3		J7-C	13	Y	22		SR2-3				
37		J7-D	13	Y	22		SR2-4				
38		J7-E	13	Y	22		SR2-5				
39-1		J7-F	13	Y	22		SR2-6				
39-2		J7-H	13	Y	22		SR2-7				

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NASA DRAWING NO.
2018609-021
SHEET 13 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN	TO TERMINATION SPEC FIND NO.	TO NO.
40-1		J7-J	13	Y	22		SR2-8				
40-2		J7-K	13	Y	22		SR2-9				
41-1		J7-L	13	Y	22		SR2-10				
41-1		J7-M	13	Y	22		SR2-11				
42					20						
42-A		SHLD-42					E11				
42-1		J7-N	13	Y	22		SR2-12				
42-2		J7-P	13	Y	22		SR2-13				
42-3		J7-R	13	Y	22		SR2-14				
43		J7-S	13	Y	22		SR2-15				
44		J7-T	13	Y	22		SR2-16				
45-1		J7-U	13	Y	22		SR2-17				
45-2		J7-V	13	Y	22		SR2-18				
46-1		J7-W	13	Y	22		SR2-19				
46-2		J7-X	13	Y	22		SR2-20				
46-3		J7-Y	13	Y	22		SR2-21				
46-4		J7-Z	13	Y	22		SR2-22				
46-5		J7-a	13	Y	22		SR2-23				

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F

NASA DRAWING NO.
2018609-021
SHEET 14 of 15

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION FIND NO.	SPEC	NO.
46-6			J7-b	13	Y	22			SR2-24					
47			J7-c	13	Y	22			SR2-25					
48			J8-A	13	Y	22			SR2-26					
49			J8-B	13	Y	22			SR2-27					
50			J8-C	13	Y	22			SR2-28					
51						20								
51-A			SHLD-51						E12					
51-1			J8-D	13	Y	22			SR2-29					
51-2			J8-E	13	Y	22			SR2-30					
51-3			J8-F	13	Y	22			SR2-31					
52			J8-H	13	Y	22			SR2-32					
53			J8-J	13	Y	22			SR2-33					
54			J8-K	13	Y	22			SR2-34					
55-1			J8-L	13	Y	22			SR2-35					
55-2			J8-M	13	Y	22			SR2-36					
56-1			J8-N	13	Y	22			SR2-37					
56-2			J8-P	13	Y	22			SR2-38					

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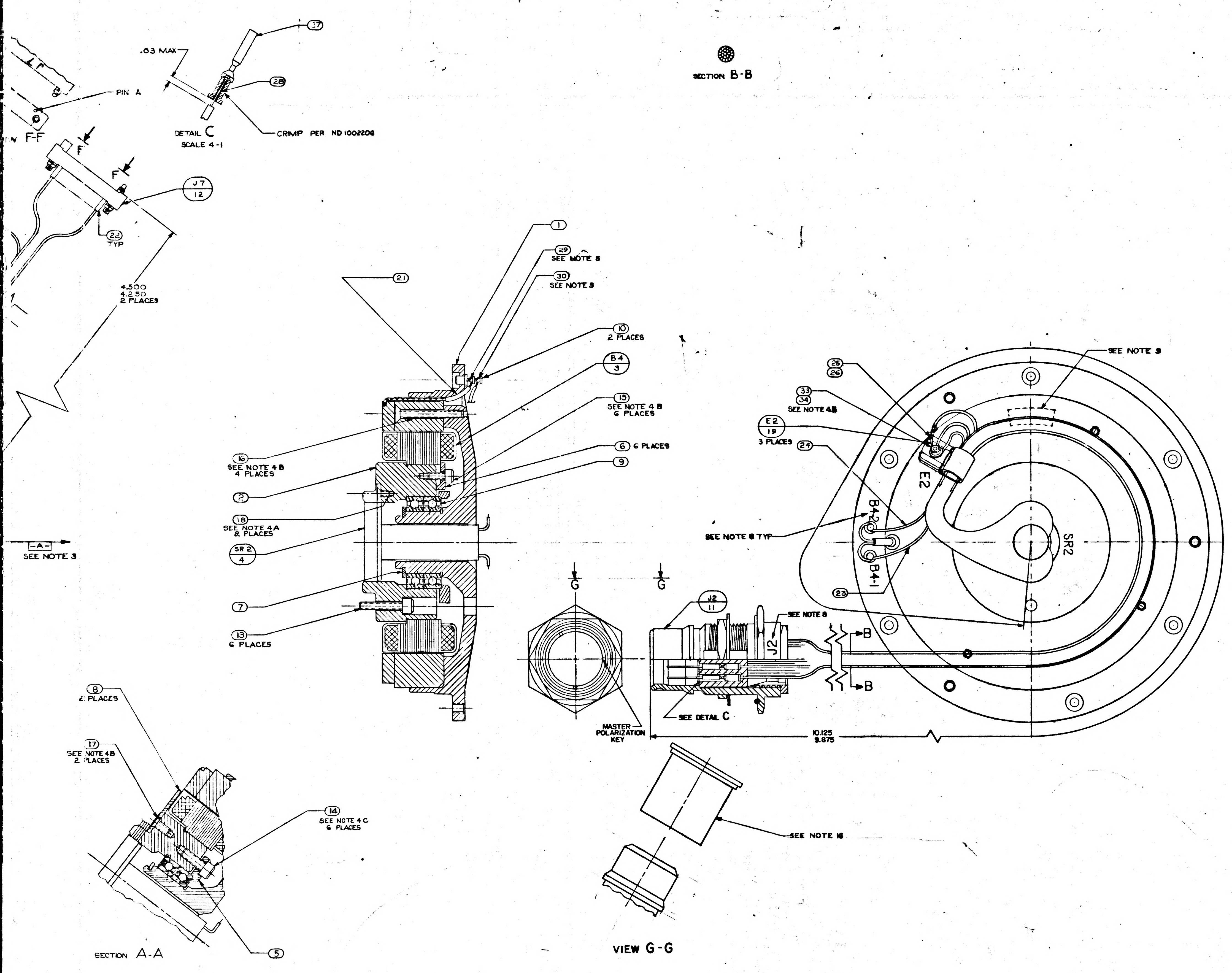
F

NASA DRAWING NO.
2018609-021
SHEET 15 of 15

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION FIND NO.	SPEC	NO.
57-1			J8-R	13	Y	22			SR2-39					
57-2			J8-S	13	Y	22			SR2-40					
58-1			J8-T	13	Y	22			SR2-41					
58-2			J8-U	13	Y	22			SR2-42					
59			J8-V	13	Y	22			SR2-43					
60			J8-W	13	Y	22			SR2-44					
61			J8-X	13	Y	22			SR2-45					
62			J8-Y	13	Y	22			SR2-46					
63			J8-Z	13	Y	22			SR2-47					
64			J8-a	13	Y	22			SR2-48					
65			J8-b	13	Y	22			SR2-49					
66			J8-c	13	Y	22			SR2-50					

REVISIONS TDRR 1683			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 17687	[illegible]	WK
B	REVISED PER TDRR 19276	2 Jun 65	WK
C	REVISED PER TDRR 21673	31 Aug 65	WK
D	REVISED PER TDRR 22595	28 Sep 65	WK
E	REVISED PER TDRR 26249	2-1-66	WK
F	REVISED PER TDRR 26254	23 Feb 66	WK
G	REVISED PER TDRR 27508	31 Mar 66	WK



.03 MAX
37
28
PIN A
DETAIL C
SCALE 4-1
CRIMP PER ND 1002206
F-F
F
F
J7
12
22
TYP
4.500
4.250
2 PLACES
SECTION B-B
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6 6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR 2
4
-A-
SEE NOTE 3
7
13
6 PLACES
8
2 PLACES
17
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4 C
6 PLACES
5
SECTION A-A
G
G
MASTER POLARIZATION KEY
VIEW G-G
J2
11
SEE NOTE 8
J2
B
B
SEE DETAIL C
10.125
9.875
SEE NOTE 16
SEE NOTE 9
25
26
33
34
SEE NOTE 4B
E2
19
3 PLACES
24
E2
B4-2
B4-1
SEE NOTE 8 TYP
SR2
23

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
1	1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	1	MS15795-803	WASHER, FLAT, METAL, ROUND	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	A/R	1010870	GREASE, LUBRICATING	31
A/R	A/R	QQ-S-571 SN60	SOLDER	30
A/R	A/R	QQ-S-571 SN10	SOLDER	29
61	61	1010862	BUSHING, SLEEVE	28
61	61	1010781-1	CONTACT, ELEC	27
1	1	1000223	WASHER, CABLE CLAMP	26
1	1	1000220-7	CLAMP, CABLE	25
1	1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	3	1000020-4	SHIELD & GRD ASS'Y	20
3	3	1000020-10	SHIELD & GRD ASS'Y	19
2	2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	6	1001489-22	SCREW, HEX SOC HD	13
2	2	1010817-106	CONNECTOR, ELEC, RECEPTACLE	12
1	1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	2	1000100-1	TERMINAL INSULATED	10
1	1	2018621	BALL BEARING DUPLEX	9
2	2	2018731	CLIP WIRE RETAINER	8
1	1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	1	2018766	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1
021	011	LIST OF MATERIALS		

2018601	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± -//- DECIMALS ± -//- ANGLES ± -//-
DO NOT SCALE THIS DRAWING
MATERIAL -//-
HEAT TREATMENT -//-
FINAL FINISH -//-

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN R.W. Consalt DATE 2-20-65
CHECKED G. QUINN 2-24-65
APPROVAL 24 Feb 65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTER GIMBAL
SUB - ASSEMBLY
TORQUE MOTOR END
OUTER AXIS

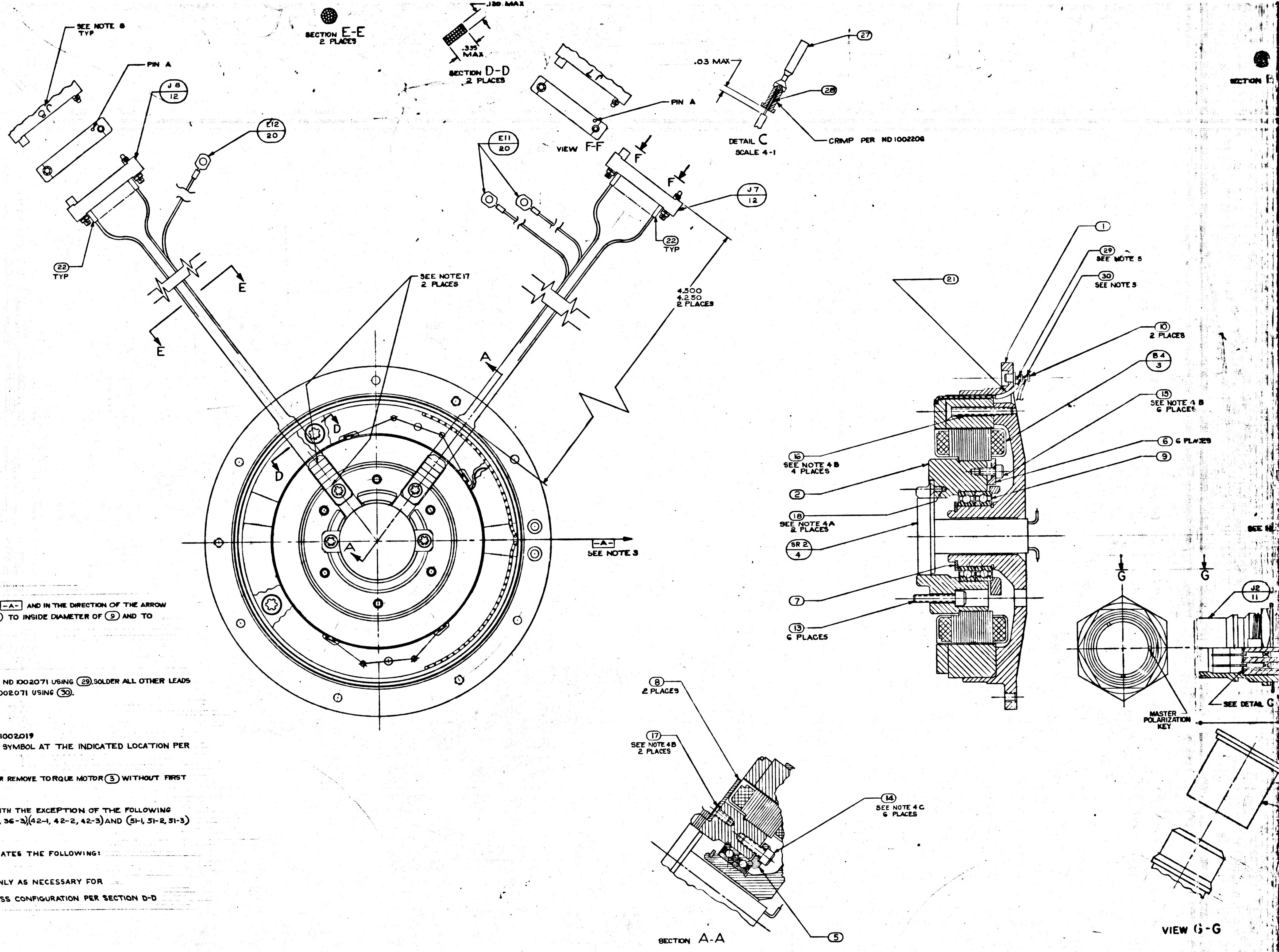
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018609
SCALE 2-1
WT
SHEET 1 OF 15

2018609 G

MASTER

JH

20 8609 REV G SHEET 1


SEE NOTE 8 TYP
PIN A
J8 12
E12 20
22 TYP
E
E
SECTION E-E 2 PLACES
.120 MAX
.335 MAX
SECTION D-D 2 PLACES
VIEW F-F
PIN A
E11 20
F
F
J7 12
22 TYP
.03 MAX
27
28
DETAIL C SCALE 4-1
CRIMP PER ND1002206
SEE NOTE 17 2 PLACES
4.300 4.250 2 PLACES
A
A
D
D
-A- SEE NOTE 3
SECTION
1
29 SEE NOTE 5
30 SEE NOTE 5
21
10 2 PLACES
B4 3
15 SEE NOTE 4 B 6 PLACES
6 6 PLACES
9
16 SEE NOTE 4 B 4 PLACES
2
18 SEE NOTE 4A 2 PLACES
SR2 4
7
13 6 PLACES
G
G
J2 11
MASTER POLARIZATION KEY
SEE DETAIL C
8 2 PLACES
17 SEE NOTE 4B 2 PLACES
14 SEE NOTE 4C 6 PLACES
5
SECTION A-A
VIEW G-G

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS 2018609 FOR -011 CONFIGURATION OR PS 2016146 FOR -021 CONFIGURATION
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $^{.10}_{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N ~~TN~~ TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH ~~THE SAME~~ NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
   - A - SHIELD GROUND ON "FROM END"
   - B - SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION
17. TAPE HARNESS IN AREA INDICATED USING ITEM ㉟ TO MAINTAIN HARNESS CONFIGURATION PER SECTION D-D AND SECURE HARNESS TO ITEM ⑧ WITH ITEM ㉟

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REVISION F

NASA DRAWING NO. 201869-011
SHEET 2 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
1					19						
1-B		E2					SHLD 1				
1-1		J2-1	13	N			SR2-1				
1-2		J2-2	13	N			SR2-2				
1-3		J2-3	13	N			SR2-3				
2		J2-4	13	N			SR2-4				
3		J2-5	13	N			SR2-5				
4-1		J2-6	13	N			SR2-6				
4-2		J2-7	13	N			SR2-7				
5-1		J2-8	13	N			SR2-8				
5-2		J2-9	13	N			SR2-9				
6-1		J2-10	13	N			SR2-10				
6-2		J2-11	13	N			SR2-11				
7					19						
7-B		E2					SHLD 7				
7-1		J2-12	13	N			SR2-12				
7-2		J2-13	13	N			SR2-13				
7-3		J2-14	13	N			SR2-14				

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REVISION F

NASA DRAWING NO. 201869-011
SHEET 3 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
8		J2-15	13	N			SR2-15				
9		J2-16	13	N			SR2-16				
10-1		J2-17	13	N			SR2-17				
10-2		J2-18	13	N			SR2-18				
11-1		J2-19	13	N			SR2-19				
11-2		J2-20	13	N			SR2-20				
11-3		J2-21	13	N			SR2-21				
11-4		J2-22	13	N			SR2-22				
11-5		J2-23	13	N			SR2-23				
11-6		J2-24	13	N			SR2-24				
12		J2-25	13	N			SR2-25				
13		J2-26	13	N			SR2-26				
14		J2-27	13	N			SR2-27				
15		J2-28	13	N			SR2-28				
16		J2-32	13	N			SR2-32				
17		J2-33	13	N			SR2-33				
18		J2-34	13	N			SR2-34				

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REVISION F

NASA DRAWING NO. 201869-011
SHEET 4 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
19-1		J2-35	13	N			SR2-35				
19-2		J2-36	13	N			SR2-36				
20-1		J2-37	13	N			SR2-37				
20-2		J2-38	13	N			SR2-38				
21-1		J2-39	13	N			SR2-39				
21-2		J2-40	13	N			SR2-40				
22-1		J2-41	13	N			SR2-41				
22-2		J2-42	13	N			SR2-42				
23		J2-43	13	N			SR2-43				
24		J2-44	13	N			SR2-44				
25		J2-45	13	N			SR2-45				
26		J2-46	13	N			SR2-46				
27		J2-47	13	N			SR2-47				
28		J2-48	13	N			SR2-48				
29		J2-49	13	N			SR2-49				
30		J2-50	13	N			SR2-50				

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REVISION F

NASA DRAWING NO. 201869-011
SHEET 5 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
31	23	J2-51	13	N			B4-1	19	Y		
32	24	J2-52	13	N			B4-2	19	Y		
33		B4-BLK					B4-1	19	Y		
34		B4-WHT					B4-2	19	Y		
35					19						
35-B		E2					SHLD 35				
35-1		J2-59	13	N			SR2-29				
35-2		J2-60	13	N			SR2-30				
35-3		J2-61	13	N			SR2-31				
36					20						
36-A		SHLD-36					E11				
36-1		J7-A	13	Y	22		SR2-1				
36-2		J7-B	13	Y	22		SR2-2				
36-3		J7-C	13	Y	22		SR2-3				
37		J7-D	13	Y	22		SR2-4				
38		J7-E	13	Y	22		SR2-5				
39-1		J7-F	13	Y	22		SR2-6				
39-2		J7-H	13	Y	22		SR2-7				

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REVISION F

NASA DRAWING NO. 2018609-011
SHEET 6 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC	NO.
40-1			J7-J	13	Y	22			SR2-8					
40-2			J7-K	13	Y	22			SR2-9					
41-1			J7-L	13	Y	22			SR2-10					
41-2			J7-M	13	Y	22			SR2-11					
42						20								
42-A			SHLD-42						E11					
42-1			J7-N	13	Y	22			SR2-12					
42-2			J7-P	13	Y	22			SR2-13					
42-3			J7-R	13	Y	22			SR2-14					
43			J7-S	13	Y	22			SR2-15					
44			J7-T	13	Y	22			SR2-16					
45-1			J7-U	13	Y	22			SR2-17					
45-2			J7-V	13	Y	22			SR2-18					
46-1			J7-W	13	Y	22			SR2-19					
46-2			J7-X	13	Y	22			SR2-20					
46-3			J7-Y	13	Y	22			SR2-21					
46-4			J7-Z	13	Y	22			SR2-22					
46-5			J7-a	13	Y	22			SR2-23					

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REVISION F

NASA DRAWING NO. 2018609-011
SHEET 7 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC	NO.
46-6			J7-b	13	Y	22			SR2-24					
47			J7-c	13	Y	22			SR2-25					
48			J8-A	13	Y	22			SR2-26					
49			J8-B	13	Y	22			SR2-27					
50			J8-C	13	Y	22			SR2-28					
51						20								
51-A			SHLD-51						E12					
51-1			J8-D	13	Y	22			SR2-29					
51-2			J8-E	13	Y	22			SR2-30					
51-3			J8-F	13	Y	22			SR2-31					
52			J8-H	13	Y	22			SR2-32					
53			J8-J	13	Y	22			SR2-33					
54			J8-K	13	Y	22			SR2-34					
55-1			J8-L	13	Y	22			SR2-35					
55-2			J8-M	13	Y	22			SR2-36					
56-1			J8-N	13	Y	22			SR2-37					
56-2			J8-P	13	Y	22			SR2-38					

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NASA DRAWING NO. 2018609-011
SHEET 8 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC	NO.
57-1			J8-R	13	Y	22			SR2-39					
57-2			J8-S	13	Y	22			SR2-40					
58-1			J8-T	13	Y	22			SR2-41					
58-2			J8-U	13	Y	22			SR2-42					
59			J8-V	13	Y	22			SR2-43					
60			J8-W	13	Y	22			SR2-44					
61			J8-X	13	Y	22			SR2-45					
62			J8-Y	13	Y	22			SR2-46					
63			J8-Z	13	Y	22			SR2-47					
64			J8-a	13	Y	22			SR2-48					
65			J8-b	13	Y	22			SR2-49					
66			J8-c	13	Y	22			SR2-50					

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NASA DRAWING NO. 2018609-011
SHEET 9 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC	NO.
1						19								
1-B			E2						SHLD 1					
1-1			J2-1	13	N				SR2-1					
1-2			J2-2	13	N				SR2-2					
1-3			J2-3	13	N				SR2-3					
2			J2-4	13	N				SR2-4					
3			J2-5	13	N				SR2-5					
4-1			J2-8	13	N				SR2-6					
4-2			J2-9	13	N				SR2-7					
5-1			J2-6	13	N				SR2-8					
5-2			J2-7	13	N				SR2-9					
6-1			J2-11	13	N				SR2-10					
6-2			J2-10	13	N				SR2-11					
7						19								
7-B			E2						SHLD 7					
7-1			J2-12	13	N				SR2-12					
7-2			J2-13	13	N				SR2-13					
7-3			J2-14	13	N				SR2-14					

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NASA DRAWING NO.
2018609-021
SHEET 10 of 15

CONDUCTOR FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.
8		J2-15	13N		SR2-15		
9		J2-16	13N		SR2-16		
10-1		J2-17	13N		SR2-17		
10-2		J2-18	13N		SR2-18		
11-1		J2-20	13N		SR2-19		
11-2		J2-19	13N		SR2-20		
11-3		J2-21	13N		SR2-21		
11-4		J2-22	13N		SR2-22		
11-5		J2-23	13N		SR2-23		
11-6		J2-24	13N		SR2-24		
12		J2-25	13N		SR2-25		
13		J2-26	13N		SR2-26		
14		J2-27	13N		SR2-27		
15		J2-28	13N		SR2-28		
16		J2-32	13N		SR2-32		
17		J2-33	13N		SR2-33		
18		J2-34	13N		SR2-34		

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NASA DRAWING NO.
2018609-021
SHEET 11 of 15

CONDUCTOR FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.
19-1		J2-35	13N		SR2-35		
19-2		J2-36	13N		SR2-36		
20-1		J2-37	13N		SR2-37		
20-2		J2-38	13N		SR2-38		
21-1		J2-39	13N		SR2-39		
21-2		J2-40	13N		SR2-40		
22-1		J2-41	13N		SR2-41		
22-2		J2-42	13N		SR2-42		
23		J2-43	13N		SR2-43		
24		J2-44	13N		SR2-44		
25		J2-45	13N		SR2-45		
26		J2-46	13N		SR2-46		
27		J2-47	13N		SR2-47		
28		J2-48	13N		SR2-48		
29		J2-49	13N		SR2-49		
30		J2-50	13N		SR2-50		

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REVISION E

NASA DRAWING NO.
2018609-021
SHEET 12 of 15

CONDUCTOR FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.
31	23	J2-51	13N		B4-1	19Y	
32	24	J2-52	13N		B4-2	19Y	
33		B4-BLK			B4-1	19Y	
34		B4-WHT			B4-2	19Y	
35				19			
35-B		E2			SHLD 35		
35-1		J2-59	13N		SR2-29		
35-2		J2-60	13N		SR2-30		
35-3		J2-61	13N		SR2-31		
36				20			
36-A		SHLD-36			E11		
36-1		J7-A	13Y	22	SR2-1		
36-2		J7-B	13Y	22	SR2-2		
36-3		J7-C	13Y	22	SR2-3		
37		J7-D	13Y	22	SR2-4		
38		J7-E	13Y	22	SR2-5		
39-1		J7-F	13Y	22	SR2-6		
39-2		J7-H	13Y	22	SR2-7		

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REVISION E

NASA DRAWING NO.
2018609-021
SHEET 13 of 15

CONDUCTOR FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.
40-1		J7-J	13Y	22	SR2-8		
40-2		J7-K	13Y	22	SR2-9		
41-1		J7-L	13Y	22	SR2-10		
41-1		J7-M	13Y	22	SR2-11		
42				20			
42-A		SHLD-42			E11		
42-1		J7-N	13Y	22	SR2-12		
42-2		J7-P	13Y	22	SR2-13		
42-3		J7-R	13Y	22	SR2-14		
43		J7-S	13Y	22	SR2-15		
44		J7-T	13Y	22	SR2-16		
45-1		J7-U	13Y	22	SR2-17		
45-2		J7-V	13Y	22	SR2-18		
46-1		J7-W	13Y	22	SR2-19		
46-2		J7-X	13Y	22	SR2-20		
46-3		J7-Y	13Y	22	SR2-21		
46-4		J7-Z	13Y	22	SR2-22		
46-5		J7-a	13Y	22	SR2-23		

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REVISION F

NASA DRAWING NO.
2018609-021
SHEET 14 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
46-6		J7-b	13	Y	22		SR2-24			
47		J7-c	13	Y	22		SR2-25			
48		J8-A	13	Y	22		SR2-26			
49		J8-B	13	Y	22		SR2-27			
50		J8-C	13	Y	22		SR2-28			
51					20					
51-A		SHLD-51					E12			
51-1		J8-D	13	Y	22		SR2-29			
51-2		J8-E	13	Y	22		SR2-30			
51-3		J8-F	13	Y	22		SR2-31			
52		J8-H	13	Y	22		SR2-32			
53		J8-J	13	Y	22		SR2-33			
54		J8-K	13	Y	22		SR2-34			
55-1		J8-L	13	Y	22		SR2-35			
55-2		J8-M	13	Y	22		SR2-36			
56-1		J8-N	13	Y	22		SR2-37			
56-2		J8-P	13	Y	22		SR2-38			

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REVISION F

NASA DRAWING NO.
2018609-021
SHEET 15 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
57-1		J8-R	13	Y	22		SR2-39			
57-2		J8-S	13	Y	22		SR2-40			
58-1		J8-T	13	Y	22		SR2-41			
58-2		J8-U	13	Y	22		SR2-42			
59		J8-V	13	Y	22		SR2-43			
60		J8-W	13	Y	22		SR2-44			
61		J8-X	13	Y	22		SR2-45			
62		J8-Y	13	Y	22		SR2-46			
63		J8-Z	13	Y	22		SR2-47			
64		J8-a	13	Y	22		SR2-48			
65		J8-b	13	Y	22		SR2-49			
66		J8-c	13	Y	22		SR2-50			

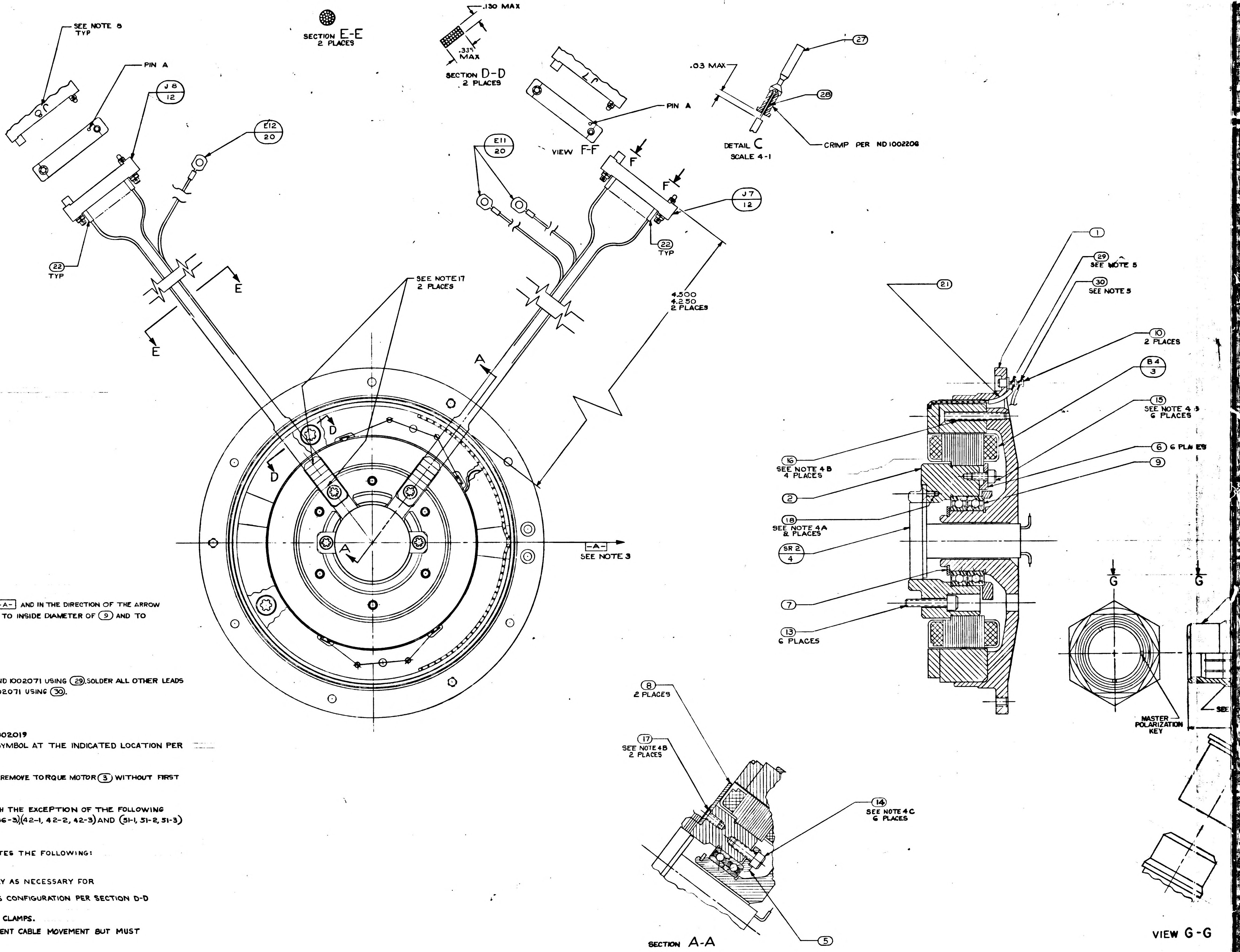
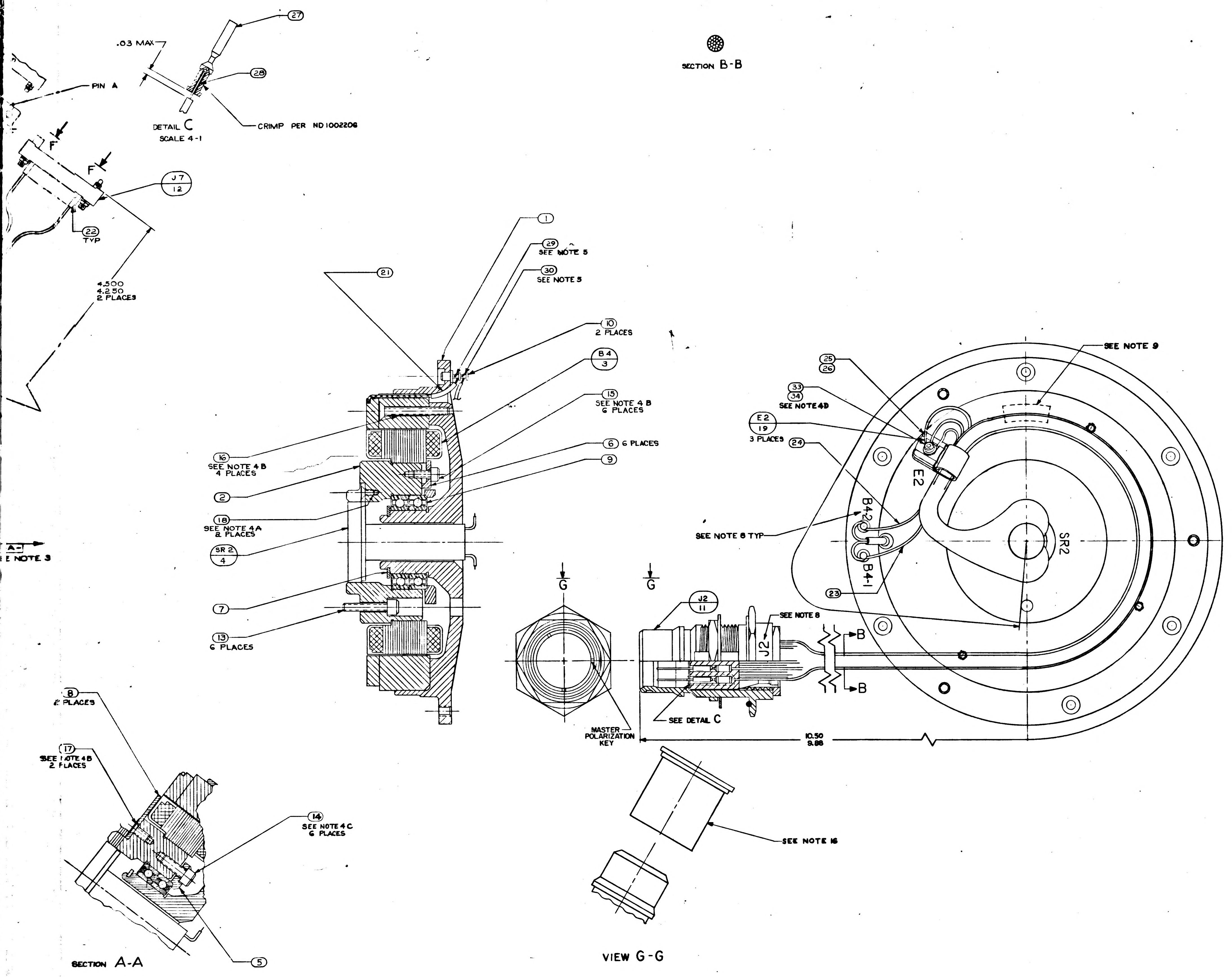

SEE NOTE 8
TYP
PIN A
J8
12
E12
20
22
TYP
E
E
SECTION E-E
2 PLACES
.130 MAX
.337 MAX
SECTION D-D
2 PLACES
E11
20
VIEW F-F
PIN A
F
F
J7
12
22
TYP
.03 MAX
27
28
DETAIL C
SCALE 4-1
CRIMP PER ND1002206
SEE NOTE 17
2 PLACES
4.500
4.250
2 PLACES
A
D
D
A
-A-
SEE NOTE 3
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6
6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
8 PLACES
SR 2
4
7
13
6 PLACES
G
G
MASTER
POLARIZATION
KEY
VIEW G-G
8
2 PLACES
17
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4C
6 PLACES
5
SECTION A-A

TABLE I	
CABLE CLAMP ㉕	
PART NUMBER	DIA. REF.
1000220-5	.234
1000220-6	.297
1000202-7	.359
1000220-15	.265
1000220-16	.328
1000220-17	.390

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS 2018609 FOR -011 CONFIGURATION OR PS 2016146 FOR -021 CONFIGURATION
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB D. 6.5 IN.LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N ~~IN~~ TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
   - A = SHIELD GROUND ON "FROM END"
   - B = SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION
17. TAPE HARNESS IN AREA INDICATED USING ITEM ㉟ TO MAINTAIN HARNESS CONFIGURATION PER SECTION D-D AND SECURE HARNESS TO ITEM ⑧ WITH ITEM ㉟
18. TAPE ㊱ SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
19. ITEM ㉕ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT BUT MUST NOT PINCH WIRES.

REVISIONS TDRR 16813				
SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 17687	18 MAR 65		WK
B	REVISED PER TDRR 19276	2 Jun 65		WK
C	REVISED PER TDRR 21673	31 Aug 65		WK
D	REVISED PER TDRR 22595	28 SEP 65		WK
E	REVISED PER TDRR 26249	2-1-66		WK
F	REVISED PER TDRR 26254	23 Feb 66		WK
G	REVISED PER TDRR 27508	31 Mar 66		WK
H	REVISED PER TDRR 31998	25 NOV 66	JWR	CP



.03 MAX
27
28
PIN A
DETAIL C
SCALE 4-1
CRIMP PER ND1002206
F
F
J7
12
22
TYP
4.500
4.250
2 PLACES
SECTION B-B
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6
6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
8 PLACES
SR 2
4
7
13
6 PLACES
A
SEE NOTE 3
SEE NOTE 9
25
26
33
34
SEE NOTE 4D
E2
19
3 PLACES
24
E2
B4-2
B4-1
SR2
SEE NOTE 8 TYP
23
G
G
J2
11
SEE NOTE 8
J2
B
B
SEE DETAIL C
MASTER POLARIZATION KEY
10.50
9.88
8
2 PLACES
17
SEE NOTE 4 B
2 PLACES
14
SEE NOTE 4 C
6 PLACES
5
SEE NOTE 16

SECTION A-A

VIEW G-G

SEE NOTE 18

A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH, ELEC, PRESS SENSITIVE ½ WIDE	36
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
1	1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	1	MS15795-803	WASHER, FLAT, METAL, ROUND	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	A/R	1010870	GREASE, LUBRICATING	31
A/R	A/R	QQ-S-571 SN60	SOLDER	30
A/R	A/R	QQ-S-571 SN10	SOLDER	29
61	61	1010862	BUSHING, SLEEVE	28
61	61	1010781-1	CONTACT, ELEC	27
1	1	1000223	WASHER, CABLE CLAMP	26
1	1	1000220 (SEE NOTE 18)	CLAMP, CABLE	25
1	1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	3	1000020-4	SHIELD & GRD ASS'Y	20
3	3	1000020-10	SHIELD & GRD ASS'Y	19
2	2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	6	1001489-22	SCREW, HEX SOC HD	13
2	2	1010917-106	CONNECTOR, ELEC, RECEPTACLE	12
1	1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	2	1000100-1	TERMINAL INSULATED	10
1	1	2018621	BALL BEARING DUPLEX	9
2	2	2018731	CLIP WIRE RETAINER	8
1	1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	1	2018766	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

2018601	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± -/- DECIMALS ± -/- ANGLES ± -/- DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
NEXT ASSY	USED ON	MATERIAL -/-	DRAWN R.W. Contant DATE 5-30-6 CHECKED G. QUINN 2-24-65 APPROVAL 24 Feb 65 APPROVAL	INTER GIMBAL SUB-ASSEMBLY TORQUE MOTOR END OUTER AXIS	
APPLICATION		HEAT TREATMENT -/- FINAL FINISH -/-	NASA APPROVAL MIT APPROVAL	CODE IDENT NO. 80230 SCALE 2-1	SIZE J NASA DRAWING NO. 2018609 WT SHEET 1 OF 15

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NASA DRAWING NO. 2018609-011
SHEET 2 of 15

CONDUCTOR		FROM				TO		
FIND NUMBER	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N
1					19			
1-B		E2				SHLD 1		
1-1		J2-1	13	N		SR2-1		
1-2		J2-2	13	N		SR2-2		
1-3		J2-3	13	N		SR2-3		
2		J2-4	13	N		SR2-4		
3		J2-5	13	N		SR2-5		
4-1		J2-6	13	N		SR2-6		
4-2		J2-7	13	N		SR2-7		
5-1		J2-8	13	N		SR2-8		
5-2		J2-9	13	N		SR2-9		
6-1		J2-10	13	N		SR2-10		
6-2		J2-11	13	N		SR2-11		
7					19			
7-B		E2				SHLD 7		
7-1		J2-12	13	N		SR2-12		
7-2		J2-13	13	N		SR2-13		
7-3		J2-14	13	N		SR2-14		

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NASA DRAWING NO. 2018609-011
SHEET 3 of 15

CONDUCTOR		FROM				TO		
FIND NUMBER	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N
8		J2-15	13	N		SR2-15		
9		J2-16	13	N		SR2-16		
10-1		J2-17	13	N		SR2-17		
10-2		J2-18	13	N		SR2-18		
11-1		J2-19	13	N		SR2-19		
11-2		J2-20	13	N		SR2-20		
11-3		J2-21	13	N		SR2-21		
11-4		J2-22	13	N		SR2-22		
11-5		J2-23	13	N		SR2-23		
11-6		J2-24	13	N		SR2-24		
12		J2-25	13	N		SR2-25		
13		J2-26	13	N		SR2-26		
14		J2-27	13	N		SR2-27		
15		J2-28	13	N		SR2-28		
16		J2-32	13	N		SR2-32		
17		J2-33	13	N		SR2-33		
18		J2-34	13	N		SR2-34		

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NASA DRAWING NO. 2018609-011
SHEET 4 of 15

CONDUCTOR		FROM				TO		
FIND NUMBER	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N
19-1		J2-35	13	N		SR2-35		
19-2		J2-36	13	N		SR2-36		
20-1		J2-37	13	N		SR2-37		
20-2		J2-38	13	N		SR2-38		
21-1		J2-39	13	N		SR2-39		
21-2		J2-40	13	N		SR2-40		
22-1		J2-41	13	N		SR2-41		
22-2		J2-42	13	N		SR2-42		
23		J2-43	13	N		SR2-43		
24		J2-44	13	N		SR2-44		
25		J2-45	13	N		SR2-45		
26		J2-46	13	N		SR2-46		
27		J2-47	13	N		SR2-47		
28		J2-48	13	N		SR2-48		
29		J2-49	13	N		SR2-49		
30		J2-50	13	N		SR2-50		

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NASA DRAWING NO. 2018609-011
SHEET 5 of 15

CONDUCTOR		FROM				TO		
FIND NUMBER	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N
31	23	J2-51	13	N		B4-1	19	Y
32	24	J2-52	13	N		B4-2	19	Y
33		B4-BLK				B4-1	19	Y
34		B4-WHT				B4-2	19	Y
35					19			
35-B		E2				SHLD 35		
35-1		J2-59	13	N		SR2-29		
35-2		J2-60	13	N		SR2-30		
35-3		J2-61	13	N		SR2-31		
36					20			
36-A		SHLD-36				E11		
36-1		J7-A	13	Y	22	SR2-1		
36-2		J7-B	13	Y	22	SR2-2		
36-3		J7-C	13	Y	22	SR2-3		
37		J7-D	13	Y	22	SR2-4		
38		J7-E	13	Y	22	SR2-5		
39-1		J7-F	13	Y	22	SR2-6		
39-2		J7-H	13	Y	22	SR2-7		

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
57-1		J8-R	13	Y	22			SR2-39					
57-2		J8-S	13	Y	22			SR2-40					
58-1		J8-T	13	Y	22			SR2-41					
58-2		J8-U	13	Y	22			SR2-42					
59		J8-V	13	Y	22			SR2-43					
60		J8-W	13	Y	22			SR2-44					
61		J8-X	13	Y	22			SR2-45					
62		J8-Y	13	Y	22			SR2-46					
63		J8-Z	13	Y	22			SR2-47					
64		J8-a	13	Y	22			SR2-48					
65		J8-b	13	Y	22			SR2-49					
66		J8-c	13	Y	22			SR2-50					

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NASA DRAWING NO.
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SHEET 8 of 85

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
40-1		J7-J	13	Y	22			SR2-8					
40-2		J7-K	13	Y	22			SR2-9					
41-1		J7-L	13	Y	22			SR2-10					
41-2		J7-M	13	Y	22			SR2-11					
42					20								
42-A		SHLD-42						E11					
42-1		J7-N	13	Y	22			SR2-12					
42-2		J7-P	13	Y	22			SR2-13					
42-3		J7-R	13	Y	22			SR2-14					
43		J7-S	13	Y	22			SR2-15					
44		J7-T	13	Y	22			SR2-16					
45-1		J7-U	13	Y	22			SR2-17					
45-2		J7-V	13	Y	22			SR2-18					
46-1		J7-W	13	Y	22			SR2-19					
46-2		J7-X	13	Y	22			SR2-20					
46-3		J7-Y	13	Y	22			SR2-21					
46-4		J7-Z	13	Y	22			SR2-22					
46-5		J7-a	13	Y	22			SR2-23					

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2018609-011

SHEET 6 of 85

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
1					19								
1-B		E2						SHLD 1					
1-1		J2-1	13	N				SR2-1					
1-2		J2-2	13	N				SR2-2					
1-3		J2-3	13	N				SR2-3					
2		J2-4	13	N				SR2-4					
3		J2-5	13	N				SR2-5					
4-1		J2-8	13	N				SR2-6					
4-2		J2-9	13	N				SR2-7					
5-1		J2-6	13	N				SR2-8					
5-2		J2-7	13	N				SR2-9					
6-1		J2-11	13	N				SR2-10					
6-2		J2-10	13	N				SR2-11					
7					19								
7-B		E2						SHLD 7					
7-1		J2-12	13	N				SR2-12					
7-2		J2-13	13	N				SR2-13					
7-3		J2-14	13	N				SR2-14					

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NASA DRAWING NO.
2018609-[illegible]

SHEET 9 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
46-6		J7-b	13	Y	22			SR2-24					
47		J7-c	13	Y	22			SR2-25					
48		J8-A	13	Y	22			SR2-26					
49		J8-B	13	Y	22			SR2-27					
50		J8-C	13	Y	22			SR2-28					
51					20								
51-A		SHLD-51						E12					
51-1		J8-D	13	Y	22			SR2-29					
51-2		J8-E	13	Y	22			SR2-30					
51-3		J8-F	13	Y	22			SR2-31					
52		J8-H	13	Y	22			SR2-32					
53		J8-J	13	Y	22			SR2-33					
54		J8-K	13	Y	22			SR2-34					
55-1		J8-L	13	Y	22			SR2-35					
55-2		J8-M	13	Y	22			SR2-36					
56-1		J8-N	13	Y	22			SR2-37					
56-2		J8-P	13	Y	22			SR2-38					

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NASA DRAWING NO.
2018609-011

SHEET 7 of 85

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TERMINATION FIND NO.	SPEC	NO.
8		J2-15	13N				SR2-15				
9		J2-16	13N				SR2-16				
10-1		J2-17	13N				SR2-17				
10-2		J2-18	13N				SR2-18				
11-1		J2-19	13N				SR2-19				
11-2		J2-20	13N				SR2-20				
11-3		J2-21	13N				SR2-21				
11-4		J2-22	13N				SR2-22				
11-5		J2-23	13N				SR2-23				
11-6		J2-24	13N				SR2-24				
12		J2-25	13N				SR2-25				
13		J2-26	13N				SR2-26				
14		J2-27	13N				SR2-27				
15		J2-28	13N				SR2-28				
16		J2-32	13N				SR2-32				
17		J2-33	13N				SR2-33				
18		J2-34	13N				SR2-34				

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NASA DRAWING NO.
2018609-021
SHEET 10 of 15

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TERMINATION FIND NO.	SPEC	NO.
19-1		J2-35	13N				SR2-35				
19-2		J2-36	13N				SR2-36				
20-1		J2-37	13N				SR2-37				
20-2		J2-38	13N				SR2-38				
21-1		J2-39	13N				SR2-39				
21-2		J2-40	13N				SR2-40				
22-1		J2-41	13N				SR2-41				
22-2		J2-42	13N				SR2-42				
23		J2-43	13N				SR2-43				
24		J2-44	13N				SR2-44				
25		J2-45	13N				SR2-45				
26		J2-46	13N				SR2-46				
27		J2-47	13N				SR2-47				
28		J2-48	13N				SR2-48				
29		J2-49	13N				SR2-49				
30		J2-50	13N				SR2-50				

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REVISION
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NASA DRAWING NO.
2018609-021
SHEET 11 of 15

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TERMINATION FIND NO.	SPEC	NO.
31	23	J2-51	13N				B4-1	19Y			
32	24	J2-52	13N				B4-2	19Y			
33		B4-BLK					B4-1	19Y			
34		B4-WHT					B4-2	19Y			
35					19						
35-B		E2					SHLD 35				
35-1		J2-59	13N				SR2-29				
35-2		J2-60	13N				SR2-30				
35-3		J2-61	13N				SR2-31				
36					20						
36-A		SHLD-36					E11				
36-1		J7-A	13Y		22		SR2-1				
36-2		J7-B	13Y		22		SR2-2				
36-3		J7-C	13Y		22		SR2-3				
37		J7-D	13Y		22		SR2-4				
38		J7-E	13Y		22		SR2-5				
39-1		J7-F	13Y		22		SR2-6				
39-2		J7-H	13Y		22		SR2-7				

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NASA DRAWING NO.
2018609-021
SHEET 12 of 15

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TERMINATION FIND NO.	SPEC	NO.
40-1		J7-J	13Y		22		SR2-8				
40-2		J7-K	13Y		22		SR2-9				
41-1		J7-L	13Y		22		SR2-10				
41-1		J7-M	13Y		22		SR2-11				
42					20						
42-A		SHLD-42					E11				
42-1		J7-N	13Y		22		SR2-12				
42-2		J7-P	13Y		22		SR2-13				
42-3		J7-R	13Y		22		SR2-14				
43		J7-S	13Y		22		SR2-15				
44		J7-T	13Y		22		SR2-16				
45-1		J7-U	13Y		22		SR2-17				
45-2		J7-V	13Y		22		SR2-18				
46-1		J7-W	13Y		22		SR2-19				
46-2		J7-X	13Y		22		SR2-20				
46-3		J7-Y	13Y		22		SR2-21				
46-4		J7-Z	13Y		22		SR2-22				
46-5		J7-a	13Y		22		SR2-23				

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NASA DRAWING NO.
2018609-021
SHEET 14 of 15

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
46-6			J7-b	13	Y	22			SR2-24					
47			J7-c	13	Y	22			SR2-25					
48			J8-A	13	Y	22			SR2-26					
49			J8-B	13	Y	22			SR2-27					
50			J8-C	13	Y	22			SR2-28					
51						20								
51-A			SHLD-51						E12					
51-1			J8-D	13	Y	22			SR2-29					
51-2			J8-E	13	Y	22			SR2-30					
51-3			J8-F	13	Y	22			SR2-31					
52			J8-H	13	Y	22			SR2-32					
53			J8-J	13	Y	22			SR2-33					
54			J8-K	13	Y	22			SR2-34					
55-1			J8-L	13	Y	22			SR2-35					
55-2			J8-M	13	Y	22			SR2-36					
56-1			J8-N	13	Y	22			SR2-37					
56-2			J8-P	13	Y	22			SR2-38					

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NASA DRAWING NO.
2018609-021
SHEET 15 of 15

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
57-1			J8-R	13	Y	22			SR2-39					
57-2			J8-S	13	Y	22			SR2-40					
58-1			J8-T	13	Y	22			SR2-41					
58-2			J8-U	13	Y	22			SR2-42					
59			J8-V	13	Y	22			SR2-43					
60			J8-W	13	Y	22			SR2-44					
61			J8-X	13	Y	22			SR2-45					
62			J8-Y	13	Y	22			SR2-46					
63			J8-Z	13	Y	22			SR2-47					
64			J8-a	13	Y	22			SR2-48					
65			J8-b	13	Y	22			SR2-49					
66			J8-c	13	Y	22			SR2-50					

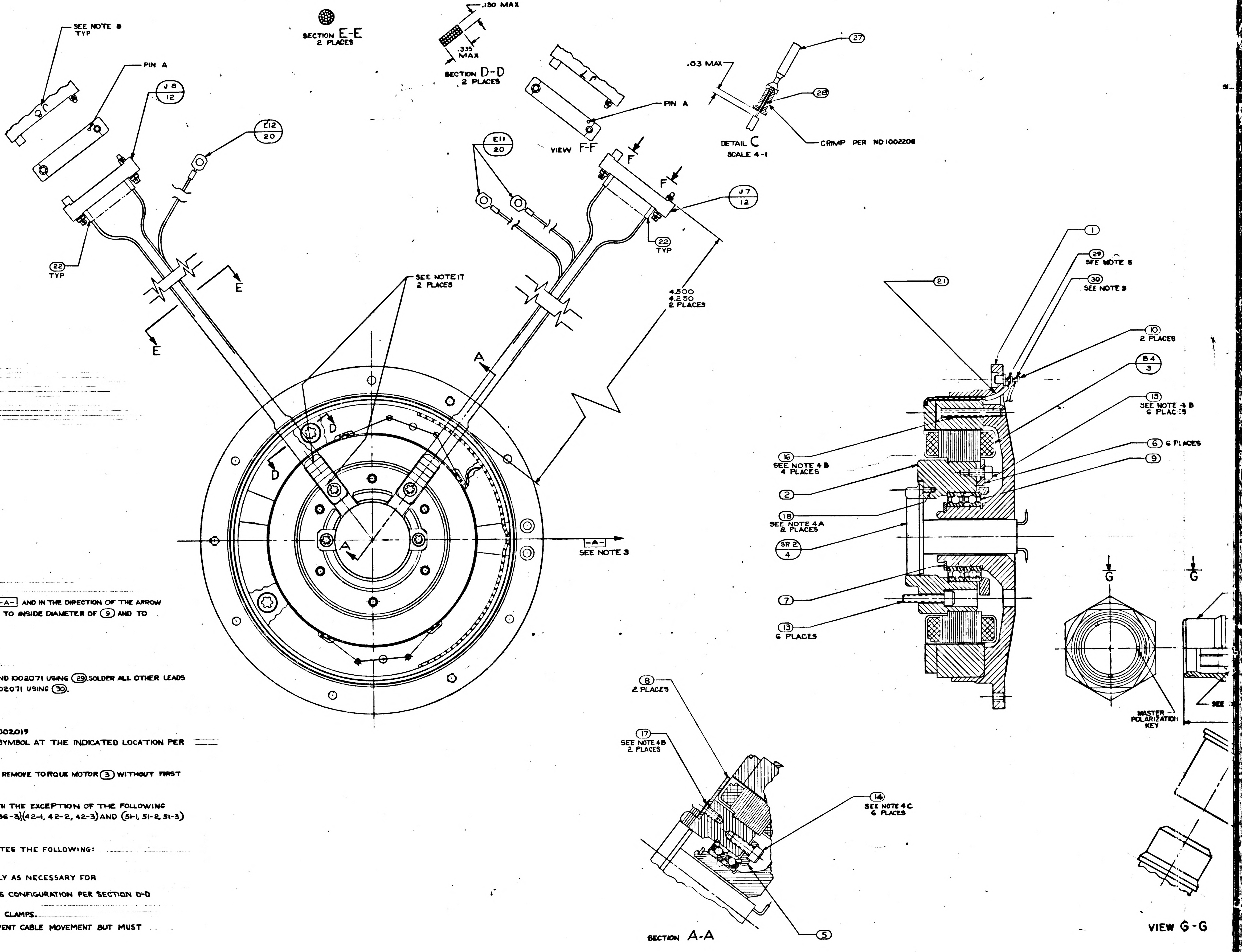

SEE NOTE 8
TYP
PIN A
J8
12
E12
20
22
TYP
E
E
SECTION E-E
2 PLACES
.130 MAX
.335
MAX
SECTION D-D
2 PLACES
PIN A
VIEW F-F
E11
20
F
F
J7
12
22
TYP
.03 MAX
27
28
DETAIL C
SCALE 4-1
CRIMP PER ND1002208
SEE NOTE 17
2 PLACES
4.500
4.250
2 PLACES
A
A
D
D
-A-
SEE NOTE 3
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4B
6 PLACES
6
6 PLACES
9
16
SEE NOTE 4B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR2
4
7
13
6 PLACES
G
G
MASTER POLARIZATION KEY
8
2 PLACES
17
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4C
6 PLACES
5
SECTION A-A
VIEW G-G

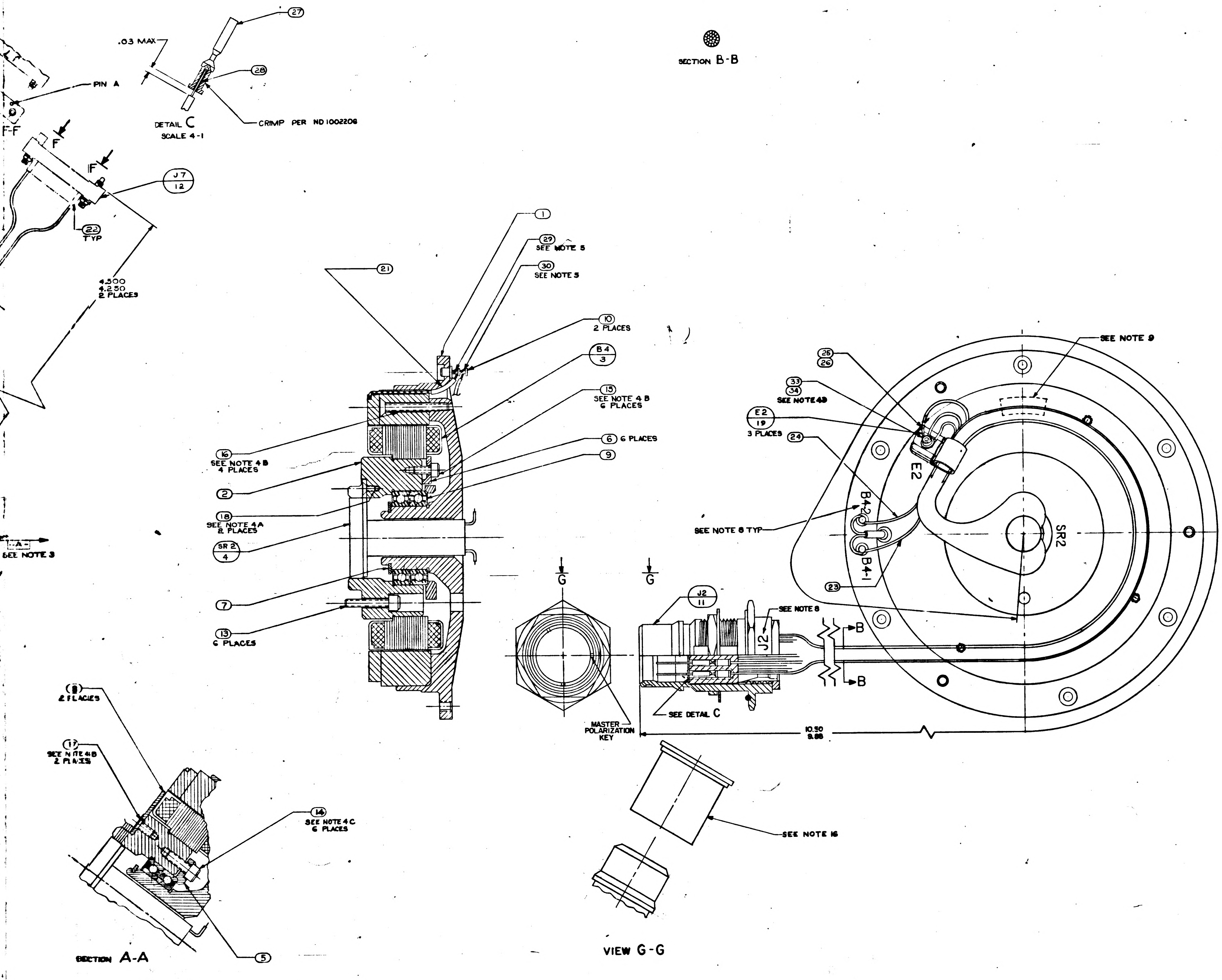
TABLE I	
CABLE CLAMP ㉕	
PART NUMBER	DIA. REF.
1000220-5	.234
1000220-6	.287
1000202-7	.359
1000220-15	.265
1000220-16	.328
1000220-17	.390

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS 2018609 FOR -011 CONFIGURATION OR PS 2016146 FOR -021 CONFIGURATION
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ±5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB ~~B. 6.5 IN. LB~~
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
    - A - SHIELD GROUND ON "FROM END"
    - B - SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION
17. TAPE HARNESS IN AREA INDICATED USING ITEM ㉟ TO MAINTAIN HARNESS CONFIGURATION PER SECTION D-D AND SECURE HARNESS TO ITEM ⑧ WITH ITEM ㉟
18. TAPE ㊱ SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
19. ITEM ㉕ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT BUT MUST NOT PINCH WIRES.

	REV	SHEET
2018609	J	1

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 16813			
A	REVISED TDRR 17687	18Mar65		WK
B	REVISED PER TDRR 19276	2Jun65		WK
C	REVISED PER TDRR 21673	31Aug65		WK
D	REVISED PER TDRR 22595	28Sep65		WK
E	REVISED PER TDRR 26249	2-1-66		WK
F	REVISED PER TDRR 26254	23Feb66		WK
G	REVISED PER TDRR 27508	31Mar66		WK
H	REVISED PER TDRR 31998	25NOV66	SWE	CP
J	REVISED PER TDRR 32855	4FEB67	DR	WH



.03 MAX
27
28
PIN A
DETAIL C
SCALE 4-1
CRIMP PER ND1002206
F-F
F
F
J7
12
22
TYP
4.300
4.250
2 PLACES
SECTION B-B
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4B
6 PLACES
6
6 PLACES
9
16
SEE NOTE 4B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR2
4
7
13
6 PLACES
A
SEE NOTE 3
8
2 PLACES
17
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4C
6 PLACES
5
SECTION A-A
G
G
J2
11
SEE NOTE 8
J2
B
B
MASTER POLARIZATION KEY
SEE DETAIL C
10.50
9.88
SEE NOTE 16
VIEW G-G
SEE NOTE 9
25
26
33
34
SEE NOTE 4B
E2
19
3 PLACES
24
E2
B4-2
B4-1
SR2
SEE NOTE 8 TYP
23

SEE NOTE 18

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH, ELEC, PRESS SENSITIVE ½ WIDE	36
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
1	1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	1	MS15795-803	WASHER, FLAT, METAL, ROUND	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	A/R	1010870	GREASE, LUBRICATING	31
A/R	A/R	QQ-S-571 SN60	SOLDER	30
A/R	A/R	QQ-S-571 SN10	SOLDER	29
61	61	1010862	BUSHING, SLEEVE	28
61	61	1010781-1	CONTACT, ELEC	27
1	1	1000223	WASHER, CABLE CLAMP	26
1	1	1000220 (SEE NOTE 18)	CLAMP, CABLE	25
1	1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	3	1000020-4	SHIELD & GRD ASS'Y	20
3	3	1000020-10	SHIELD & GRD ASS'Y	19
2	2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	6	1001489-22	SCREW, HEX SOC HD	13
2	2	1010817-106	CONNECTOR, ELEC, RECEPTACLE	12
1	1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	2	1000100-1	TERMINAL, INSULATED	10
1	1	2018621	BALL BEARING DUPLEX	9
2	2	2018731	CLIP WIRE RETAINER	8
1	1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	1	2018766	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1
021	011	LIST OF MATERIALS		

2018601	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± // DECIMALS ± // ANGLES ± // DO NOT SCALE THIS DRAWING MATERIAL // HEAT TREATMENT // FINAL FINISH //	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DRAWN R.W. Cormault DATE 2-20-65 CHECKED G. QUINN 2-24-65 APPROVAL 24Feb65 APPROVAL NASA APPROVAL MIT APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS INTER GIMBAL SUB-ASSEMBLY TORQUE MOTOR END OUTER AXIS CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018609 SCALE 2-1 WT SHEET 1 OF 15
NEXT ASSY	USED ON			
APPLICATION				

J 2018609

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
1					19						
1-B		E2					SHLD 1				
1-1		J2-1	.17	N			SR2-1				
1-2		J2-2	.17	N			SR2-2				
1-3		J2-3	.17	N			SR2-3				
2		J2-4	.17	N			SR2-4				
3		J2-5	.17	N			SR2-5				
4-1		J2-6	.17	N			SR2-6				
4-2		J2-7	.17	N			SR2-7				
5-1		J2-8	.17	N			SR2-8				
5-2		J2-9	.17	N			SR2-9				
6-1		J2-10	.17	N			SR2-10				
6-2		J2-11	.17	N			SR2-11				
7					19						
7-B		E2					SHLD 7				
7-1		J2-12	.17	N			SR2-12				
7-2		J2-13	.17	N			SR2-13				
7-3		J2-14	.17	N			SR2-14				

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NASA DRAWING NO. 2018609-011
SHEET 3 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
8		J2-15	.17	N			SR2-15				
9		J2-16	.17	N			SR2-16				
10-1		J2-17	.17	N			SR2-17				
10-2		J2-18	.17	N			SR2-18				
11-1		J2-19	.17	N			SR2-19				
11-2		J2-20	.17	N			SR2-20				
11-3		J2-21	.17	N			SR2-21				
11-4		J2-22	.17	N			SR2-22				
11-5		J2-23	.17	N			SR2-23				
11-6		J2-24	.17	N			SR2-24				
12		J2-25	.17	N			SR2-25				
13		J2-26	.17	N			SR2-26				
14		J2-27	.17	N			SR2-27				
15		J2-28	.17	N			SR2-28				
16		J2-32	.17	N			SR2-32				
17		J2-33	.17	N			SR2-33				
18		J2-34	.17	N			SR2-34				

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SHEET 4 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
19-1		J2-35	.17	N			SR2-35				
19-2		J2-36	.17	N			SR2-36				
20-1		J2-37	.17	N			SR2-37				
20-2		J2-38	.17	N			SR2-38				
21-1		J2-39	.17	N			SR2-39				
21-2		J2-40	.17	N			SR2-40				
22-1		J2-41	.17	N			SR2-41				
22-2		J2-42	.17	N			SR2-42				
23		J2-43	.17	N			SR2-43				
24		J2-44	.17	N			SR2-44				
25		J2-45	.17	N			SR2-45				
26		J2-46	.17	N			SR2-46				
27		J2-47	.17	N			SR2-47				
28		J2-48	.17	N			SR2-48				
29		J2-49	.17	N			SR2-49				
30		J2-50	.17	N			SR2-50				

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
31	23	J2-51	.17	N			B4-1	.25	Y		
32	24	J2-52	.17	N			B4-2	.25	Y		
33		B4-BLK					B4-1	.25	Y		
34		B4-WHT					B4-2	.25	Y		
35					19						
35-B		E2					SHLD 35				
35-1		J2-59	.17	N			SR2-29				
35-2		J2-60	.17	N			SR2-30				
35-3		J2-61	.17	N			SR2-31				
36					20						
36-A		SHLD-36					E11				
36-1		J7-A	.17	Y	22		SR2-1				
36-2		J7-B	.17	Y	22		SR2-2				
36-3		J7-C	.17	Y	22		SR2-3				
37		J7-D	.17	Y	22		SR2-4				
38		J7-E	.17	Y	22		SR2-5				
39-1		J7-F	.17	Y	22		SR2-6				
39-2		J7-H	.17	Y	22		SR2-7				

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION SPEC FIND NO.	TO NO.
57-1			J8-R	.17	Y	22		SR2-39				
57-2			J8-S	.17	Y	22		SR2-40				
58-1			J8-T	.17	Y	22		SR2-41				
58-2			J8-U	.17	Y	22		SR2-42				
59			J8-V	.17	Y	22		SR2-43				
60			J8-W	.17	Y	22		SR2-44				
61			J8-X	.17	Y	22		SR2-45				
62			J8-Y	.17	Y	22		SR2-46				
63			J8-Z	.17	Y	22		SR2-47				
64			J8-a	.17	Y	22		SR2-48				
65			J8-b	.17	Y	22		SR2-49				
66			J8-c	.17	Y	22		SR2-50				

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REVISION J
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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION SPEC FIND NO.	TO NO.
40-1			J7-J	.17	Y	22		SR2-8				
40-2			J7-K	.17	Y	22		SR2-9				
41-1			J7-L	.17	Y	22		SR2-10				
41-2			J7-M	.17	Y	22		SR2-11				
42						20						
42-A			SHLD-42					E11				
42-1			J7-N	.17	Y	22		SR2-12				
42-2			J7-P	.17	Y	22		SR2-13				
42-3			J7-R	.17	Y	22		SR2-14				
43			J7-S	.17	Y	22		SR2-15				
44			J7-T	.17	Y	22		SR2-16				
45-1			J7-U	.17	Y	22		SR2-17				
45-2			J7-V	.17	Y	22		SR2-18				
46-1			J7-W	.17	Y	22		SR2-19				
46-2			J7-X	.17	Y	22		SR2-20				
46-3			J7-Y	.17	Y	22		SR2-21				
46-4			J7-Z	.17	Y	22		SR2-22				
46-5			J7-a	.17	Y	22		SR2-23				

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SHEET 9 of 15
REVISION J
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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION SPEC FIND NO.	TO NO.
1						19						
1-B			E2					SHLD 1				
1-1			J2-1	.17	N			SR2-1				
1-2			J2-2	.17	N			SR2-2				
1-3			J2-3	.17	N			SR2-3				
2			J2-4	.17	N			SR2-4				
3			J2-5	.17	N			SR2-5				
4-1			J2-8	.17	N			SR2-6				
4-2			J2-9	.17	N			SR2-7				
5-1			J2-6	.17	N			SR2-8				
5-2			J2-7	.17	N			SR2-9				
6-1			J2-11	.17	N			SR2-10				
6-2			J2-10	.17	N			SR2-11				
7						19						
7-B			E2					SHLD 7				
7-1			J2-12	.17	N			SR2-12				
7-2			J2-13	.17	N			SR2-13				
7-3			J2-14	.17	N			SR2-14				

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION SPEC FIND NO.	TO NO.
46-6			J7-b	.17	Y	22		SR2-24				
47			J7-c	.17	Y	22		SR2-25				
48			J8-A	.17	Y	22		SR2-26				
49			J8-B	.17	Y	22		SR2-27				
50			J8-C	.17	Y	22		SR2-28				
51						20						
51-A			SHLD-51					E12				
51-1			J8-D	.17	Y	22		SR2-29				
51-2			J8-E	.17	Y	22		SR2-30				
51-3			J8-F	.17	Y	22		SR2-31				
52			J8-H	.17	Y	22		SR2-32				
53			J8-J	.17	Y	22		SR2-33				
54			J8-K	.17	Y	22		SR2-34				
55-1			J8-L	.17	Y	22		SR2-35				
55-2			J8-M	.17	Y	22		SR2-36				
56-1			J8-N	.17	Y	22		SR2-37				
56-2			J8-P	.17	Y	22		SR2-38				

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NASA DRAWING NO. 2018609-021
SHEET 12 of 15

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
31	23		J2-51	.17	N				B4-1	.25	Y			
32	24		J2-52	.17	N				B4-2	.25	Y			
33			B4-BLK						B4-1	.25	Y			
34			B4-WHT						B4-2	.25	Y			
35						19								
35-B			E2						SHLD 35					
35-1			J2-59	.17	N				SR2-29					
35-2			J2-60	.17	N				SR2-30					
35-3			J2-61	.17	N				SR2-31					
36						20								
36-A			SHLD-36						E11					
36-1			J7-A	.17	Y	22			SR2-1					
36-2			J7-B	.17	Y	22			SR2-2					
36-3			J7-C	.17	Y	22			SR2-3					
37			J7-D	.17	Y	22			SR2-4					
38			J7-E	.17	Y	22			SR2-5					
39-1			J7-F	.17	Y	22			SR2-6					
39-2			J7-H	.17	Y	22			SR2-7					

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NASA DRAWING NO. 2018609-021
SHEET 10 of 15

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
8			J2-15	.17	N				SR2-15					
9			J2-16	.17	N				SR2-16					
10-1			J2-17	.17	N				SR2-17					
10-2			J2-18	.17	N				SR2-18					
11-1			J2-20	.17	N				SR2-19					
11-2			J2-19	.17	N				SR2-20					
11-3			J2-21	.17	N				SR2-21					
11-4			J2-22	.17	N				SR2-22					
11-5			J2-23	.17	N				SR2-23					
11-6			J2-24	.17	N				SR2-24					
12			J2-25	.17	N				SR2-25					
13			J2-26	.17	N				SR2-26					
14			J2-27	.17	N				SR2-27					
15			J2-28	.17	N				SR2-28					
16			J2-32	.17	N				SR2-32					
17			J2-33	.17	N				SR2-33					
18			J2-34	.17	N				SR2-34					

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CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
40-1			J7-J	.17	Y	22			SR2-8					
40-2			J7-K	.17	Y	22			SR2-9					
41-1			J7-L	.17	Y	22			SR2-10					
41-1			J7-M	.17	Y	22			SR2-11					
42						20								
42-A			SHLD-42						E11					
42-1			J7-N	.17	Y	22			SR2-12					
42-2			J7-P	.17	Y	22			SR2-13					
42-3			J7-R	.17	Y	22			SR2-14					
43			J7-S	.17	Y	22			SR2-15					
44			J7-T	.17	Y	22			SR2-16					
45-1			J7-U	.17	Y	22			SR2-17					
45-2			J7-V	.17	Y	22			SR2-18					
46-1			J7-W	.17	Y	22			SR2-19					
46-2			J7-X	.17	Y	22			SR2-20					
46-3			J7-Y	.17	Y	22			SR2-21					
46-4			J7-Z	.17	Y	22			SR2-22					
46-5			J7-a	.17	Y	22			SR2-23					

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NASA DRAWING NO. 2018609-021
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CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
19-1			J2-35	.17	N				SR2-35					
19-2			J2-36	.17	N				SR2-36					
20-1			J2-37	.17	N				SR2-37					
20-2			J2-38	.17	N				SR2-38					
21-1			J2-39	.17	N				SR2-39					
21-2			J2-40	.17	N				SR2-40					
22-1			J2-41	.17	N				SR2-41					
22-2			J2-42	.17	N				SR2-42					
23			J2-43	.17	N				SR2-43					
24			J2-44	.17	N				SR2-44					
25			J2-45	.17	N				SR2-45					
26			J2-46	.17	N				SR2-46					
27			J2-47	.17	N				SR2-47					
28			J2-48	.17	N				SR2-48					
29			J2-49	.17	N				SR2-49					
30			J2-50	.17	N				SR2-50					

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC	NO.
46-6		J7-b	.17	Y		22		SR2-24					
47		J7-c	.17	Y		22		SR2-25					
48		J8-A	.17	Y		22		SR2-26					
49		J8-B	.17	Y		22		SR2-27					
50		J8-C	.17	Y		22		SR2-28					
51						20							
51-A		SHLD-51						E12					
51-1		J8-D	.17	Y		22		SR2-29					
51-2		J8-E	.17	Y		22		SR2-30					
51-3		J8-F	.17	Y		22		SR2-31					
52		J8-H	.17	Y		22		SR2-32					
53		J8-J	.17	Y		22		SR2-33					
54		J8-K	.17	Y		22		SR2-34					
55-1		J8-L	.17	Y		22		SR2-35					
55-2		J8-M	.17	Y		22		SR2-36					
56-1		J8-N	.17	Y		22		SR2-37					
56-2		J8-P	.17	Y		22		SR2-38					

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC	NO.
57-1		J8-R	.17	Y		22		SR2-39					
57-2		J8-S	.17	Y		22		SR2-40					
58-1		J8-T	.17	Y		22		SR2-41					
58-2		J8-U	.17	Y		22		SR2-42					
59		J8-V	.17	Y		22		SR2-43					
60		J8-W	.17	Y		22		SR2-44					
61		J8-X	.17	Y		22		SR2-45					
62		J8-Y	.17	Y		22		SR2-46					
63		J8-Z	.17	Y		22		SR2-47					
64		J8-a	.17	Y		22		SR2-48					
65		J8-b	.17	Y		22		SR2-49					
66		J8-c	.17	Y		22		SR2-50					

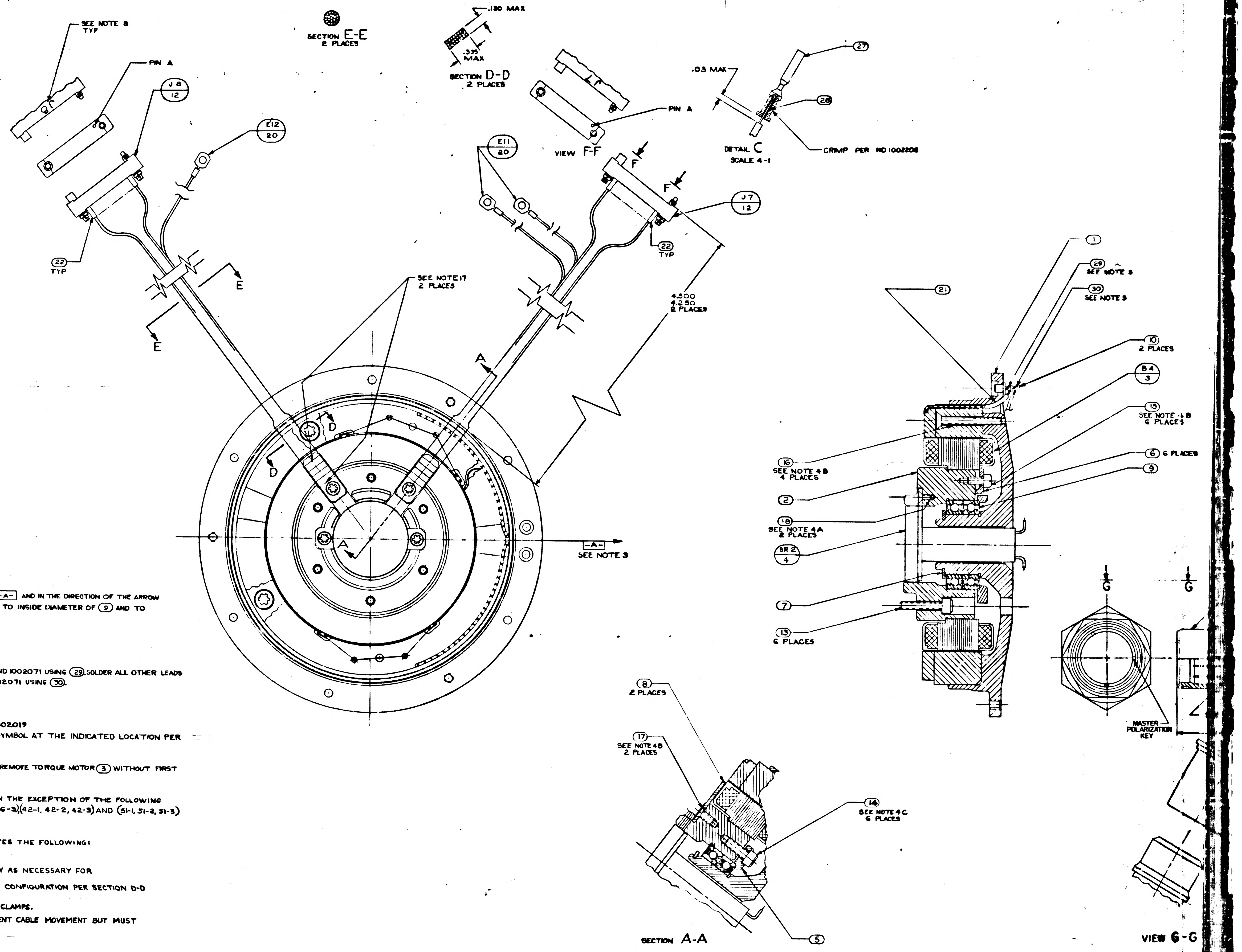
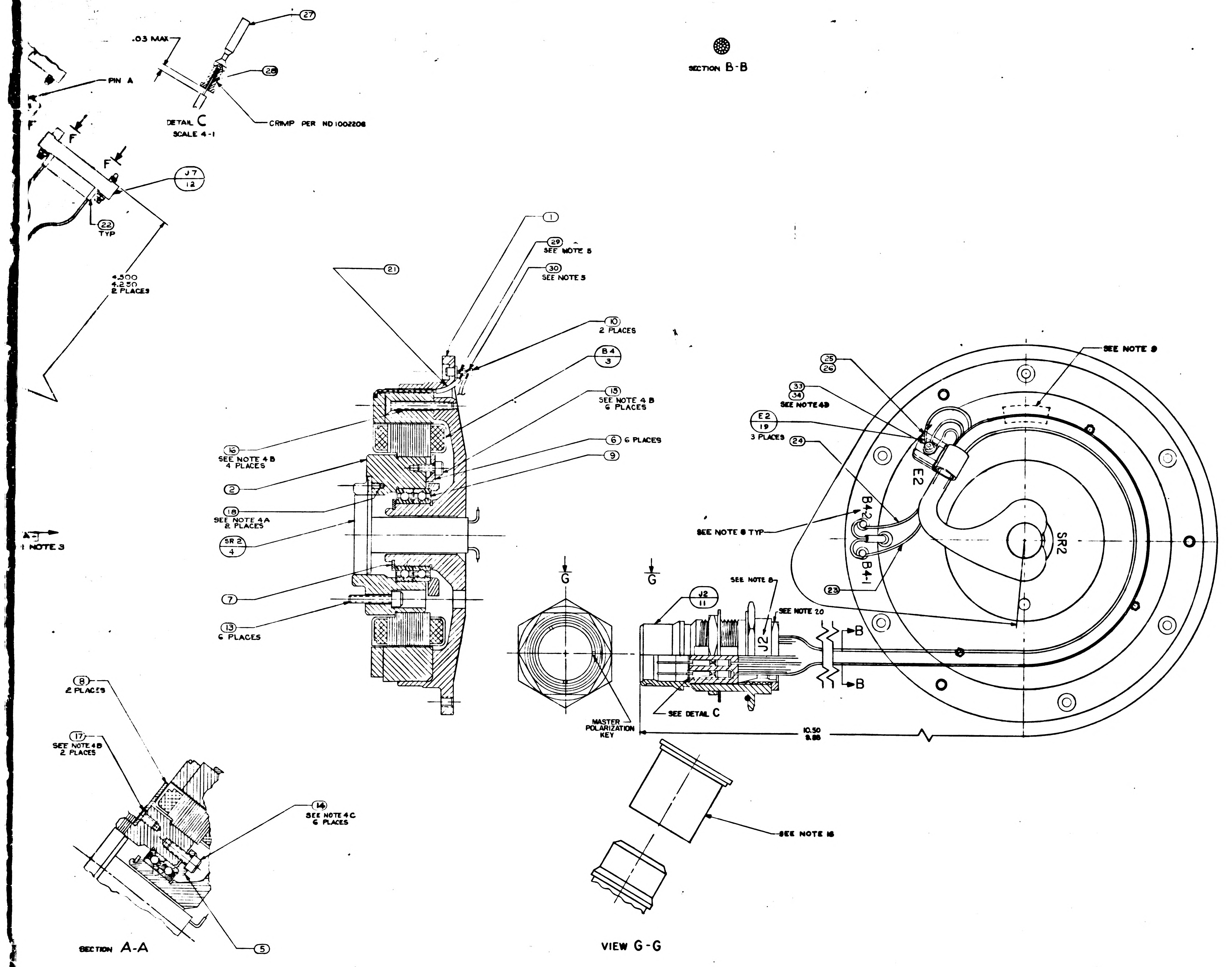

SEE NOTE 8 TYP
PIN A
J8 / 12
E12 / 20
22 TYP
E
E
SECTION E-E 2 PLACES
.130 MAX
.335 MAX
SECTION D-D 2 PLACES
VIEW F-F
PIN A
E11 / 20
F
F
J7 / 12
22 TYP
.03 MAX
27
28
DETAIL C SCALE 4-1
CRIMP PER ND1002208
SEE NOTE 17 2 PLACES
4.300 4.250 2 PLACES
A
A
D
D
-A- SEE NOTE 3
1
29 SEE NOTE 5
30 SEE NOTE 5
21
10 2 PLACES
B4 / 3
15 SEE NOTE 4B 6 PLACES
16 SEE NOTE 4B 4 PLACES
6 6 PLACES
9
2
18 SEE NOTE 4A 2 PLACES
SR2 / 4
7
13 6 PLACES
G
G
MASTER POLARIZATION KEY
8 2 PLACES
17 SEE NOTE 4B 2 PLACES
14 SEE NOTE 4C 6 PLACES
5
SECTION A-A
VIEW G-G

TABLE I	
CABLE CLAMP ㉕	
PART NUMBER	DIA. REF.
1000220-5	.234
1000220-6	.287
1000202-7	.359
1000220-15	.265
1000220-16	.328
1000220-17	.390

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS 2018609 FOR -011 CONFIGURATION OR PS 2016146 FOR -021 CONFIGURATION
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   A. 3.5 IN LB
   B. 5.0 IN LB
   C. 10.0 IN LB
   D. 6.5 IN. LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $^{.10}_{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
   A = SHIELD GROUND ON "FROM END"
   B = SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION
17. TAPE HARNESS IN AREA INDICATED USING ITEM ㉟ TO MAINTAIN HARNESS CONFIGURATION PER SECTION D-D AND SECURE HARNESS TO ITEM ⑧ WITH ITEM ㉟
18. TAPE ㊱ SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
19. ITEM ㉕ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT BUT MUST NOT PINCH WIRES.
20. TORQUE RETAINING NUT TO 45-55 lb.-IN.

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 1463			
A	REVISED TDRR 17687	[illegible]		WK
B	REVISED PER TDRR 19276	[illegible]		WK
C	REVISED PER TDRR 21673	31 [illegible]		WK
D	REVISED PER TDRR 22585	28 Sep 65		WK
E	REVISED PER TDRR 26249	2-1-66		WK
F	REVISED PER TDRR 26254	[illegible]		WK
G	REVISED PER TDRR 27508	[illegible]		WK
H	REVISED PER TDRR 31884	25 NOV 66	JWE	CP
J	REVISED PER TDRR 32855	6 FEB 67	DR	WH
K	REVISED PER TDRR 33178	13 MAR 67		RCB


.03 MAX
27
28
PIN A
CRIMP PER ND1002208
DETAIL C
SCALE 4-1
SECTION B-B
F
F
J7
12
22
TYP
4.300
4.250
2 PLACES
A
NOTE 3
21
1
29
SEE NOTE 5
30
SEE NOTE 5
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6
6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR 2
4
7
13
6 PLACES
8
2 PLACES
17
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4C
6 PLACES
5
SECTION A-A
G
G
J2
11
SEE NOTE 8
SEE NOTE 20
J2
B
B
MASTER POLARIZATION KEY
SEE DETAIL C
10.50
9.88
SEE NOTE 16
VIEW G-G
SEE NOTE 9
25
26
33
34
SEE NOTE 4B
E2
19
3 PLACES
24
E2
B4-2
B4-1
SEE NOTE 8 TYP
SR2
23

SEE NOTE 18

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH, ELEC, PRESS SENSITIVE ½ WIDE	36
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
1	1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	1	MS15795-803	WASHER, FLAT, METAL, ROUND	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	A/R	1010870	GREASE, LUBRICATING	31
A/R	A/R	QQ-S-571 SN60	SOLDER	30
A/R	A/R	QQ-S-571 SN10	SOLDER	29
61	61	1010862	BUSHING, SLEEVE	28
61	61	1010781-1	CONTACT, ELEC	27
1	1	1000223	WASHER, CABLE CLAMP	26
1	1	1000220 (SEE NOTE 18)	CLAMP, CABLE	25
1	1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	3	1000020-4	SHIELD & GRD ASS'Y	20
3	3	1000020-10	SHIELD & GRD ASS'Y	19
2	2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	6	1001489-22	SCREW, HEX SOC HD	13
2	2	1010917-106	CONNECTOR, ELEC, RECEPTACLE	12
1	1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	2	1000100-1	TERMINAL INSULATED	10
1	1	2018621	BALL BEARING DUPLEX	9
2	2	2018731	CLIP WIRE RETAINER	8
1	1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	1	2018766	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1
021	011	LIST OF MATERIALS		

2018601	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —/— DECIMALS ± —/— ANGLES ± —/—
DO NOT SCALE THIS DRAWING
MATERIAL —/—
HEAT TREATMENT —/—
FINAL FINISH —/—

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN R.W. Connolly DATE 2-20-65
CHECKED G. Quinn 2-24-65
APPROVAL 24 Feb 65
APPROVAL
NASA APPROVAL
MIT APPROVAL

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INTER GIMBAL
SUB-ASSEMBLY
TORQUE MOTOR END
OUTER AXIS

CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018609
SCALE 2-1 WT SHEET 1 OF 1

K
2018609

MASTER

2018609 Y 1

2/2018609

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
1					19						
1-B		E2					SHLD 1				
1-1		J2-1	.17	N			SR2-1				
1-2		J2-2	.17	N			SR2-2				
1-3		J2-3	.17	N			SR2-3				
2		J2-4	.17	N			SR2-4				
3		J2-5	.17	N			SR2-5				
4-1		J2-6	.17	N			SR2-6				
4-2		J2-7	.17	N			SR2-7				
5-1		J2-8	.17	N			SR2-8				
5-2		J2-9	.17	N			SR2-9				
6-1		J2-10	.17	N			SR2-10				
6-2		J2-11	.17	N			SR2-11				
7					19						
7-B		E2					SHLD 7				
7-1		J2-12	.17	N			SR2-12				
7-2		J2-13	.17	N			SR2-13				
7-3		J2-14	.17	N			SR2-14				

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NASA DRAWING NO. 2018609-011
SHEET 3 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
8		J2-15	.17	N			SR2-15				
9		J2-16	.17	N			SR2-16				
10-1		J2-17	.17	N			SR2-17				
10-2		J2-18	.17	N			SR2-18				
11-1		J2-19	.17	N			SR2-19				
11-2		J2-20	.17	N			SR2-20				
11-3		J2-21	.17	N			SR2-21				
11-4		J2-22	.17	N			SR2-22				
11-5		J2-23	.17	N			SR2-23				
11-6		J2-24	.17	N			SR2-24				
12		J2-25	.17	N			SR2-25				
13		J2-26	.17	N			SR2-26				
14		J2-27	.17	N			SR2-27				
15		J2-28	.17	N			SR2-28				
16		J2-32	.17	N			SR2-32				
17		J2-33	.17	N			SR2-33				
18		J2-34	.17	N			SR2-34				

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NASA DRAWING NO. 2018609-011
SHEET 4 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
19-1		J2-35	.17	N			SR2-35				
19-2		J2-36	.17	N			SR2-36				
20-1		J2-37	.17	N			SR2-37				
20-2		J2-38	.17	N			SR2-38				
21-1		J2-39	.17	N			SR2-39				
21-2		J2-40	.17	N			SR2-40				
22-1		J2-41	.17	N			SR2-41				
22-2		J2-42	.17	N			SR2-42				
23		J2-43	.17	N			SR2-43				
24		J2-44	.17	N			SR2-44				
25		J2-45	.17	N			SR2-45				
26		J2-46	.17	N			SR2-46				
27		J2-47	.17	N			SR2-47				
28		J2-48	.17	N			SR2-48				
29		J2-49	.17	N			SR2-49				
30		J2-50	.17	N			SR2-50				

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NASA DRAWING NO. 2018609-011
SHEET 5 of 15

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
31	23	J2-51	.17	N			B4-1	.25	Y		
32	24	J2-52	.17	N			B4-2	.25	Y		
33		B4-BLK					B4-1	.25	Y		
34		B4-WHT					B4-2	.25	Y		
35					19						
35-B		E2					SHLD 35				
35-1		J2-59	.17	N			SR2-29				
35-2		J2-60	.17	N			SR2-30				
35-3		J2-61	.17	N			SR2-31				
36					20						
36-A		SHLD-36					E11				
36-1		J7-A	.17	Y	22		SR2-1				
36-2		J7-B	.17	Y	22		SR2-2				
36-3		J7-C	.17	Y	22		SR2-3				
37		J7-D	.17	Y	22		SR2-4				
38		J7-E	.17	Y	22		SR2-5				
39-1		J7-F	.17	Y	22		SR2-6				
39-2		J7-H	.17	Y	22		SR2-7				

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.
40-1			J7-J	.17	Y	22		SR2-8				
40-2			J7-K	.17	Y	22		SR2-9				
41-1			J7-L	.17	Y	22		SR2-10				
41-2			J7-M	.17	Y	22		SR2-11				
42						20						
42-A			SHLD-42					E11				
42-1			J7-N	.17	Y	22		SR2-12				
42-2			J7-P	.17	Y	22		SR2-13				
42-3			J7-R	.17	Y	22		SR2-14				
43			J7-S	.17	Y	22		SR2-15				
44			J7-T	.17	Y	22		SR2-16				
45-1			J7-U	.17	Y	22		SR2-17				
45-2			J7-V	.17	Y	22		SR2-18				
46-1			J7-W	.17	Y	22		SR2-19				
46-2			J7-X	.17	Y	22		SR2-20				
46-3			J7-Y	.17	Y	22		SR2-21				
46-4			J7-Z	.17	Y	22		SR2-22				
46-5			J7-a	.17	Y	22		SR2-23				

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SHEET 7 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.
46-6			J7-b	.17	Y	22		SR2-24				
47			J7-c	.17	Y	22		SR2-25				
48			J8-A	.17	Y	22		SR2-26				
49			J8-B	.17	Y	22		SR2-27				
50			J8-C	.17	Y	22		SR2-28				
51						20						
51-A			SHLD-51					E12				
51-1			J8-D	.17	Y	22		SR2-29				
51-2			J8-E	.17	Y	22		SR2-30				
51-3			J8-F	.17	Y	22		SR2-31				
52			J8-H	.17	Y	22		SR2-32				
53			J8-J	.17	Y	22		SR2-33				
54			J8-K	.17	Y	22		SR2-34				
55-1			J8-L	.17	Y	22		SR2-35				
55-2			J8-M	.17	Y	22		SR2-36				
56-1			J8-N	.17	Y	22		SR2-37				
56-2			J8-F	.17	Y	22		SR2-38				

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NASA DRAWING NO.
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SHEET 8 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.
57-1			J8-R	.17	Y	22		SR2-39				
57-2			J8-S	.17	Y	22		SR2-40				
58-1			J8-T	.17	Y	22		SR2-41				
58-2			J8-U	.17	Y	22		SR2-42				
59			J8-V	.17	Y	22		SR2-43				
60			J8-W	.17	Y	22		SR2-44				
61			J8-X	.17	Y	22		SR2-45				
62			J8-Y	.17	Y	22		SR2-46				
63			J8-Z	.17	Y	22		SR2-47				
64			J8-a	.17	Y	22		SR2-48				
65			J8-b	.17	Y	22		SR2-49				
66			J8-c	.17	Y	22		SR2-50				

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NASA DRAWING NO.
2018609-021
SHEET 9 of 15

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.
1						19						
1-B			E2					SHLD 1				
1-1			J2-1	.17	N			SR2-1				
1-2			J2-2	.17	N			SR2-2				
1-3			J2-3	.17	N			SR2-3				
2			J2-4	.17	N			SR2-4				
3			J2-5	.17	N			SR2-5				
4-1			J2-8	.17	N			SR2-6				
4-2			J2-9	.17	N			SR2-7				
5-1			J2-6	.17	N			SR2-8				
5-2			J2-7	.17	N			SR2-9				
6-1			J2-11	.17	N			SR2-10				
6-2			J2-10	.17	N			SR2-11				
7						19						
7-B			E2					SHLD 7				
7-1			J2-12	.17	N			SR2-12				
7-2			J2-13	.17	N			SR2-13				
7-3			J2-14	.17	N			SR2-14				

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CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y / N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y / N	TERMINATION FIND NO.	SPEC NO.
8			J2-15	.17	N			SR2-15				
9			J2-16	.17	N			SR2-16				
10-1			J2-17	.17	N			SR2-17				
10-2			J2-18	.17	N			SR2-18				
11-1			J2-19	.17	N			SR2-19				
11-2			J2-20	.17	N			SR2-20				
11-3			J2-21	.17	N			SR2-21				
11-4			J2-22	.17	N			SR2-22				
11-5			J2-23	.17	N			SR2-23				
11-6			J2-24	.17	N			SR2-24				
12			J2-25	.17	N			SR2-25				
13			J2-26	.17	N			SR2-26				
14			J2-27	.17	N			SR2-27				
15			J2-28	.17	N			SR2-28				
16			J2-32	.17	N			SR2-32				
17			J2-33	.17	N			SR2-33				
18			J2-34	.17	N			SR2-34				

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2018609-021
SHEET 11 of 15

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y / N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y / N	TERMINATION FIND NO.	SPEC NO.
19-1			J2-35	.17	N			SR2-35				
19-2			J2-36	.17	N			SR2-36				
20-1			J2-37	.17	N			SR2-37				
20-2			J2-38	.17	N			SR2-38				
21-1			J2-39	.17	N			SR2-39				
21-2			J2-40	.17	N			SR2-40				
22-1			J2-41	.17	N			SR2-41				
22-2			J2-42	.17	N			SR2-42				
23			J2-43	.17	N			SR2-43				
24			J2-44	.17	N			SR2-44				
25			J2-45	.17	N			SR2-45				
26			J2-46	.17	N			SR2-46				
27			J2-47	.17	N			SR2-47				
28			J2-48	.17	N			SR2-48				
29			J2-49	.17	N			SR2-49				
30			J2-50	.17	N			SR2-50				

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NASA DRAWING NO.
2018609-021
SHEET 12 of 15

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y / N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y / N	TERMINATION FIND NO.	SPEC NO.
31	23		J2-51	.17	N			B4-1	25	Y		
32	24		J2-52	.17	N			B4-2	25	Y		
33			B4-BLK					B4-1	25	Y		
34			B4-WHT					B4-2	25	Y		
35						19						
35-B			E2					SHLD 35				
35-1			J2-59	.17	N			SR2-29				
35-2			J2-60	.17	N			SR2-30				
35-3			J2-61	.17	N			SR2-31				
36						20						
36-A			SHLD-36					E11				
36-1			J7-A	.17	Y	22		SR2-1				
36-2			J7-B	.17	Y	22		SR2-2				
36-3			J7-C	.17	Y	22		SR2-3				
37			J7-D	.17	Y	22		SR2-4				
38			J7-E	.17	Y	22		SR2-5				
39-1			J7-F	.17	Y	22		SR2-6				
39-2			J7-H	.17	Y	22		SR2-7				

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CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y / N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y / N	TERMINATION FIND NO.	SPEC NO.
40-1			J7-J	.17	Y	22		SR2-8				
40-2			J7-K	.17	Y	22		SR2-9				
41-1			J7-L	.17	Y	22		SR2-10				
41-1			J7-M	.17	Y	22		SR2-11				
42						20						
42-A			SHLD-42					E11				
42-1			J7-N	.17	Y	22		SR2-12				
42-2			J7-P	.17	Y	22		SR2-13				
42-3			J7-R	.17	Y	22		SR2-14				
43			J7-S	.17	Y	22		SR2-15				
44			J7-T	.17	Y	22		SR2-16				
45-1			J7-U	.17	Y	22		SR2-17				
45-2			J7-V	.17	Y	22		SR2-18				
46-1			J7-W	.17	Y	22		SR2-19				
46-2			J7-X	.17	Y	22		SR2-20				
46-3			J7-Y	.17	Y	22		SR2-21				
46-4			J7-Z	.17	Y	22		SR2-22				
46-5			J7-a	.17	Y	22		SR2-23				

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
46-6			J7-b	.17	Y	22		SR2-24				
47			J7-c	.17	Y	22		SR2-25				
48			J8-A	.17	Y	22		SR2-26				
49			J8-B	.17	Y	22		SR2-27				
50			J8-C	.17	Y	22		SR2-28				
51						20						
51-A			SHLD-51					E12				
51-1			J8-D	.17	Y	22		SR2-29				
51-2			J8-E	.17	Y	22		SR2-30				
51-3			J8-F	.17	Y	22		SR2-31				
52			J8-H	.17	Y	22		SR2-32				
53			J8-J	.17	Y	22		SR2-33				
54			J8-K	.17	Y	22		SR2-34				
55-1			J8-L	.17	Y	22		SR2-35				
55-2			J8-M	.17	Y	22		SR2-36				
56-1			J8-N	.17	Y	22		SR2-37				
56-2			J8-P	.17	Y	22		SR2-38				

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
57-1			J8-R	.17	Y	22		SR2-39				
57-2			J8-S	.17	Y	22		SR2-40				
58-1			J8-T	.17	Y	22		SR2-41				
58-2			J8-U	.17	Y	22		SR2-42				
59			J8-V	.17	Y	22		SR2-43				
60			J8-W	.17	Y	22		SR2-44				
61			J8-X	.17	Y	22		SR2-45				
62			J8-Y	.17	Y	22		SR2-46				
63			J8-Z	.17	Y	22		SR2-47				
64			J8-a	.17	Y	22		SR2-48				
65			J8-b	.17	Y	22		SR2-49				
66			J8-c	.17	Y	22		SR2-50				

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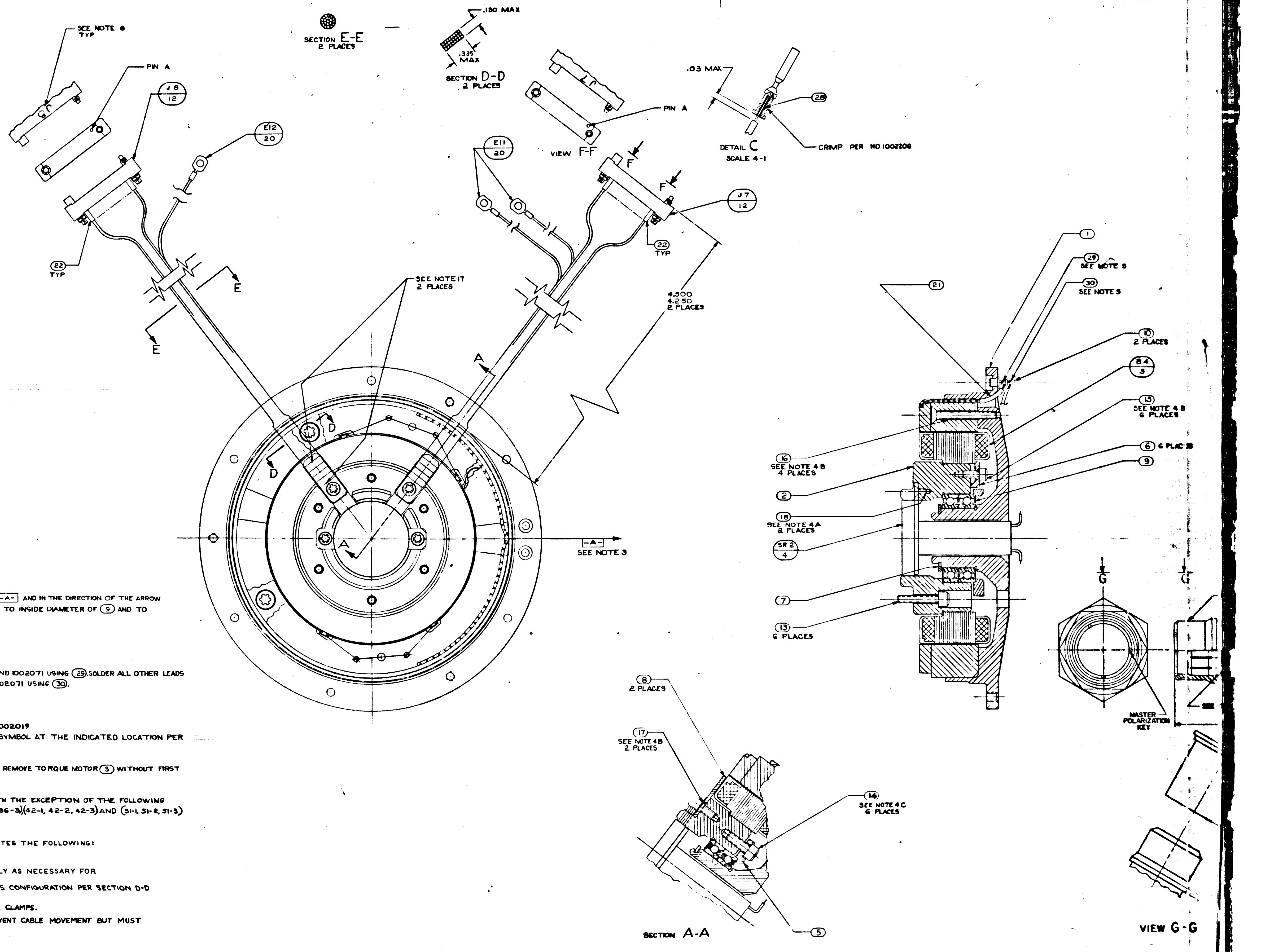
TABLE I	
CABLE CLAMP ㉕	
PART NUMBER	DIA. REF.
1000220-5	.234
1000220-6	.287
1000202-7	.359
1000220-15	.265
1000220-16	.328
1000220-17	.390


SEE NOTE 8
TYP
PIN A
J8
12
E12
20
22
TYP
E
SECTION E-E
2 PLACES
.130 MAX
.335 MAX
SECTION D-D
2 PLACES
VIEW F-F
PIN A
E11
20
F
J7
12
22
TYP
.03 MAX
28
DETAIL C
SCALE 4-1
CRIMP PER ND1002206
SEE NOTE 17
2 PLACES
4.500
4.250
2 PLACES
A
D
-A-
SEE NOTE 3
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
16
SEE NOTE 4 B
4 PLACES
6
6 PLACES
9
2
18
SEE NOTE 4A
8 PLACES
SR2
4
7
13
6 PLACES
G
MASTER POLARIZATION KEY
8
2 PLACES
17
SEE NOTE 4 B
2 PLACES
14
SEE NOTE 4 C
6 PLACES
5
SECTION A-A
VIEW G-G

NOTES

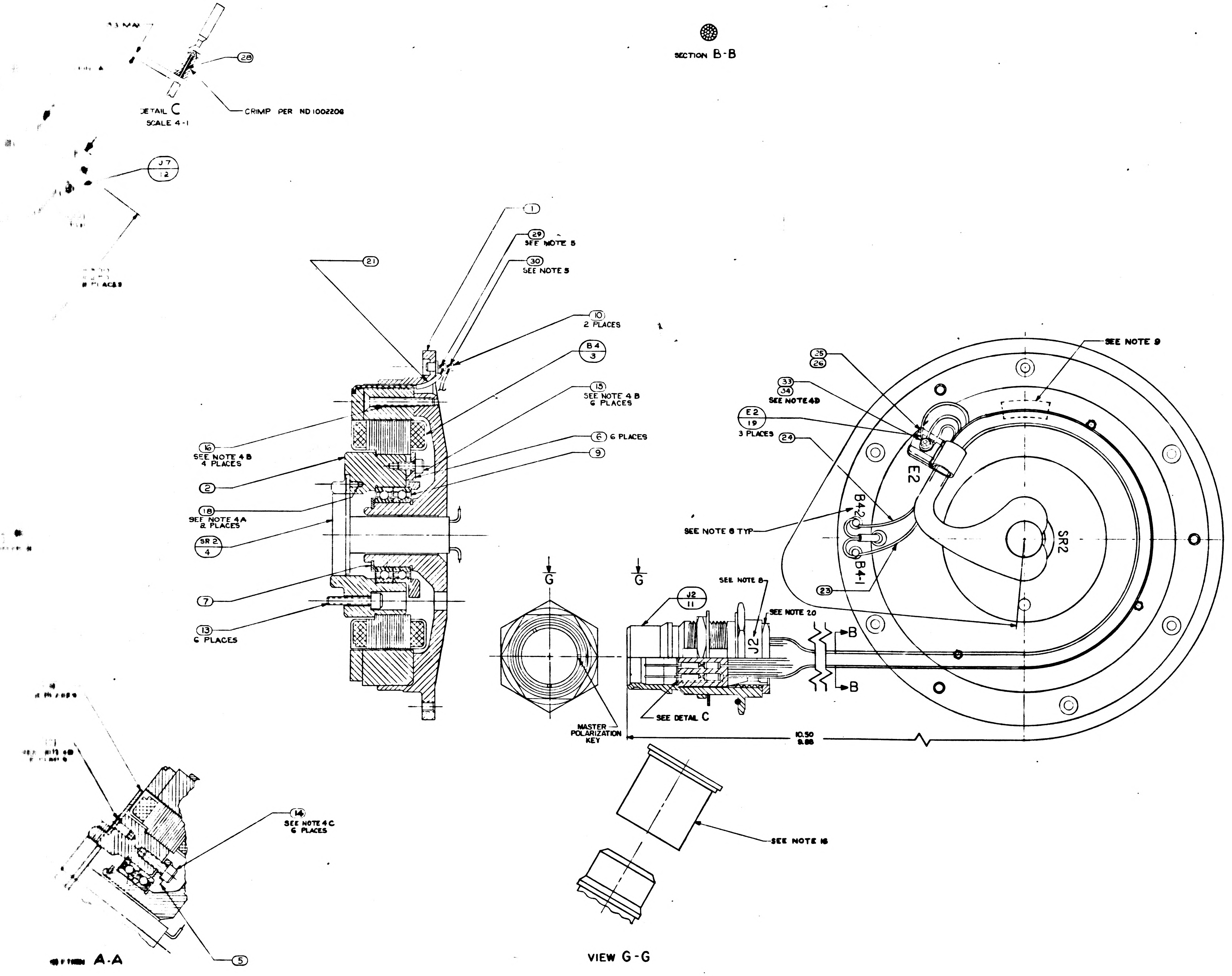
1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS 2018609 FOR -011 CONFIGURATION OR PS 2016146 FOR -021 CONFIGURATION
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
   - D. 6.5 IN. LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
   - A - SHIELD GROUND ON "FROM END"
   - B - SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION
17. TAPE HARNESS IN AREA INDICATED USING ITEM ㉟ TO MAINTAIN HARNESS CONFIGURATION PER SECTION D-D AND SECURE HARNESS TO ITEM ⑧ WITH ITEM ㉟
18. TAPE ㊱ SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
19. ITEM ㉕ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT BUT MUST NOT PINCH WIRES.
20. TORQUE RETAINING NUT TO 45-55 lb.-IN.

	REV	SHEET
2018609	L	1

1/2018609

SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 17687			
B	REVISED PER TDRR 19276	2 Jun 65		
C	REVISED PER TDRR 21673	31 Aug 65		
D	REVISED PER TDRR 22585	28 Sep 65		
E	REVISED PER TDRR 26249	2-1-66		
F	REVISED PER TDRR 26254	23 Feb 66		
G	REVISED PER TDRR 27508	31 Mar 66		
H	REVISED PER TDRR 31988	25 NOV 66	JWP	CP
J	REVISED PER TDRR 32855	4 FEB 67	DR	WH
K	REVISED PER TDRR 33178	3 MAR 67		RCB
L	REVISED PER TDRR 33465	7 APR 67		

REVISIONS TDRR 16673



SECTION B-B
DETAIL C
SCALE 4-1
28
CRIMP PER ND 1002208
J7
12
8 PLACES
1
29 SEE NOTE 5
30 SEE NOTE 5
21
10 2 PLACES
B4
3
15 SEE NOTE 4 B 6 PLACES
6 6 PLACES
9
16 SEE NOTE 4 B 4 PLACES
2
18 SEE NOTE 4A 2 PLACES
SR 2
4
7
13 6 PLACES
25
26
33
34
SEE NOTE 4D
E2
19
3 PLACES
24
SEE NOTE 9
E2
B4-2
B4-1
SR2
SEE NOTE 6 TYP
23
G
G
J2
11
SEE NOTE 8
SEE NOTE 20
J2
B
B
MASTER POLARIZATION KEY
SEE DETAIL C
10.50
9.88
SEE NOTE 16
VIEW G-G
14
SEE NOTE 4C 6 PLACES
5
SECTION A-A

SEE NOTE 18

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH, ELEC, PRESS SENSITIVE ½ WIDE	36
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
1	1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	1	MS15795-803	WASHER, FLAT, METAL, ROUND	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	A/R	1010870	GREASE, LUBRICATING	31
A/R	A/R	QQ-S-571 SN60	SOLDER	30
A/R	A/R	QQ-S-571 SN10	SOLDER	29
61	61	1010862	BUSHING, SLEEVE	28
~~61~~	~~61~~	~~[illegible]~~	~~CONTACT, ELEC~~	~~27~~
1	1	1000223	WASHER, CABLE CLAMP	26
1	1	1000220 (SEE NOTE 18)	CLAMP, CABLE	25
1	1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	3	1000020-4	SHIELD & GRD ASS'Y	20
3	3	1000020-10	SHIELD & GRD ASS'Y	19
2	2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	6	1001489-22	SCREW, HEX SOC HD	13
2	2	1010817-106	CONNECTOR, ELEC, RECEPTACLE	12
1	1	1010783-2	CONNECTOR, ELEC RECEPTACLE	11
2	2	1000100-1	TERMINAL INSULATED	10
1	1	2018621	BALL BEARING DUPLEX	9
2	2	2018731	CLIP WIRE RETAINER	8
1	1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	1	2018766	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1
021	011	LIST OF MATERIALS		

2018601	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN R.W. Cou[illegible] DATE 2-20-65
CHECKED G. Gunn 2-24-65
APPROVAL 24 Feb 65
APPROVAL
NASA APPROVAL
MIT APPROVAL

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INTER GIMBAL
SUB-ASSEMBLY
TORQUE MOTOR END
OUTER AXIS

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 2018609
SCALE 2-1
WT
SHEET 1 OF 15

2018609

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NASA DRAWING NO.
201860̸9-011
SHEET 2 of 15

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC	NO.
1						19								
1-B			E2						SHLD 1					
1-1			J2-1	.17	N				SR2-1					
1-2			J2-2	.17	N				SR2-2					
1-3			J2-3	.17	N				SR2-3					
2			J2-4	.17	N				SR2-4					
3			J2-5	.17	N				SR2-5					
4-1			J2-6	.17	N				SR2-6					
4-2			J2-7	.17	N				SR2-7					
5-1			J2-8	.17	N				SR2-8					
5-2			J2-9	.17	N				SR2-9					
6-1			J2-10	.17	N				SR2-10					
6-2			J2-11	.17	N				SR2-11					
7						19								
7-B			E2						SHLD 7					
7-1			J2-12	.17	N				SR2-12					
7-2			J2-13	.17	N				SR2-13					
7-3			J2-14	.17	N				SR2-14					

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NASA DRAWING NO.
201860̸9-011
SHEET 3 of 15

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC	NO.
8			J2-15	.17	N				SR2-15					
9			J2-16	.17	N				SR2-16					
10-1			J2-17	.17	N				SR2-17					
10-2			J2-18	.17	N				SR2-18					
11-1			J2-19	.17	N				SR2-19					
11-2			J2-20	.17	N				SR2-20					
11-3			J2-21	.17	N				SR2-21					
11-4			J2-22	.17	N				SR2-22					
11-5			J2-23	.17	N				SR2-23					
11-6			J2-24	.17	N				SR2-24					
12			J2-25	.17	N				SR2-25					
13			J2-26	.17	N				SR2-26					
14			J2-27	.17	N				SR2-27					
15			J2-28	.17	N				SR2-28					
16			J2-32	.17	N				SR2-32					
17			J2-33	.17	N				SR2-33					
18			J2-34	.17	N				SR2-34					

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NASA DRAWING NO.
201860̸9-011
SHEET 4 of 15

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC	NO.
19-1			J2-35	.17	N				SR2-35					
19-2			J2-36	.17	N				SR2-36					
20-1			J2-37	.17	N				SR2-37					
20-2			J2-38	.17	N				SR2-38					
21-1			J2-39	.17	N				SR2-39					
21-2			J2-40	.17	N				SR2-40					
22-1			J2-41	.17	N				SR2-41					
22-2			J2-42	.17	N				SR2-42					
23			J2-43	.17	N				SR2-43					
24			J2-44	.17	N				SR2-44					
25			J2-45	.17	N				SR2-45					
26			J2-46	.17	N				SR2-46					
27			J2-47	.17	N				SR2-47					
28			J2-48	.17	N				SR2-48					
29			J2-49	.17	N				SR2-49					
30			J2-50	.17	N				SR2-50					

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NASA DRAWING NO.
201860̸9-011
SHEET 5 of 15

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC	NO.
31	23		J2-51	.17	N				B4-1	.25	Y			
32	24		J2-52	.17	N				B4-2	.25	Y			
33			B4-BLK.						B4-1	.25	Y			
34			B4-WHT						B4-2	.25	Y			
35						19								
35-B			E2						SHLD 35					
35-1			J2-59	.17	N				SR2-29					
35-2			J2-60	.17	N				SR2-30					
35-3			J2-61	.17	N				SR2-31					
36						20								
36-A			SHLD-36						E11					
36-1			J7-A	.17	Y	22			SR2-1					
36-2			J7-B	.17	Y	22			SR2-2					
36-3			J7-C	.17	Y	22			SR2-3					
37			J7-D	.17	Y	22			SR2-4					
38			J7-E	.17	Y	22			SR2-5					
39-1			J7-F	.17	Y	22			SR2-6					
39-2			J7-H	.17	Y	22			SR2-7					

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT
57-1		J8-R	.17	Y	22	SR2-39
57-2		J8-S	.17	Y	22	SR2-40
58-1		J8-T	.17	Y	22	SR2-41
58-2		J8-U	.17	Y	22	SR2-42
59		J8-V	.17	Y	22	SR2-43
60		J8-W	.17	Y	22	SR2-44
61		J8-X	.17	Y	22	SR2-45
62		J8-Y	.17	Y	22	SR2-46
63		J8-Z	.17	Y	22	SR2-47
64		J8-a	.17	Y	22	SR2-48
65		J8-b	.17	Y	22	SR2-49
66		J8-c	.17	Y	22	SR2-50

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NASA DRAWING NO. 2018609-011
SHEET 8 of 15

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT
40-1		J7-J	.17	Y	22	SR2-8
40-2		J7-K	.17	Y	22	SR2-9
41-1		J7-L	.17	Y	22	SR2-10
41-2		J7-M	.17	Y	22	SR2-11
42					20	
42-A		SHLD-42				E11
42-1		J7-N	.17	Y	22	SR2-12
42-2		J7-P	.17	Y	22	SR2-13
42-3		J7-R	.17	Y	22	SR2-14
43		J7-S	.17	Y	22	SR2-15
44		J7-T	.17	Y	22	SR2-16
45-1		J7-U	.17	Y	22	SR2-17
45-2		J7-V	.17	Y	22	SR2-18
46-1		J7-W	.17	Y	22	SR2-19
46-2		J7-X	.17	Y	22	SR2-20
46-3		J7-Y	.17	Y	22	SR2-21
46-4		J7-Z	.17	Y	22	SR2-22
46-5		J7-a	.17	Y	22	SR2-23

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SHEET 6 of 15

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT
1					19	
1-B		E2				SHLD 1
1-1		J2-1	.17	N		SR2-1
1-2		J2-2	.17	N		SR2-2
1-3		J2-3	.17	N		SR2-3
2		J2-4	.17	N		SR2-4
3		J2-5	.17	N		SR2-5
4-1		J2-8	.17	N		SR2-6
4-2		J2-9	.17	N		SR2-7
5-1		J2-6	.17	N		SR2-8
5-2		J2-7	.17	N		SR2-9
6-1		J2-11	.17	N		SR2-10
6-2		J2-10	.17	N		SR2-11
7					19	
7-B		E2				SHLD 7
7-1		J2-12	.17	N		SR2-12
7-2		J2-13	.17	N		SR2-13
7-3		J2-14	.17	N		SR2-14

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SHEET 9 of 15

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT
46-6		J7-b	.17	Y	22	SR2-24
47		J7-c	.17	Y	22	SR2-25
48		J8-A	.17	Y	22	SR2-26
49		J8-B	.17	Y	22	SR2-27
50		J8-C	.17	Y	22	SR2-28
51					20	
51-A		SHLD-51				E12
51-1		J8-D	.17	Y	22	SR2-29
51-2		J8-E	.17	Y	22	SR2-30
51-3		J8-F	.17	Y	22	SR2-31
52		J8-H	.17	Y	22	SR2-32
53		J8-J	.17	Y	22	SR2-33
54		J8-K	.17	Y	22	SR2-34
55-1		J8-L	.17	Y	22	SR2-35
55-2		J8-M	.17	Y	22	SR2-36
56-1		J8-N	.17	Y	22	SR2-37
56-2		J8-F	.17	Y	22	SR2-38

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NASA DRAWING NO.
2018609-021
SHEET 12 of 15

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
31	23	J2-51	.17	N			B4-1	25	Y		
32	24	J2-52	.17	N			B4-2	25	Y		
33		B4-BLK					B4-1	25	Y		
34		B4-WHT					B4-2	25	Y		
35					19						
35-B		E2					SHLD 35				
35-1		J2-59	.17	N			SR2-29				
35-2		J2-60	.17	N			SR2-30				
35-3		J2-61	.17	N			SR2-31				
36					20						
36-A		SHLD-36					E11				
36-1		J7-A	.17	Y	22		SR2-1				
36-2		J7-B	.17	Y	22		SR2-2				
36-3		J7-C	.17	Y	22		SR2-3				
37		J7-D	.17	Y	22		SR2-4				
38		J7-E	.17	Y	22		SR2-5				
39-1		J7-F	.17	Y	22		SR2-6				
39-2		J7-H	.17	Y	22		SR2-7				

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NASA DRAWING NO.
2018609-021
SHEET 10 of 15

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
8		J2-15	.17	N			SR2-15				
9		J2-16	.17	N			SR2-16				
10-1		J2-17	.17	N			SR2-17				
10-2		J2-18	.17	N			SR2-18				
11-1		J2-20	.17	N			SR2-19				
11-2		J2-19	.17	N			SR2-20				
11-3		J2-21	.17	N			SR2-21				
11-4		J2-22	.17	N			SR2-22				
11-5		J2-23	.17	N			SR2-23				
11-6		J2-24	.17	N			SR2-24				
12		J2-25	.17	N			SR2-25				
13		J2-26	.17	N			SR2-26				
14		J2-27	.17	N			SR2-27				
15		J2-28	.17	N			SR2-28				
16		J2-32	.17	N			SR2-32				
17		J2-33	.17	N			SR2-33				
18		J2-34	.17	N			SR2-34				

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NASA DRAWING NO.
2018609-021
SHEET 13 of 15

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
40-1		J7-J	.17	Y	22		SR2-8				
40-2		J7-K	.17	Y	22		SR2-9				
41-1		J7-L	.17	Y	22		SR2-10				
41-1		J7-M	.17	Y	22		SR2-11				
42					20						
42-A		SHLD-42					E11				
42-1		J7-N	.17	Y	22		SR2-12				
42-2		J7-P	.17	Y	22		SR2-13				
42-3		J7-R	.17	Y	22		SR2-14				
43		J7-S	.17	Y	22		SR2-15				
44		J7-T	.17	Y	22		SR2-16				
45-1		J7-U	.17	Y	22		SR2-17				
45-2		J7-V	.17	Y	22		SR2-18				
46-1		J7-W	.17	Y	22		SR2-19				
46-2		J7-X	.17	Y	22		SR2-20				
46-3		J7-Y	.17	Y	22		SR2-21				
46-4		J7-Z	.17	Y	22		SR2-22				
46-5		J7-a	.17	Y	22		SR2-23				

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REVISION L

NASA DRAWING NO.
2018609-021
SHEET 11 of 15

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
19-1		J2-35	.17	N			SR2-35				
19-2		J2-36	.17	N			SR2-36				
20-1		J2-37	.17	N			SR2-37				
20-2		J2-38	.17	N			SR2-38				
21-1		J2-39	.17	N			SR2-39				
21-2		J2-40	.17	N			SR2-40				
22-1		J2-41	.17	N			SR2-41				
22-2		J2-42	.17	N			SR2-42				
23		J2-43	.17	N			SR2-43				
24		J2-44	.17	N			SR2-44				
25		J2-45	.17	N			SR2-45				
26		J2-46	.17	N			SR2-46				
27		J2-47	.17	N			SR2-47				
28		J2-48	.17	N			SR2-48				
29		J2-49	.17	N			SR2-49				
30		J2-50	.17	N			SR2-50				

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO	SPEC	NO.
46-6			J7-b	.17	Y	22			SR2-24					
47			J7-c	.17	Y	22			SR2-25					
48			J8-A	.17	Y	22			SR2-26					
49			J8-B	.17	Y	22			SR2-27					
50			J8-C	.17	Y	22			SR2-28					
51						20								
51-A			SHLD-51						E12					
51-1			J8-D	.17	Y	22			SR2-29					
51-2			J8-E	.17	Y	22			SR2-30					
51-3			J8-F	.17	Y	22			SR2-31					
52			J8-H	.17	Y	22			SR2-32					
53			J8-J	.17	Y	22			SR2-33					
54			J8-K	.17	Y	22			SR2-34					
55-1			J8-L	.17	Y	22			SR2-35					
55-2			J8-M	.17	Y	22			SR2-36					
56-1			J8-N	.17	Y	22			SR2-37					
56-2			J8-P	.17	Y	22			SR2-38					

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CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
57-1			J8-R	.17	Y	22			SR2-39					
57-2			J8-S	.17	Y	22			SR2-40					
58-1			J8-T	.17	Y	22			SR2-41					
58-2			J8-U	.17	Y	22			SR2-42					
59			J8-V	.17	Y	22			SR2-43					
60			J8-W	.17	Y	22			SR2-44					
61			J8-X	.17	Y	22			SR2-45					
62			J8-Y	.17	Y	22			SR2-46					
63			J8-Z	.17	Y	22			SR2-47					
64			J8-a	.17	Y	22			SR2-48					
65			J8-b	.17	Y	22			SR2-49					
66			J8-c	.17	Y	22			SR2-50					

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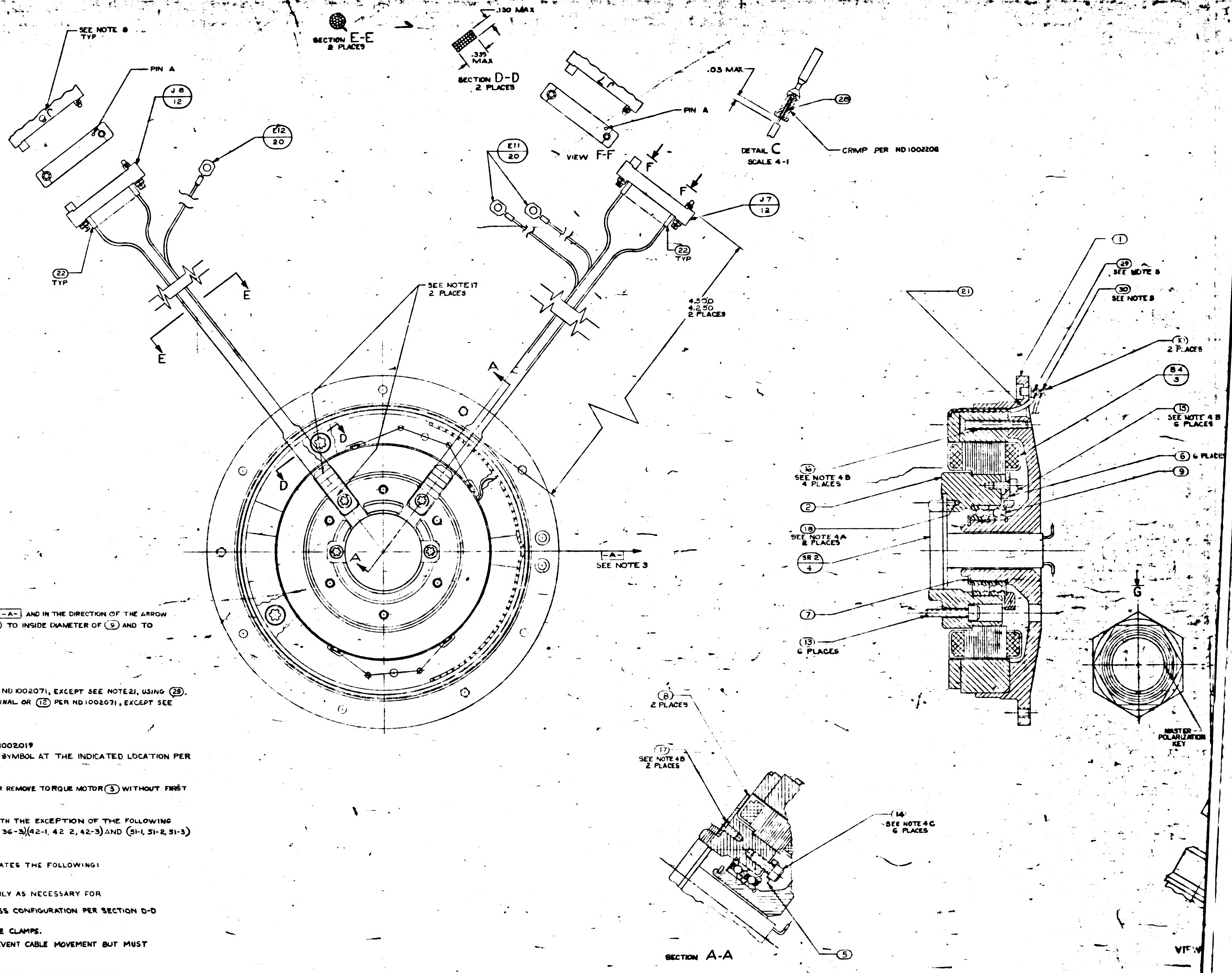
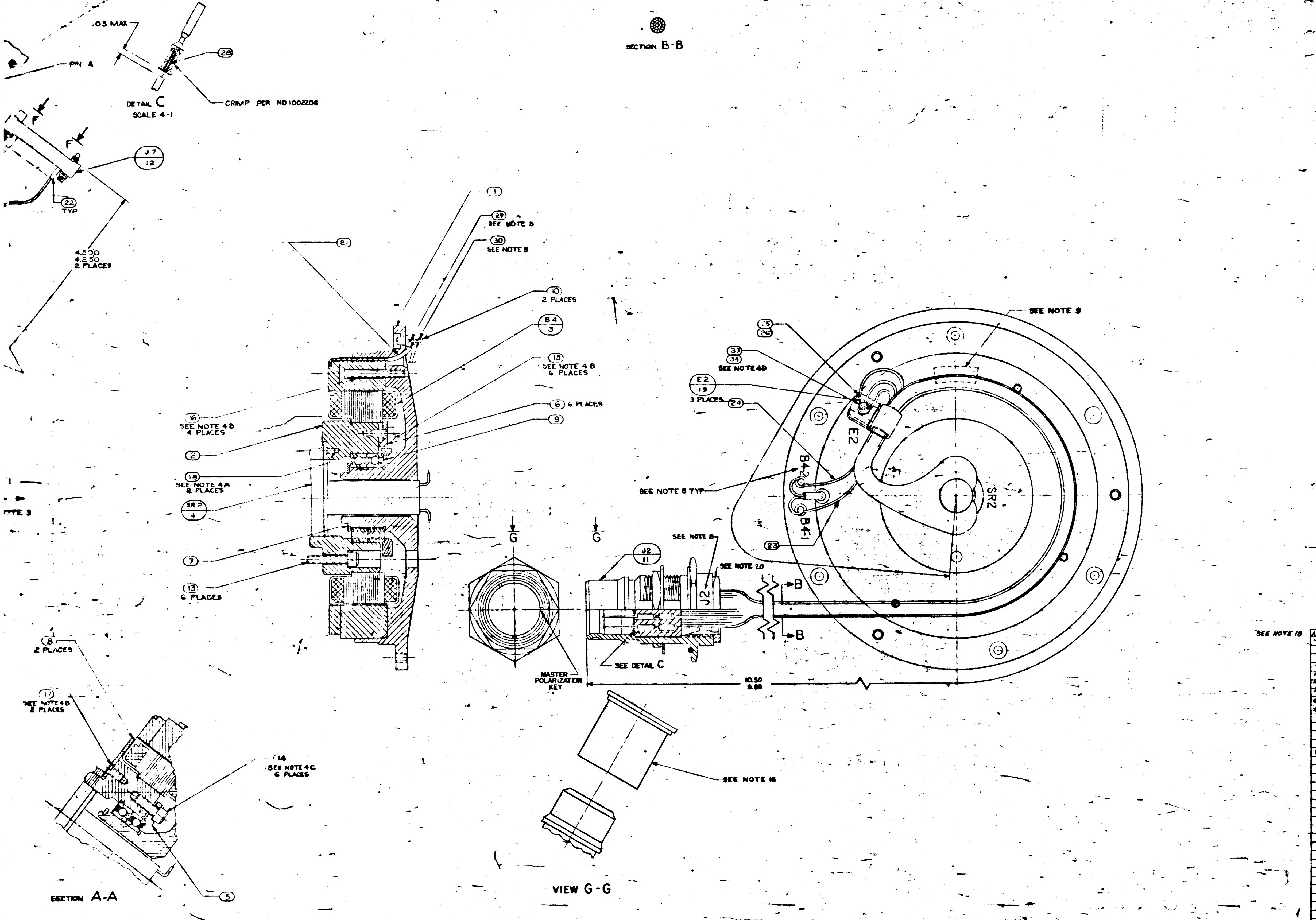

SEE NOTE 8
TYP
PIN A
J8
12
E12
20
22
TYP
E
E
SECTION E-E
2 PLACES
.130 MAX
.335
MAX
SECTION D-D
2 PLACES
E11
20
VIEW F-F
F
F
PIN A
J7
12
22
TYP
.03 MAX
28
DETAIL C
SCALE 4-1
CRIMP PER ND1002206
SEE NOTE 17
2 PLACES
4.550
4.250
2 PLACES
A
D
D
A
-A-
SEE NOTE 3
1
29
SEE NOTE 5
30
SEE NOTE 5
21
K1
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6
6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR2
4
7
13
6 PLACES
G
MASTER
POLARIZATION
KEY
8
2 PLACES
17
SEE NOTE 4 B
2 PLACES
14
SEE NOTE 4 C
6 PLACES
5
SECTION A-A
VIEW

TABLE I	
CABLE CLAMP ㉕	
PART NUMBER	DIA. REF.
1000220-5	.234
1000220-6	.287
1000202-7	.359
1000220-15	.265
1000220-16	.328
1000220-17	.390

NOTES

1. INTERPRET DWG IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS 2018609 FOR -011 CONFIGURATION OR PS 2016146 FOR -021 CONFIGURATION
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF (31) TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB D. 6.5 IN. LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND1002071, EXCEPT SEE NOTE 21, USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071, EXCEPT SEE NOTE 21, USING ㉚
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS .10/.14 HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3) (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 8 INDICATES THE FOLLOWING:
   - A - SHIELD GROUND ON "FROM END"
   - B - SHIELD GROUND ON "TO END"
16. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST AND INSPECTION
17. TAPE HARNESS IN AREA INDICATED USING ITEM (35) TO MAINTAIN HARNESS CONFIGURATION PER SECTION D-D AND SECURE HARNESS TO ITEM ⑧ WITH ITEM (35)
18. TAPE (36) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
19. ITEM ㉕ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT BUT MUST NOT PINCH WIRES.
20. TORQUE RETAINING NUT TO 45-55 lb.-IN.
21. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED, DWG NBR	[illegible]	[illegible]
B	REVISED PER TDRR 19875	[illegible]	[illegible]
C	REVISED PER TDRR 21673	[illegible]	WK
D	REVISED PER TDRR 22585	8 SEP 65	WK
E	REVISED PER TDRR 26249	2-1-66	WK
F	REVISED PER TDRR 26254	[illegible]	WK
G	REVISED PER TDRR 27508	[illegible]	WK
H	REVISED PER TDRR 31894	25 NOV 66	WR CD
J	REVISED PER TDRR 32855	4 FEB 67	DR WM
K	REVISED PER TDRR 33178	13 MAR 67	ECD
L	REVISED PER TDRR 33465	7 APR 67	[illegible]
M	REVISED PER TDRR 34784	9 OCT 67	GD



.03 MAX
PIN A
28
DETAIL C
SCALE 4-1
CRIMP PER ND1002206
SECTION B-B
F
F
J7
12
22
TYP
4.300
4.250
2 PLACES
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4B
6 PLACES
6 6 PLACES
9
16
SEE NOTE 4B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR2
4
7
13
6 PLACES
G
G
J2
11
SEE NOTE 8
SEE NOTE 20
J2
B
B
MASTER POLARIZATION KEY
SEE DETAIL C
10.50
9.88
SEE NOTE 9
25
26
33
34
SEE NOTE 4D
E2
19
3 PLACES
24
E2
B4-2
B4-1
SEE NOTE 6 TYP
23
SR2
8
2 PLACES
17
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4C
6 PLACES
5
SECTION A-A
VIEW G-G
SEE NOTE 16

SEE NOTE 18

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
A/R	A/R	MIL-I-15126 TYPE "ACT"	TAPE, ADH, ELEC, PRESS SENSITIVE ½ WIDE	36
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
1	1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	1	MS15795-803	WASHER, FLAT, METAL, ROUND	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, ~~WAXED~~	32
A/R	A/R	1010870	GREASE, LUBRICATING	31
A/R	A/R	QQ-S-571 SN60	SOLDER	30
A/R	A/R	QQ-S-571 SN10	SOLDER	29
61	61	1010862	BUSHING, SLEEVE	28
~~61~~	~~61~~	~~[illegible]~~	~~CONTACT, ELEC~~	~~27~~
1	1	1000223	WASHER, CABLE CLAMP	26
1	1	1000220 (SEE NOTE 19)	CLAMP, CABLE	25
1	1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	50	1006776-18	INSULATION, SLEEVING ELEC 9/16 LONG	22
1	1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	3	1000020-4	SHIELD & GRD ASS'Y	20
3		1000020-10	SHIELD & GRD ASS'Y	19
2	2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	4	1010867-18	SCREW FLAT HD SELF LOCKING SOC SPLINE	16
6	6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	6	1001489-22	SCREW, HEX SOC HD	13
2	2	1010917-106	CONNECTOR, ELEC, RECEPTACLE	12
1	1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	2	1000100-1	TERMINAL INSULATED	10
1	1	2018621	BALL BEARING DUPLEX	9
2	2	2018731	CLIP WIRE RETAINER	8
1	1	MS16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	1	2018768	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	1	2018625	SLIP RING ASS'Y 30 CONTACT	4
1	1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	1	2018754	SHAFT, STUB TORQUE MOTOR O.A.	2
1	1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1
021	011	LIST OF MATERIALS		

2018601	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± -/- DECIMALS ± -/- ANGLES ± -/- DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	MATERIAL -/-	DRAWN R.W. Coulombe DATE 2-2-65 CHECKED J QUINN 2-24-65 APPROVAL [illegible] APPROVAL	INTER GIMBAL SUB-ASSEMBLY TORQUE MOTOR END OUTER AXIS
APPLICATION		HEAT TREATMENT -/- FINAL FINISH -/-	NASA APPROVAL [illegible] MIT APPROVAL [illegible]	CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018609 SCALE 2-1 WT SHEET 1 OF 15

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201609-011
SHEET 2 of 15

CONDUCTOR		FROM				TO			
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.
1					19				
1-B		E2				SHLD 1			
1-1		J2-1	.17	N		SR2-1			
1-2		J2-2	.17	N		SR2-2			
1-3		J2-3	.17	N		SR2-3			
2		J2-4	.17	N		SR2-4			
3		J2-5	.17	N		SR2-5			
4-1		J2-6	.17	N		SR2-6			
4-2		J2-7	.17	N		SR2-7			
5-1		J2-8	.17	N		SR2-8			
5-2		J2-9	.17	N		SR2-9			
6-1		J2-10	.17	N		SR2-10			
6-2		J2-11	.17	N		SR2-11			
7					19				
7-B		E2				SHLD 7			
7-1		J2-12	.17	N		SR2-12			
7-2		J2-13	.17	N		SR2-13			
7-3		J2-14	.17	N		SR2-14			

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201609-011
SHEET 3 of 15

CONDUCTOR		FROM				TO			
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.
8		J2-15	.17	N		SR2-15			
9		J2-16	.17	N		SR2-16			
10-1		J2-17	.17	N		SR2-17			
10-2		J2-18	.17	N		SR2-18			
11-1		J2-19	.17	N		SR2-19			
11-2		J2-20	.17	N		SR2-20			
11-3		J2-21	.17	N		SR2-21			
11-4		J2-22	.17	N		SR2-22			
11-5		J2-23	.17	N		SR2-23			
11-6		J2-24	.17	N		SR2-24			
12		J2-25	.17	N		SR2-25			
13		J2-26	.17	N		SR2-26			
14		J2-27	.17	N		SR2-27			
15		J2-28	.17	N		SR2-28			
16		J2-32	.17	N		SR2-32			
17		J2-33	.17	N		SR2-33			
18		J2-34	.17	N		SR2-34			

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CONDUCTOR		FROM				TO			
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.
19-1		J2-35	.17	N		SR2-35			
19-2		J2-36	.17	N		SR2-36			
20-1		J2-37	.17	N		SR2-37			
20-2		J2-38	.17	N		SR2-38			
21-1		J2-39	.17	N		SR2-39			
21-2		J2-40	.17	N		SR2-40			
22-1		J2-41	.17	N		SR2-41			
22-2		J2-42	.17	N		SR2-42			
23		J2-43	.17	N		SR2-43			
24		J2-44	.17	N		SR2-44			
25		J2-45	.17	N		SR2-45			
26		J2-46	.17	N		SR2-46			
27		J2-47	.17	N		SR2-47			
28		J2-48	.17	N		SR2-48			
29		J2-49	.17	N		SR2-49			
30		J2-50	.17	N		SR2-50			

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201609-011
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CONDUCTOR		FROM				TO			
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.
31	23	J2-51	.17	N		B4-1	25	Y	
32	24	J2-52	.17	N		B4-2	25	Y	
33		B4-BLK				B4-1	25	Y	
34		B4-WHT				B4-2	25	Y	
35					19				
35-B		E2				SHLD 35			
35-1		J2-59	.17	N		SR2-29			
35-2		J2-60	.17	N		SR2-30			
35-3		J2-61	.17	N		SR2-31			
36					20				
36-A		SHLD-36				E11			
36-1		J7-A	.17	Y	22	SR2-1			
36-2		J7-B	.17	Y	22	SR2-2			
36-3		J7-C	.17	Y	22	SR2-3			
37		J7-D	.17	Y	22	SR2-4			
38		J7-E	.17	Y	22	SR2-5			
39-1		J7-F	.17	Y	22	SR2-6			
39-2		J7-E	.17	Y		SR2-7			

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
57-1			J8-R	.17	Y	22			SR2-39					
57-2			J8-S	.17	Y	22			SR2-40					
58-1			J8-T	.17	Y	22			SR2-41					
58-2			J8-U	.17	Y	22			SR2-42					
59			J8-V	.17	Y	22			SR2-43					
60			J8-W	.17	Y	22			SR2-44					
61			J8-X	.17	Y	22			SR2-45					
62			J8-Y	.17	Y	22			SR2-46					
63			J8-Z	.17	Y	22			SR2-47					
64			J8-a	.17	Y	22			SR2-48					
65			J8-b	.17	Y	22			SR2-49					
66			J8-c	.17	Y	22			SR2-50					

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SHEET 6 of 85

CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
40-1			J7-J	.17	Y	22			SR2-8					
40-2			J7-K	.17	Y	22			SR2-9					
41-1			J7-L	.17	Y	22			SR2-10					
41-2			J7-M	.17	Y	22			SR2-11					
42						20								
42-A			SHLD-42						E11					
42-1			J7-N	.17	Y	22			SR2-12					
42-2			J7-P	.17	Y	22			SR2-13					
42-3			J7-R	.17	Y	22			SR2-14					
43			J7-S	.17	Y	22			SR2-15					
44			J7-T	.17	Y	22			SR2-16					
45-1			J7-U	.17	Y	22			SR2-17					
45-2			J7-V	.17	Y	22			SR2-18					
46-1			J7-W	.17	Y	22			SR2-19					
46-2			J7-X	.17	Y	22			SR2-20					
46-3			J7-Y	.17	Y	22			SR2-21					
46-4			J7-Z	.17	Y	22			SR2-22					
46-5			J7-a	.17	Y	22			SR2-23					

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NASA DRAWING NO. 2018609-024
SHEET 9 of 15

CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
1						19								
1-B			E2						SHLD 1					
1-1			J2-1	.17	N				SR2-1					
1-2			J2-2	.17	N				SR2-2					
1-3			J2-3	.17	N				SR2-3					
2			J2-4	.17	N				SR2-4					
3			J2-5	.17	N				SR2-5					
4-1			J2-8	.17	N				SR2-6					
4-2			J2-9	.17	N				SR2-7					
5-1			J2-6	.17	N				SR2-8					
5-2			J2-7	.17	N				SR2-9					
6-1			J2-11	.17	N				SR2-10					
6-2			J2-10	.17	N				SR2-11					
7						19								
7-B			E2						SHLD 7					
7-1			J2-12	.17	N				SR2-12					
7-2			J2-13	.17	N				SR2-13					
7-3			J2-14	.17	N				SR2-14					

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NASA DRAWING NO. 2018609-011
SHEET 7 of 85

CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
46-6			J7-b	.17	Y	22			SR2-24					
47			J7-c	.17	Y	22			SR2-25					
48			J8-A	.17	Y	22			SR2-26					
49			J8-B	.17	Y	22			SR2-27					
50			J8-C	.17	Y	22			SR2-28					
51						20								
51-A			SHLD-51						E12					
51-1			J8-D	.17	Y	22			SR2-29					
51-2			J8-E	.17	Y	22			SR2-30					
51-3			J8-F	.17	Y	22			SR2-31					
52			J8-H	.17	Y	22			SR2-32					
53			J8-J	.17	Y	22			SR2-33					
54			J8-K	.17	Y	22			SR2-34					
55-1			J8-L	.17	Y	22			SR2-35					
55-2			J8-M	.17	Y	22			SR2-36					
56-1			J8-N	.17	Y	22			SR2-37					
56-2			J8-P	.17	Y	22			SR2-38					

NASA DRAWING NO. 2018609-021 **SHEET** 10 of 15 — **REVISION** M — **MANNED SPACECRAFT CENTER** HOUSTON TEXAS — O.A. T.M.

CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
8			J2-15	.17	N				SR2-15					
9			J2-16	.17	N				SR2-16					
10-1			J2-17	.17	N				SR2-17					
10-2			J2-18	.17	N				SR2-18					
11-1			J2-20	.17	N				SR2-19					
11-2			J2-19	.17	N				SR2-20					
11-3			J2-21	.17	N				SR2-21					
11-4			J2-22	.17	N				SR2-22					
11-5			J2-23	.17	N				SR2-23					
11-6			J2-24	.17	N				SR2-24					
12			J2-25	.17	N				SR2-25					
13			J2-26	.17	N				SR2-26					
14			J2-27	.17	N				SR2-27					
15			J2-28	.17	N				SR2-28					
16			J2-32	.17	N				SR2-32					
17			J2-33	.17	N				SR2-33					
18			J2-34	.17	N				SR2-34					

NASA DRAWING NO. 2018609-021 **SHEET** 11 of 15 — **REVISION** M — **MANNED SPACECRAFT CENTER** HOUSTON TEXAS — O.A. T.M.

CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
19-1			J2-35	.17	N				SR2-35					
19-2			J2-36	.17	N				SR2-36					
20-1			J2-37	.17	N				SR2-37					
20-2			J2-38	.17	N				SR2-38					
21-1			J2-39	.17	N				SR2-39					
21-2			J2-40	.17	N				SR2-40					
22-1			J2-41	.17	N				SR2-41					
22-2			J2-42	.17	N				SR2-42					
23			J2-43	.17	N				SR2-43					
24			J2-44	.17	N				SR2-44					
25			J2-45	.17	N				SR2-45					
26			J2-46	.17	N				SR2-46					
27			J2-47	.17	N				SR2-47					
28			J2-48	.17	N				SR2-48					
29			J2-49	.17	N				SR2-49					
30			J2-50	.17	N				SR2-50					

NASA DRAWING NO. 2018609-021 **SHEET** 12 of 15 — **REVISION** M — **MANNED SPACECRAFT CENTER** HOUSTON TEXAS — O.A. T.M.

CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
31	23		J2-51	.17	N				B4-1	25	Y			
32	24		J2-52	.17	N				B4-2	25	Y			
33			B4-BLK						B4-1	25	Y			
34			B4-WHT						B4-2	25	Y			
35						19								
35-B			E2						SHLD 35					
35-1			J2-59	.17	N				SR2-29					
35-2			J2-60	.17	N				SR2-30					
35-3			J2-61	.17	N				SR2-31					
36						20								
36-A			SHLD-36						E11					
36-1			J7-A	.17	Y	22			SR2-1					
36-2			J7-B	.17	Y	22			SR2-2					
36-3			J7-C	.17	Y	22			SR2-3					
37			J7-D	.17	Y	22			SR2-4					
38			J7-E	.17	Y	22			SR2-5					
39-1			J7-F	.17	Y	22			SR2-6					
39-2			J7-H	.17	Y	22			SR2-7					

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
40-1			J7-J	.17	Y	22			SR2-8					
40-2			J7-K	.17	Y	22			SR2-9					
41-1			J7-L	.17	Y	22			SR2-10					
41-1			J7-M	.17	Y	22			SR2-11					
42						20								
42-A			SHLD-42						E11					
42-1			J7-N	.17	Y	22			SR2-12					
42-2			J7-P	.17	Y	22			SR2-13					
42-3			J7-R	.17	Y	22			SR2-14					
43			J7-S	.17	Y	22			SR2-15					
44			J7-T	.17	Y	22			SR2-16					
45-1			J7-U	.17	Y	22			SR2-17					
45-2			J7-V	.17	Y	22			SR2-18					
46-1			J7-W	.17	Y	22			SR2-19					
46-2			J7-X	.17	Y	22			SR2-20					
46-3			J7-Y	.17	Y	22			SR2-21					
46-4			J7-Z	.17	Y	22			SR2-22					
46-5			J7-a	.17	Y	22			SR2-23					

CONDUCTOR		FROM						TO					
INDIVIDUAL LENGTH		CUT WIRE OR SHIELD			TERMINATION			CUT WIRE OR SHIELD			TERMINATION		
FIND NUMBER	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FIND NO.	SPEC	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FIND NO.	SPEC	NO.
46-6		J7-b	.17	Y		22		SR2-24					
47		J7-c	.17	Y		22		SR2-25					
48		J8-A	.17	Y		22		SR2-26					
49		J8-B	.17	Y		22		SR2-27					
50		J8-C	.17	Y		22		SR2-28					
51						20							
51-A		SHLD-51						E12					
51-1		J8-D	.17	Y		22		SR2-29					
51-2		J8-E	.17	Y		22		SR2-30					
51-3		J8-F	.17	Y		22		SR2-31					
52		J8-H	.17	Y		22		SR2-32					
53		J8-J	.17	Y		22		SR2-33					
54		J8-K	.17	Y		22		SR2-34					
55-1		J8-L	.17	Y		22		SR2-35					
55-2		J8-M	.17	Y		22		SR2-36					
56-1		J8-N	.17	Y		22		SR2-37					
56-2		J8-P	.17	Y		22		SR2-38					

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CONDUCTOR		FROM						TO					
INDIVIDUAL LENGTH		CUT WIRE OR SHIELD			TERMINATION			CUT WIRE OR SHIELD			TERMINATION		
FIND NUMBER	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FIND NO.	SPEC	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	FIND NO.	SPEC	NO.
57-1		J8-R	.17	Y		22		SR2-39					
57-2		J8-S	.17	Y		22		SR2-40					
58-1		J8-T	.17	Y		22		SR2-41					
58-2		J8-U	.17	Y		22		SR2-42					
59		J8-V	.17	Y		22		SR2-43					
60		J8-W	.17	Y		22		SR2-44					
61		J8-X	.17	Y		22		SR2-45					
62		J8-Y	.17	Y		22		SR2-46					
63		J8-Z	.17	Y		22		SR2-47					
64		J8-a	.17	Y		22		SR2-48					
65		J8-b	.17	Y		22		SR2-49					
66		J8-c	.17	Y		22		SR2-50					

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NASA DRAWING NO. 2018609
SHEET 6 of 8

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TIN	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TIN	TERMINATION FIND NO.	SPEC	NO.
40-1			J7-J	13Y	22			SR2-8				
40-2			J7-K	13Y	22			SR2-9				
41-1			J7-L	13Y	22			SR2-10				
41-2			J7-M	13Y	22			SR2-11				
42					20							
42-A			SHLD-42					E11				
42-1			J7-N	13Y	22			SR2-12				
42-2			J7-P	13Y	22			SR2-13				
42-3			J7-R	13Y	22			SR2-14				
43			J7-S	13Y	22			SR2-15				
44			J7-T	13Y	22			SR2-16				
45-1			P7-U	13Y	22			SR2-17				
45-2			J7-V	13Y	22			SR2-18				
46-1			J7-W	13Y	22			SR2-19				
46-2			J7-X	13Y	22			SR2-20				
46-3			J7-Y	13Y	22			SR2-21				
46-4			J7-Z	13Y	22			SR2-22				
46-5			J7-a	13Y	22			SR2-23				

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NASA DRAWING NO. 2018609
SHEET 7 of 8

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TIN	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TIN	TERMINATION FIND NO.	SPEC	NO.
46-6			J7-b	13Y	22			SR2-24				
47			J7-c	13Y	22			SR2-25				
48			J8-A	13Y	22			SR2-26				
49			J8-B	13Y	22			SR2-27				
50			J8-C	13Y	22			SR2-28				
51					20							
51-A			SHLD-51					E12				
51-1			J8-D	13Y	22			SR2-29				
51-2			J8-E	13Y	22			SR2-30				
51-3			J8-F	13Y	22			SR2-31				
52			J8-H	13Y	22			SR2-32				
53			J8-J	13Y	22			SR2-33				
54			J8-K	13Y	22			SR2-34				
55-1			J8-L	13Y	22			SR2-35				
55-2			J8-M	13Y	22			SR2-36				
56-1			J8-N	13Y	22			SR2-37				
56-2			J8-P	13Y	22			SR2-38				

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NASA DRAWING NO. 2018609
SHEET 8 of 8

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TIN	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TIN	TERMINATION FIND NO.	SPEC	NO.
57-1			J8-R	13Y	22			SR2-39				
57-2			J8-S	13Y	22			SR2-40				
58-1			J8-T	13Y	22			SR2-41				
58-2			J8-U	13Y	22			SR2-42				
59			J8-V	13Y	22			SR2-43				
60			J8-W	13Y	22			SR2-44				
61			J8-X	13Y	22			SR2-45				
62			J8-Y	13Y	22			SR2-46				
63			J8-Z	13Y	22			SR2-47				
64			J8-a	13Y	22			SR2-48				
65			J8-b	13Y	22			SR2-49				
66			J8-c	13Y	22			SR2-50				

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SHEET 2 of 8

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	TO NO.
1					19						
1-B		E2					SHLD 1				
1-1		J2-1	13	N			SR2-1				
1-2		J2-2	13	N			SR2-2				
1-3		J2-3	13	N			SR2-3				
2		J2-4	13	N			SR2-4				
3		J2-5	13	N			SR2-5				
4-1		J2-6	13	N			SR2-6				
4-2		J2-7	13	N			SR2-7				
5-1		J2-8	13	N			SR2-8				
5-2		J2-9	13	N			SR2-9				
6-1		J2-10	13	N			SR2-10				
6-2		J2-11	13	N			SR2-11				
7					19						
7-B		E2					SHLD 7				
7-1		J2-12	13	N			SR2-12				
7-2		J2-13	13	N			SR2-13				
7-3		J2-14	13	N			SR2-14				

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SHEET 3 of 8

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	TO NO.
8		J2-15	13	N			SR2-15				
9		J2-16	13	N			SR2-16				
10-1		J2-17	13	N			SR2-17				
10-2		J2-18	13	N			SR2-18				
11-1		J2-19	13	N			SR2-19				
11-2		J2-20	13	N			SR2-20				
11-3		J2-21	13	N			SR2-21				
11-4		J2-22	13	N			SR2-22				
11-5		J2-23	13	N			SR2-23				
11-6		J2-24	13	N			SR2-24				
12		J2-25	13	N			SR2-25				
13		J2-26	13	N			SR2-26				
14		J2-27	13	N			SR2-27				
15		J2-28	13	N			SR2-28				
16		J2-32	13	N			SR2-32				
17		J2-33	13	N			SR2-33				
18		J2-34	13	N			SR2-34				

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NASA DRAWING NO.
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SHEET 4 of 8

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	TO NO.
19-1		J2-35	13	N			SR2-35				
19-2		J2-36	13	N			SR2-36				
20-1		J2-37	13	N			SR2-37				
20-2		J2-38	13	N			SR2-38				
21-1		J2-39	13	N			SR2-39				
21-2		J2-40	13	N			SR2-40				
22-1		J2-41	13	N			SR2-41				
22-2		J2-42	13	N			SR2-42				
23		J2-43	13	N			SR2-43				
24		J2-44	13	N			SR2-44				
25		J2-45	13	N			SR2-45				
26		J2-46	13	N			SR2-46				
27		J2-47	13	N			SR2-47				
28		J2-48	13	N			SR2-48				
29		J2-49	13	N			SR2-49				
30		J2-50	13	N			SR2-50				

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NASA DRAWING NO.
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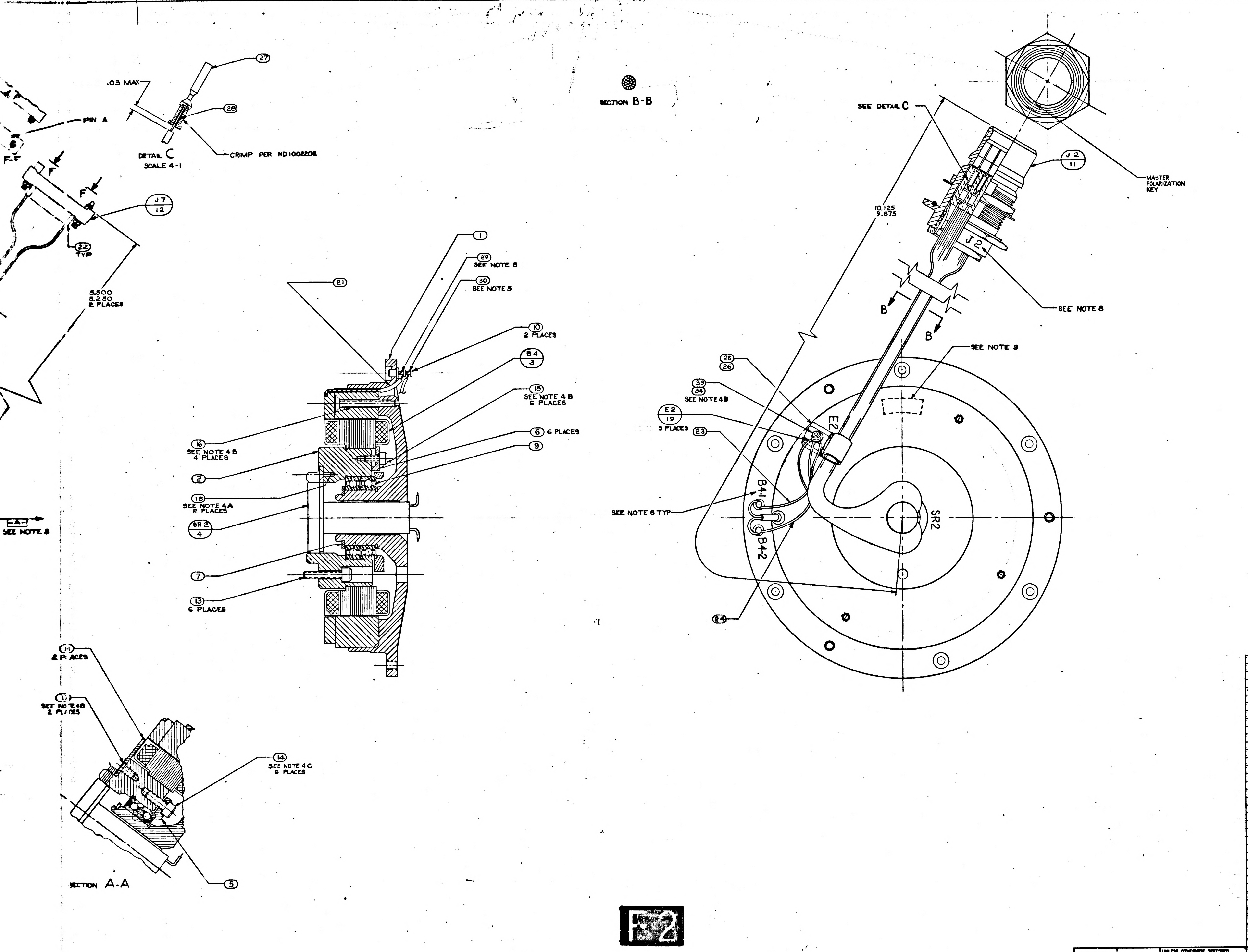
SHEET 5 of 8

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	TO NO.
31	23	J2-51	13	N			B4-1	13	Y		
32	24	J2-52	13	N			B4-2	13	Y		
33		B4-BLK					B4-1	13	Y		
34		B4-WHT					B4-2	13	Y		
35					19						
35-B		E2					SHLD 35				
35-1		J2-59	13	N			SR2-29				
35-2		J2-60	13	N			SR2-30				
35-3		J2-61	13	N			SR2-31				
36					20						
36-A		SHLD-36					E11				
36-1		J7-A	13	Y	22		SR2-1				
36-2		J7-B	13	Y	22		SR2-2				
36-3		J7-C	13	Y	22		SR2-3				
37		J7-D	13	Y	22		SR2-4				
38		J7-E	13	Y	22		SR2-5				
39-1		J7-F	13	Y	22		SR2-6				
39-2		J7-H	13	Y	22		SR2-7				

REVISIONS TDRR 14813

SYM	DESCRIPTION	DATE	APPROVAL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28
DETAIL C
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CRIMP PER ND 1002208
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J7
12
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5.300
5.250
2 PLACES
SECTION B-B
SEE DETAIL C
MASTER POLARIZATION KEY
J2
11
10.125
9.875
SEE NOTE 8
B
B
SEE NOTE 9
1
29
SEE NOTE 5
30
SEE NOTE 5
21
10
2 PLACES
B4
3
15
SEE NOTE 4 B
6 PLACES
6
6 PLACES
9
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR2
4
A
SEE NOTE 3
7
13
6 PLACES
25
26
33
34
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E2
19
3 PLACES
23
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24
E2
B4-1
B4-2
SR2
11
2 PLACES
17
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4 C
6 PLACES
5
SECTION A-A

F-2

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1001488-4	SCREW HEX SOC HD SELF LOCKING	34
1	MS15795-303	WASHER, FLAT, METAL, ROUND	33
A/R	1012507-002	TAPE - LACING	32
A/R	1010870	GREASE, LUBRICATING	31
A/R	QQ-S-571 SN60	SOLDER	30
A/R	QQ-S-571 SN10	SOLDER	29
61	1010862	BUSHING, SLEEVE	28
61	1010781-1	CONTACT, ELEC	27
1	1000223	WASHER, CABLE CLAMP	26
1	1000220-7	CLAMP, CABLE	25
1	1010416-10	WIRE AWG 28E WHT 10" LONG	24
1	1010416-1	WIRE AWG 28E BLK 10" LONG	23
50	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	22
1	1010490-114	INSULATION, SLEEVING ELEC HEAT SHRINK	21
3	1000020-8	SHIELD & GRD ASS'Y	20
3	1000020-9	SHIELD & GRD ASS'Y	19
2	1010867-2	SCREW, FLAT HD SELF LOCKING SOC SPLINE	18
2	1010867-12	SCREW, FLAT HD SELF LOCKING SOC SPLINE	17
4	1010867-18	SCREW, FLAT HD SELF LOCKING SOC SPLINE	16
6	1001488-2	SCREW, HEX SOC HD SELF LOCKING	15
6	1001488-18	SCREW, HEX SOC HD SELF LOCKING	14
6	1001489-22	SCREW, HEX SOC HD	13
2	1000122	CONNECTOR, ELEC, RECEPTACLE	12
1	1010783-2	CONNECTOR, ELEC, RECEPTACLE	11
2	1000100-1	TERMINAL, INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
6	2018756	CLIP RETAINER TORQUE MOTOR O.A.	6
1	2018766	PLATE BRG RETAINER TORQUE MOT O.A.	5
1	2018625	SLIP RING ASS'Y 50 CONTACT	4
1	2018629	MOTOR, TORQUE DC FRAMELESS	3
1	2018751	SHAFT, STUB TORQUE MOTOR O.A.	2
1	2018755	HOUSING BRG TORQUE MOTOR OUTER AXIS	1

011 LIST OF MATERIALS

2018601	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R.W. Contrell DATE 1-29-65
CHECKED G. Quinn 2-24-65
APPROVAL 24 Feb 65
APPROVAL
NASA APPROVAL
MIT APPROVAL

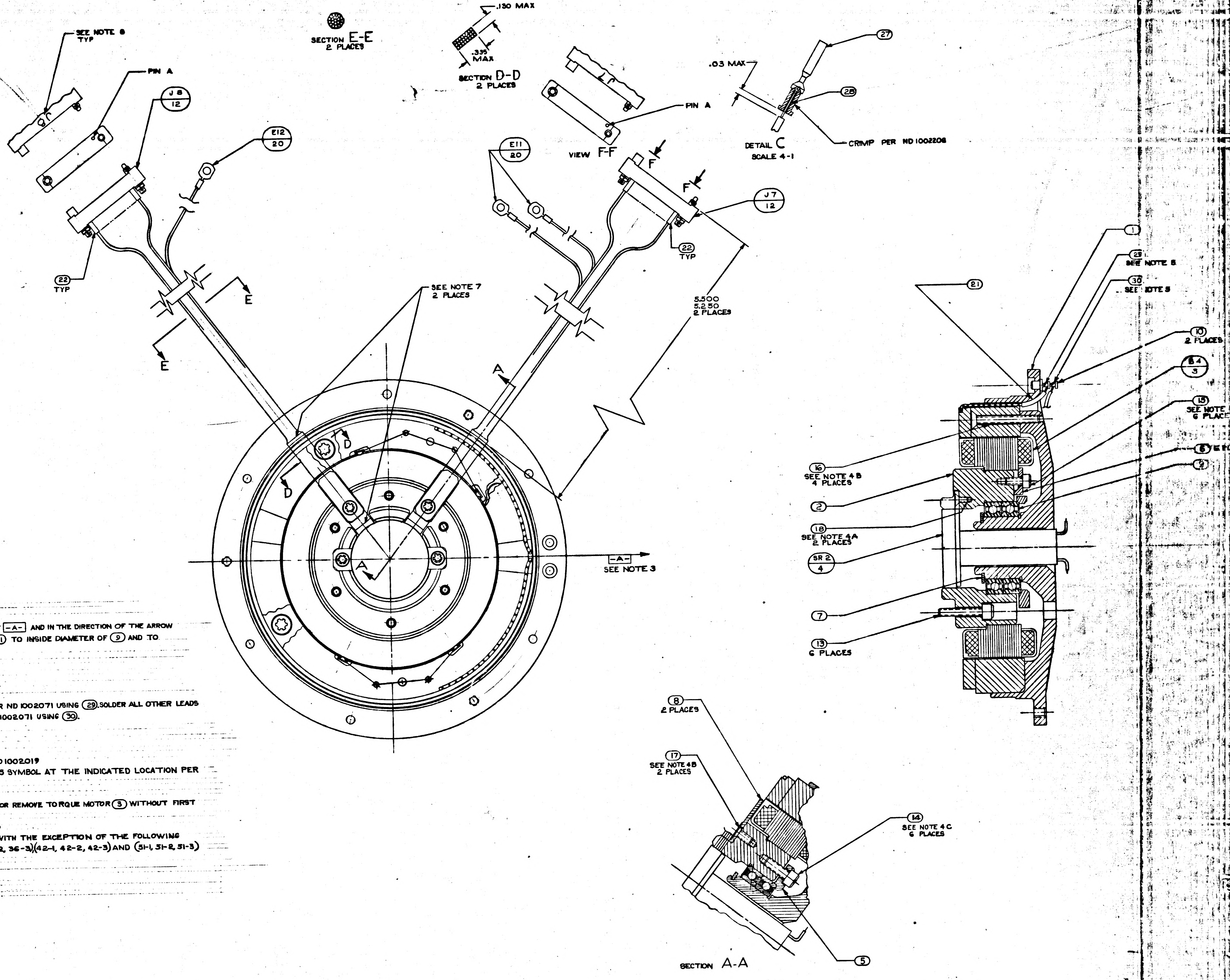
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTER GIMBAL
SUB - ASSEMBLY
TORQUE MOTOR END
OUTER AXIS

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 2018609
SCALE 2-1 | WT | SHEET 1 OF 8

2018609

2018609 REV SHEET 1


SEE NOTE 8
TYP
PIN A
J8
12
E12
20
22
TYP
E
E
SECTION E-E
2 PLACES
.130 MAX
.335 MAX
SECTION D-D
2 PLACES
VIEW F-F
PIN A
E11
20
F
F
J7
12
22
TYP
27
.03 MAX
28
DETAIL C
SCALE 4-1
CRIMP PER ND1002206
SEE NOTE 7
2 PLACES
5.500
5.250
2 PLACES
A
A
D
D
-A-
SEE NOTE 3
1
25
SEE NOTE 8
30
SEE NOTE 5
21
10
2 PLACES
15
SEE NOTE
6 PLACES
16
SEE NOTE 4 B
4 PLACES
2
18
SEE NOTE 4A
2 PLACES
SR 2
4
7
13
6 PLACES
8
2 PLACES
17
SEE NOTE 4B
2 PLACES
14
SEE NOTE 4 C
6 PLACES
5
SECTION A-A

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF ATP2018601
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
    - A. 3.5 IN LB
    - B. 5.0 IN LB
    - C. 10.0 IN LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑫ PER ND1002071 USING ㉚.
6. HEAT SHRINK SLEEVING ON ⑲ & ⑳ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 & SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 8 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3), (35-1, 35-2, 35-3), (36-1, 36-2, 36-3), (42-1, 42-2, 42-3) AND (51-1, 51-2, 51-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 8 ARE IN INCHES AND 2 PLACE DECIMALS

FI

2018609	REV	SHEET
		1

APOLLO G&N Specification
PS2018609 Rev -
Original Issue Date: 6/28/65
Release Authority: TDRR 20443
Class A Release

PROCUREMENT SPECIFICATION
PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS
INTERGIMBAL SUBASSEMBLY, TORQUE MOTOR, OUTER AXIS

Drawing No. 2018609

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 7 inclusive.

APPROVALS	6/23/65 NASA/MSC	28 June 65 MIT/IL	ACSP

3. REQUIREMENTS

3.1 PERFORMANCE

3.1.1 Supply Voltage. The assembly shall function as specified herein when supplied with a dc voltage which can be adjusted from 0 to 28 volts.

3.1.2 Characteristics

3.1.2.1 Torque. The torque required to just begin rotation of the subassembly shall be 12 in.-oz. max.

3.1.2.2 Brush Force. The force required at the heel of the brush to lift each brush shall be 30 to 50 gm.

3.1.2.3 Torque Motor Phasing. With excitation voltage applied, as specified in para 4.2.6, the bearing housing shall rotate in a ccw direction.

3.1.2.4 Torque Motor Output. Torque Motor output torque shall be:

a. 140 in.-oz. min with 0.900 ± 1% amps applied
b. 15.5 in.-oz. min with 0.100 ± 1% amps applied

3.1.2.5 Continuity and DC Resistance. The continuity and dc resistance shall be in accordance with Table I.

3.1.2.6 Insulation Resistance. The insulation resistance shall be in accordance with Table II with 500 vdc applied.

3.2 PRODUCT CONFIGURATION

3.2.1 Drawings. The configuration of the assembly shall be in accordance with APOLLO G&N Drawing 2018609 and all drawings and engineering data referenced thereon.

TABLE I

CONTINUITY AND DC RESISTANCE

FROM	TO	RESISTANCE (ohms)	FROM	TO	RESISTANCE (ohms)
J2-1	J7-A	<0.4	J2-37	J8-N	<0.4
2	B		38	P	
3	C		39	R	
4	D		40	S	
5	E		41	T	
6	F		42	U	
7	H		43	V	
8	J		44	W	
9	K		45	X	
10	L		46	Y	
11	M		47	Z	
12	N		48	a	
13	P		49	b	
14	R		50	J8-c	<0.4
15	S		51	B4-1	<0.1
16	T		52	B4-2	<0.1
17	U		52	J2-51	10 to 37
18	V		59	J8-D	<0.4
19	W		60	J8-E	<0.4
20	X		J2-61	J8-F	<0.4
21	Y		Shield On		<0.2
22	Z		J2-59, 60, 61	E2	
23	a		Shield On		
24	b		J2-12, 13, 14	E2	
25	J7-c		Shield On		
26	J8-A		J2-1, 2, 3	E2	
27	B		Shield On		
28	C		J8-D, E, P	E12	
32	H		Shield On		
33	J		J7-A, B, C	E11	
34	K		Shield On		
35	L		J7-N, P, R	E11	<0.2
J2-36	J8-M	<0.4			

4. QUALITY ASSURANCE PROVISIONS

4.1 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.1.1 Test Conditions

4.1.1.1 Environmental. Unless otherwise specified, the assemblies shall be tested under the following ambient conditions:

a. Ambient Temperature:	75° ± 5°F
b. Relative Humidity:	50% max
c. Pressure Differential:	Internal positive pressure of 0.01 inch H_2O
d. Particle Count Tolerance:	Maximum of 100,000 particles, from 1 to 10 microns in size, per cubic foot of air. Maximum of 25,000 particles, greater than 10 microns in size, per cubic foot of air.

4.1.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.2 TESTS

4.2.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of APOLLO G&N Drawing 2018609. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, unacceptable soldering, pin misalignment, and legibility and appearance of markings.

4.2.2 Brush Force. The force required to lift each brush, as measured at the heel of the brush, shall be 30 to 50 gm. (This test shall be conducted before performing all other tests.)

4.2.3 Continuity and DC Resistance. The resistance between each pair of terminals shall be as specified in Table I when measured with an ohmmeter limited to an open circuit voltage of 10 mv maximum in accordance with MIL-STD-202 method 303.

4.2.4 Insulation Resistance. Insulation Resistance shall be checked between the points specified in Table II with 500 vdc applied and limited to a short circuit current of 1ma. The resistance shall be per Table II.

4.2.5 Torque. The torque required to just begin rotation of the assembly at eight equally spaced positions in both the cw and ccw directions shall be 12 inch - ounces, maximum.

4.2.6 Torque Motor Output.

a. With an excitation current of 0.900 ± 1% amps applied, the torque output shall be 140 in.-oz. min.

b. With an excitation current of 0.100 ± 1% amps applied, the torque output shall be 15.5 in.-oz. min.

4.2.7 Torque Motor Phasing. With a minimum voltage (0 to 28 vdc) applied to pins J2-51 (hi) and J2-52 (Lo), the bearing housing shall rotate in a ccw direction as viewed from the bearing housing end.

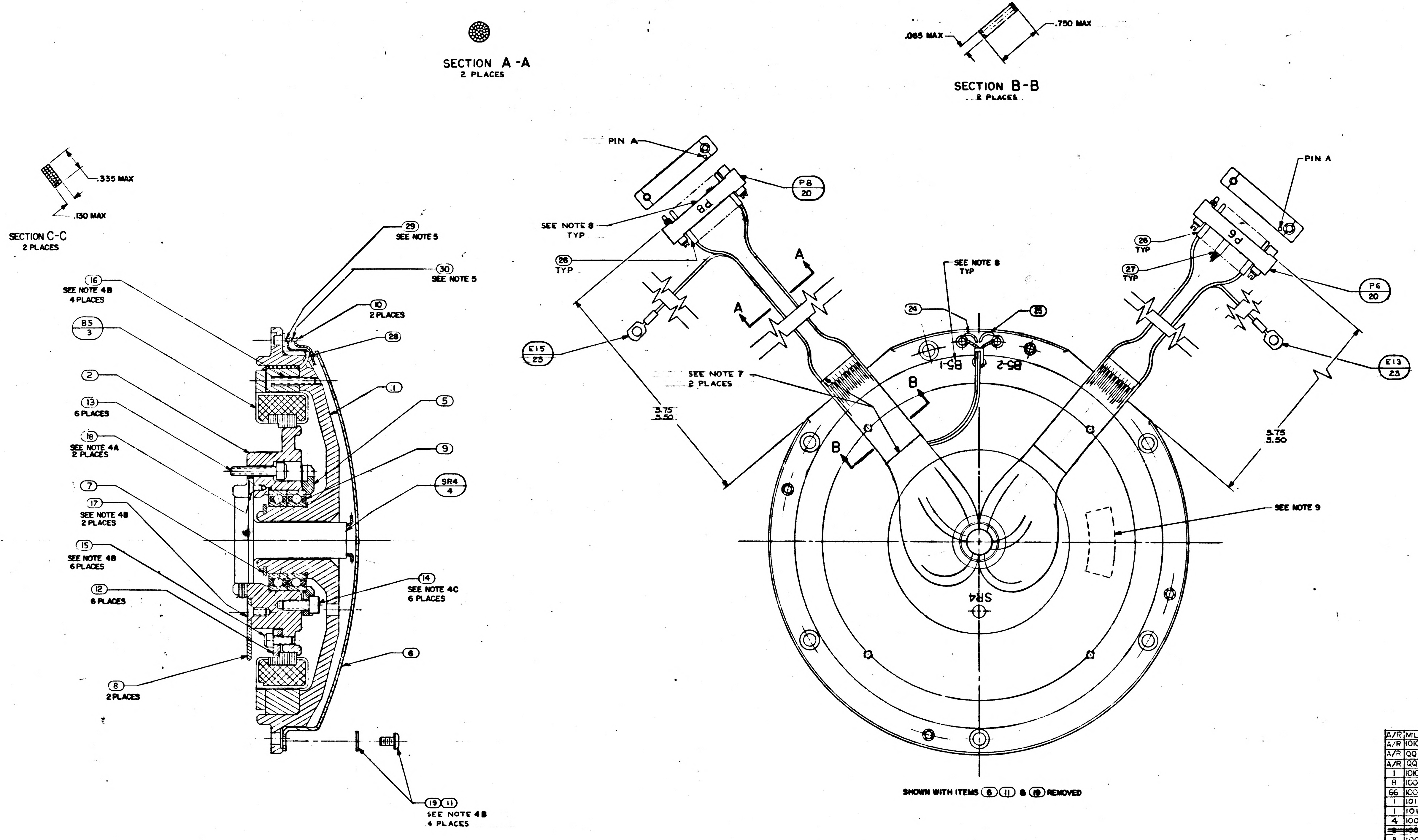
5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES. None.

SYM	DESCRIPTION	DATE	APPR
A	REVISED PER TDRR 19281	2 Jun 65	[illegible]

REVISIONS TDRR 17167


SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
.065 MAX
.750 MAX
.335 MAX
.130 MAX
SECTION C-C
2 PLACES
29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5
3
28
2
1
13
6 PLACES
5
18
SEE NOTE 4A
2 PLACES
9
SR4
4
7
17
SEE NOTE 4B
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
6
8
2 PLACES
19 11
SEE NOTE 4B
4 PLACES
PIN A
P8
20
SEE NOTE 8
TYP
26
TYP
E15
25
SEE NOTE 7
2 PLACES
3.75
3.50
A
B
SEE NOTE 8
TYP
24
25
B5-1
B5-2
SR4
PIN A
26
TYP
27
TYP
P6
20
E13
23
3.75
3.50
SEE NOTE 9

SHOWN WITH ITEMS ⑥ ⑪ & ⑲ REMOVED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	2
A/R	1010870	GREASE LUBRICATING	1
A/R	QQ-S-571 SN60	SOLDER	0
A/R	QQ-S-571 SN10	SOLDER	9
1	1010490-054	INSULATION SLEEVING ELEC HEAT SHRINK	8
8	1006776-14	INSULATION, SLEEVING ELEC 5/16 LONG	7
66	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	6
1	1010416-10	WIRE, AWG 28E WHITE 10" LONG	5
1	1010416-1	WIRE, AWG 28E BLACK 10" LONG	4
4	1000020-6	SHIELD AND GROUND ASSY	3
~~8~~	~~1000020-4~~	~~SHIELD AND GROUND ASSY~~	~~2~~
2	1000122	CONN ELEC RECEPT 26 PIN	1
2	1000123	CONN ELEC PLUG 26 PIN	[illegible]
4	1010891-12	SCREW, BUT. HD SELF LKG SOC SPLINE	9
2	1010867-2	SCREW, FLAT HD SELF LKG SOC SPLINE	8
2	1010867-12	SCREW, FLAT HD SELF LKG SOC SPLINE	7
4	1010867-17	SCREW, FLAT HD SELF LKG SOC SPLINE	6
6	1001488-2	SCREW, HEX SOC HD SELF-LOCKING.	5
6	1001488-18	SCREW, HEX SOC HD SELF-LOCKING	4
6	1001489-22	SCREW, HEX SOC HD	13
6	2018745	CLIP, RETAINER TORQUE MOTOR L.& M.A.	12
4	MS15795-703	WASHER, FLAT, METAL, ROUND	1
2	1000100-1	TERMINAL INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP, WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
1	2018783	WIRE GUIDE BRG HSG T. M. M. A.	6
1	2018753	PLATE, BRG RETAINER TORQUE MOT. M.A.	5
1	2018624	SLIP RING 4C CONTACT	4
1	2018623	MOTOR, TORQUE DC FRAMELESS	3
1	2018748	SHAFT, STUB TORQUE MOTOR M.A.	2
1	2018749	HOUSING, BRG TORQUE MOTOR M.A.	1

011 LIST OF MATERIALS

2018603	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN B.W. [illegible] DATE 6-8-64
CHECKED G. QUINN 3-2-65
APPROVAL [illegible] 8 Mar 65
APPROVAL
NASA APPROVAL W. J. R[illegible] 3-4-65
MIT APPROVAL [illegible] 9 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTER GIMBAL
SUB ASSEMBLY
TORQUE MOTOR END
MIDDLE AXIS

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 2018610
SCALE 2-1 | WT | SHEET 1 OF 1

MASTER

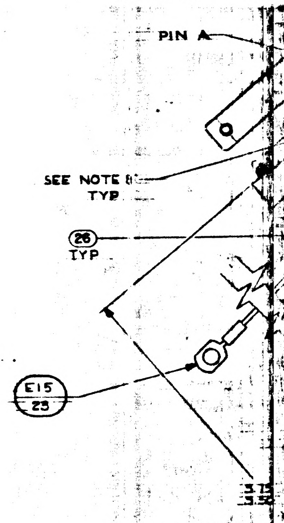
	REV	SHEET
2018610	A	1

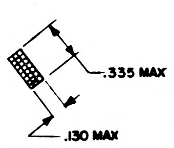
2018610 A

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. COMPLETED ASS'Y SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018610
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ±5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ㉑ & ㉒ PER ND 1002071 USING ㉚
6. HEAT SHRINK SLEEVING ON ㉒ & ㉓ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $^{.10}_{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBERS SHALL BE TWISTED OR TWISTED & SHIELDED WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (15-1, 15-2, 15-3) AND (29-1, 29-2, 29-3) WHICH SHALL BE SHIELDED BUT NOT TWISTED. TWIST PER ND 1002032
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEET 2 THRU 7 INDICATES THE FOLLOWING:
   - A = SHIELD GROUND ON "FROM END"
   - B = SHIELD GROUND ON "TO END"

SECTION A-A
2 PLACES


PIN A
SEE NOTE 8
TYP
㉖
TYP
E15
23
3.75
3.50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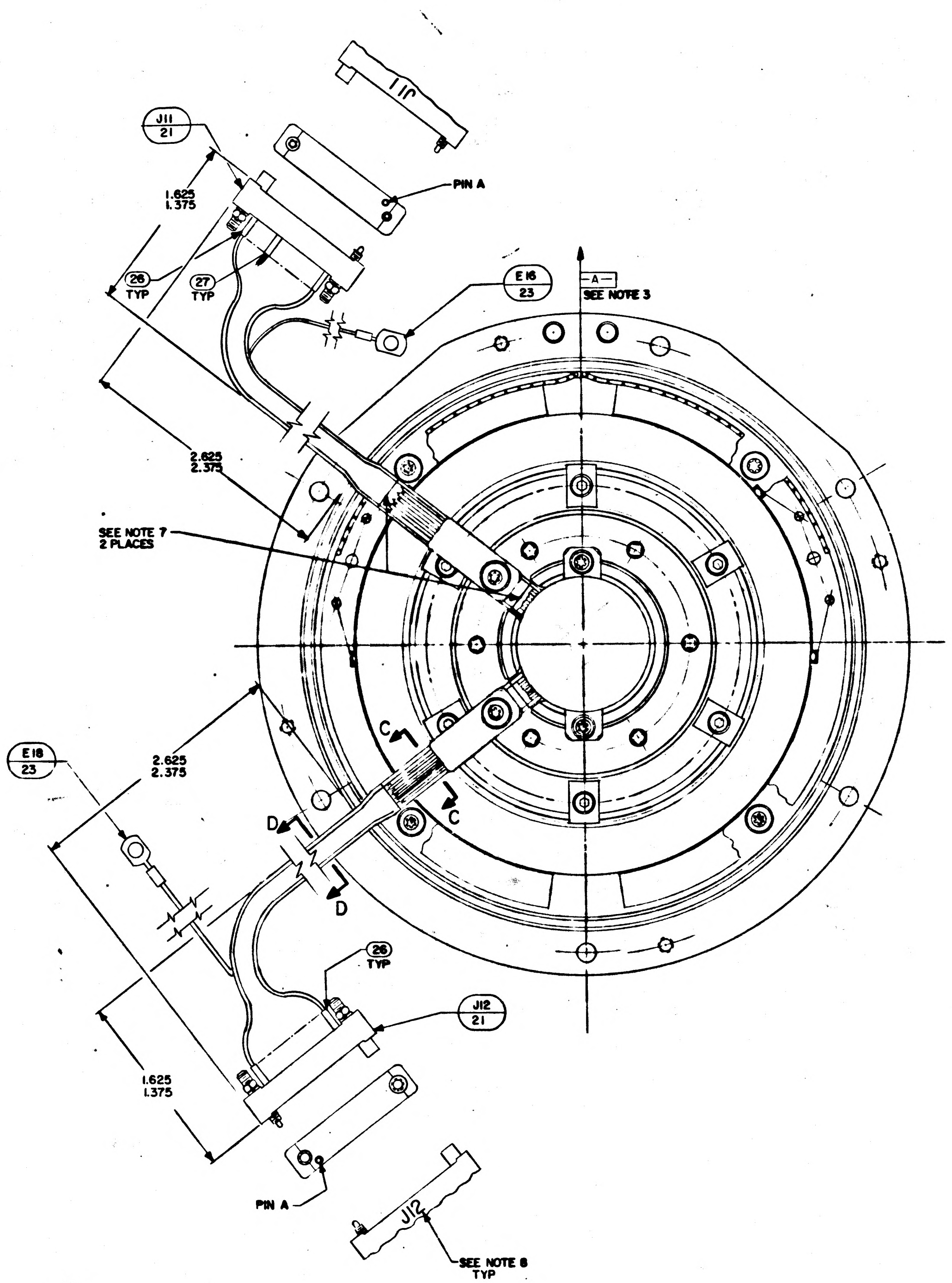
.130 MAX

SECTION C-C
2 PLACES


J11
21
J11
PIN A
1.625
1.375
㉖
TYP
㉗
TYP
E16
23
-A-
SEE NOTE 3
2.625
2.375
SEE NOTE 7
2 PLACES
C
C
D
D
E18
23
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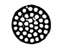
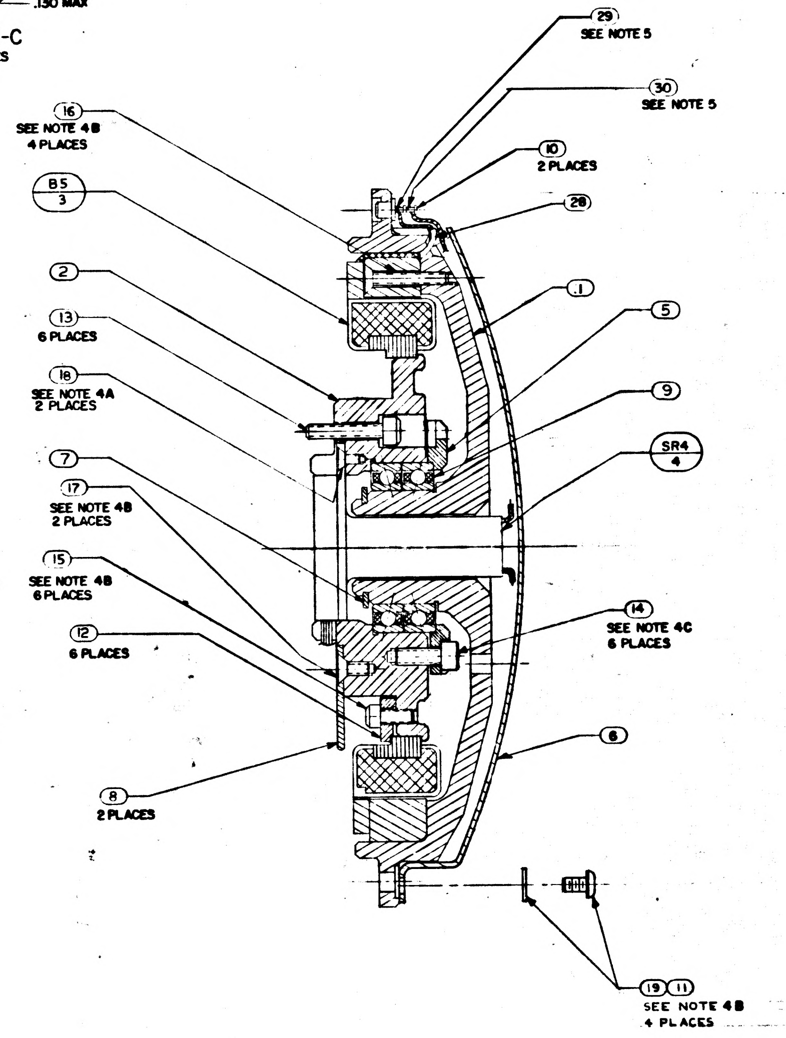
2.375
㉘
TYP
J12
21
1.625
1.375
PIN A
J12
SEE NOTE 8
TYP



SECTION D-D
2 PLACES


㉙
SEE NOTE 5
㉚
SEE NOTE 5
⑯
SEE NOTE 4B
4 PLACES
⑩
2 PLACES
B5
3
㉘
②
.1
⑬
6 PLACES
⑤
⑱
SEE NOTE 4A
2 PLACES
⑨
SR4
4
⑦
⑰
SEE NOTE 4B
2 PLACES
⑮
SEE NOTE 4B
6 PLACES
⑭
SEE NOTE 4C
6 PLACES
⑫
6 PLACES
⑥
⑧
2 PLACES
⑲ ⑪
SEE NOTE 4B
4 PLACES

JH

2018610	REV A	SHEET 1

TDRR 17167 MAR 9 1965

M.A. T.M.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 201861O

SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N
1		P6-A	13	Y	26	SR4-1		
2					22			
2-A		SHLD-2				E13		
2-1		P6-B	13	Y	27	SR4-2		
2-2		P6-B	13	Y		SR4-3		
2-3		P6-D	13	Y	27	SR4-4		
2-4		P6-D	13	Y		SR4-5		
3-1		P6-F	13	Y	27	SR4-6		
3-2		P6-F	13	Y		SR4-7		
3-3		P6-J	13	Y	27	SR4-8		
3-4		P6-J	13	Y		SR4-9		
4		P6-L	13	Y	26	SR4-10		
5		P6-M	13	Y	26	SR4-11		
6		P6-N	13	Y	26	SR4-12		

TDRR 17167 MAR 6 1965

M.A. T.M.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 201861O

SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N
7		P6-P	13	Y	26	SR4-13		
8-1		P6-R	13	Y	26	SR4-14		
8-2		P6-S	13	Y	26	SR4-15		
9		P6-T	13	Y	26	SR4-16		
10-1		P6-U	13	Y	26	SR4-17		
10-2		P6-V	13	Y	26	SR4-18		
11		P6-W	13	Y	26	SR4-19		
12		P6-X	13	Y	26	SR4-20		
13-1		P6-Y	13	Y	26	SR4-21		
13-2		P6-Z	13	Y	26	SR4-22		
13-3		P6-a	13	Y	26	SR4-23		
13-4		P6-b	13	Y	26	SR4-24		
13-5		P6-c	13	Y	26	SR4-25		
14		P8-A	13	Y	26	SR4-26		
15		P8-B	13	Y	26	SR4-27		
16		P3-C	13	Y	26	SR4-28		

TDRR 17167 MAR 6 1965

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REVISION —

NASA DRAWING NO. 201861O

SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N
17					22			
17A		SHLD-17				E15		
17-1		P8-D	13	Y	26	SR4-29		
17-2		P3-E	13	Y	26	SR4-30		
17-3		P8-F	13	Y	26	SR4-31		
18		P8-H	13	Y	26	SR4-32		
19		P8-J	13	Y	26	SR4-33		
20		P8-K	13	Y	26	SR4-34		
21-1		P8-L	13	Y	26	SR4-35		
21-2		P8-M	13	Y	26	SR4-36		
22-1		P8-N	13	Y	26	SR4-37		
22-2		P8-P	13	Y	26	SR4-38		
23-1		P8-R	13	Y	26	SR4-39		
23-2		P8-S	13	Y	26	SR4-40		
24	24	P8-T	13	Y	26	B5-1	19	Y
25	25	P8-U	13	Y	26	B5-2	19	Y
26		B5-BLK				B5-1	19	Y
27		B5-WHT				B5-2	19	Y

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SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N
28		J12-A	13	Y	26	SR4-26		
29		J12-B	13	Y	26	SR4-27		
30		J12-C	13	Y	26	SR4-28		
31					23			
31A		SHLD-31				E18		
31-1		J12-D	13	Y	26	SR4-29		
31-2		J12-E	13	Y	26	SR4-30		
31-3		J12-F	13	Y	26	SR4-31		
32		J12-H	13	Y	26	SR4-32		
33		J12-J	13	Y	26	SR4-33		
34		J12-K	13	Y	26	SR434		
35-1		J12-L	13	Y	26	SR4-35		
35-2		J12-M	13	Y	26	SR4-36		
36-1		J12-N	13	Y	26	SR4-37		
36-2		J12-P	13	Y	26	SR4-38		
37-1		J12-R	13	Y	26	SR4-39		
37-2		J12-S	13	Y	26	SR4-40		

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NASA DRAWING NO. 2018610
SHEET 6 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.
38-1			J12-X	13	Y	26		SR4-21			
38-2			J12-Z	13	Y	26		SR4-22			
38-3			J12-a	13	Y	26		SR4-23			
38-4			J12-b	13	Y	26		SR4-24			
38-5			J12-c	13	Y	26		SR4-25			
39			J11-A	13	Y	26		SR4-1			
40						23					
40A			SHLD-40			-		E16			
40-1			J11-B	13	Y	27		SR4-2			
40-2			J11-B	13	Y			SR4-3			
40-3			J11-D	13	Y	27		SR4-4			
40-4			J11-D	13	Y			SR4-5			
41-1			J11-F	13	Y	27		SR4-6			
41-2			J11-F	13	Y			SR4-7			
41-3			J11-J	13	Y	27		SR4-8			
41-4			J11-J	13	Y			SR4-9			

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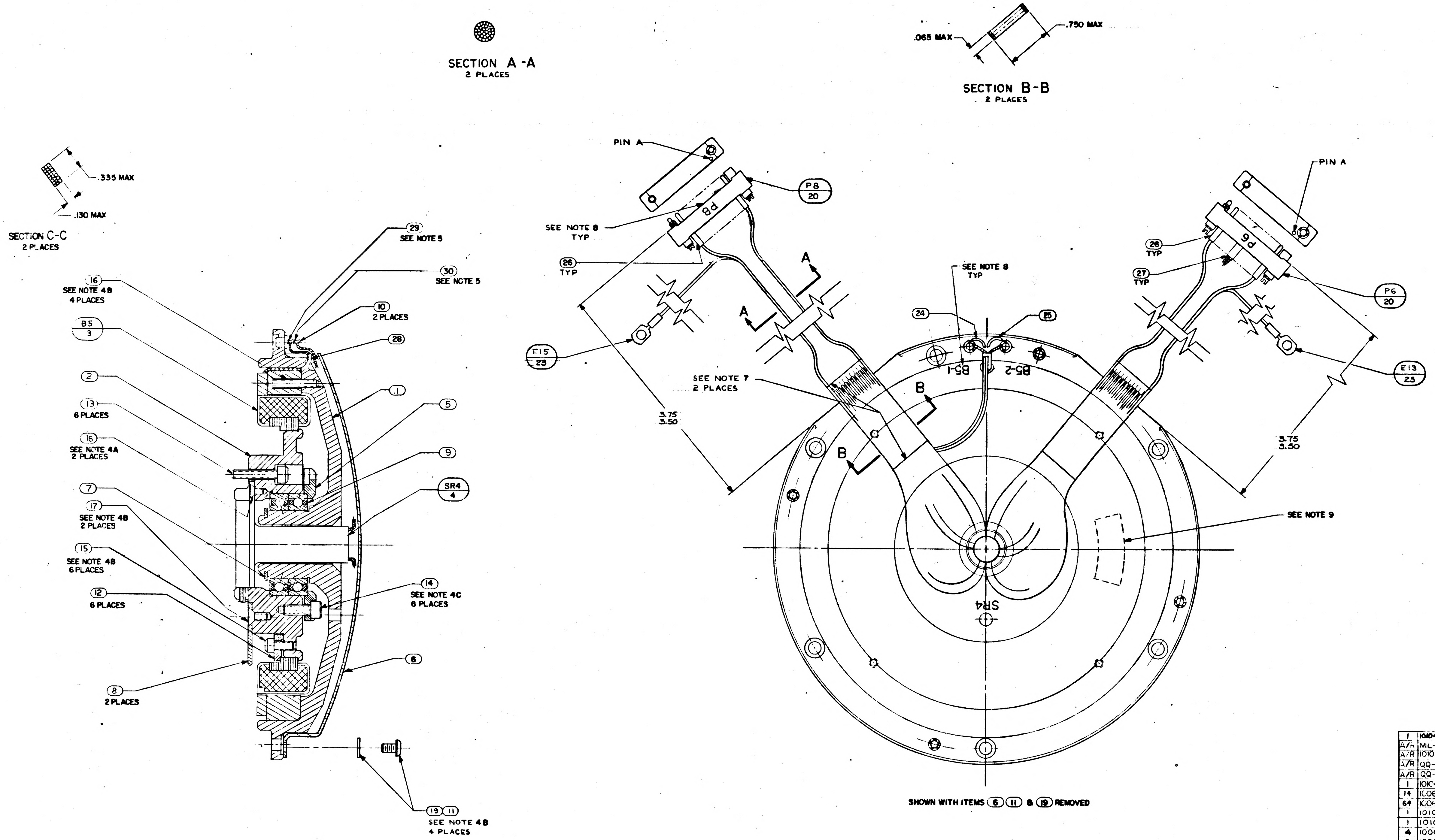
NASA DRAWING NO. 2018610
SHEET 7 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.
42			J11-L	13	Y	26		SR4-10			
43			J11-M	13	Y	26		SR4-11			
44			J11-N	13	Y	26		SR4-12			
45			J11-P	13	Y	26		SR4-13			
46-1			J11-R	13	Y	26		SR4-14			
46-2			J11-S	13	Y	26		SR4-15			
47			J11-T	13	Y	26		SR4-16			
48-1			J11-U	13	Y	26		SR4-17			
48-2			J11-V	13	Y	26		SR4-18			
49			J11-W	13	Y	26		SR4-19			
50			J11-X	13	Y	26		SR4-20			

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17167			
A	REVISED PER TDRR 19281	2 JUN 65		
B	REVISED PER TDRR 20662	26 JUL 70		


SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
.065 MAX
.750 MAX
SECTION C-C
2 PLACES
.335 MAX
.130 MAX
29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5
3
28
2
1
13
6 PLACES
5
18
SEE NOTE 4A
2 PLACES
9
SR4
4
7
17
SEE NOTE 4B
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
6
8
2 PLACES
19
11
SEE NOTE 4B
4 PLACES
PIN A
P8
20
SEE NOTE 8
TYP
26
TYP
A
E15
23
SEE NOTE 7
2 PLACES
3.75
3.50
B
24
SEE NOTE 8
TYP
25
B5-1
B5-2
PIN A
P6
26
TYP
27
TYP
P6
20
E13
23
3.75
3.50
SEE NOTE 9
SR4
SHOWN WITH ITEMS 6 11 & 19 REMOVED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010416-3	WIRE, AWG 28E RED 4" LONG	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	1010870	GREASE LUBRICATING	31
A/R	QQ-S-571 SN60	SOLDER	30
A/R	QQ-S-571 SN10	SOLDER	29
1	1010490-054	INSULATION SLEEVING ELEC HEAT SHRINK	28
14	1006776-14	INSULATION, SLEEVING ELEC 5/16 LONG	27
64	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	26
1	1010416-10	WIRE, AWG 28E WHITE 10" LONG	25
1	1010416-1	WIRE, AWG 28E BLACK 14" LONG	24
4	1000020-6	SHIELD AND GROUND ASSY	23
~~2~~	~~1000020-4~~	~~SHIELD AND GROUND ASSY~~	~~22~~
2	1000122	CONN ELEC RECEPT 26 PIN	21
2	1000123	CONN ELEC PLUG 26 PIN	20
4	1010891-12	SCREW, BUT. HD SELF LKG SOC SPLINE	19
2	1010867-52	SCREW, FLAT HD SELF LKG SOC SPLINE	18
2	1010867-12	SCREW, FLAT HD SELF LKG SOC SPLINE	17
4	1010867-17	SCREW, FLAT HD SELF LKG SOC SPLINE	16
6	1001488-2	SCREW, HEX SOC HD SELF-LOCKING.	15
6	1001488-18	SCREW, HEX SOC HD SELF-LOCKING	14
6	1001489-22	SCREW, HEX SOC HD	13
6	2018745	CLIP, RETAINER TORQUE MOTOR I.& M.A.	12
4	MS15795-703	WASHER, FLAT, METAL, ROUND	11
2	1000100-1	TERMINAL INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP, WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
1	2018783	WIRE GUIDE BRG HSG T. M. M. A.	6
1	2018753	PLATE, BRG RETAINER TORQUE MOT M.A.	5
1	2018624	SLIP RING 4C CONTACT	4
1	2018623	MOTOR, TORQUE DC FRAMELESS	3
1	2018748	SHAFT, STUB TORQUE MOTOR M.A.	2
1	2018749	HOUSING, BRG TORQUE MOTOR M.A.	1
011		LIST OF MATERIALS	

2018603	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT

DRAWN Bill Carteaux DATE 6-8-64
CHECKED G. QUINN 3-2-65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL W. J. Rhine 3-9-65
MIT APPROVAL

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INTER GIMBAL
SUB ASSEMBLY
TORQUE MOTOR END
MIDDLE AXIS

CODE IDENT NO. SIZE J NASA DRAWING NO. 2018610
SCALE 2-1 WT SHEET 1 OF 7

MASTER

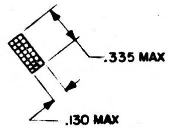
B
2018610

	REV	SHEET
2013610	E	1

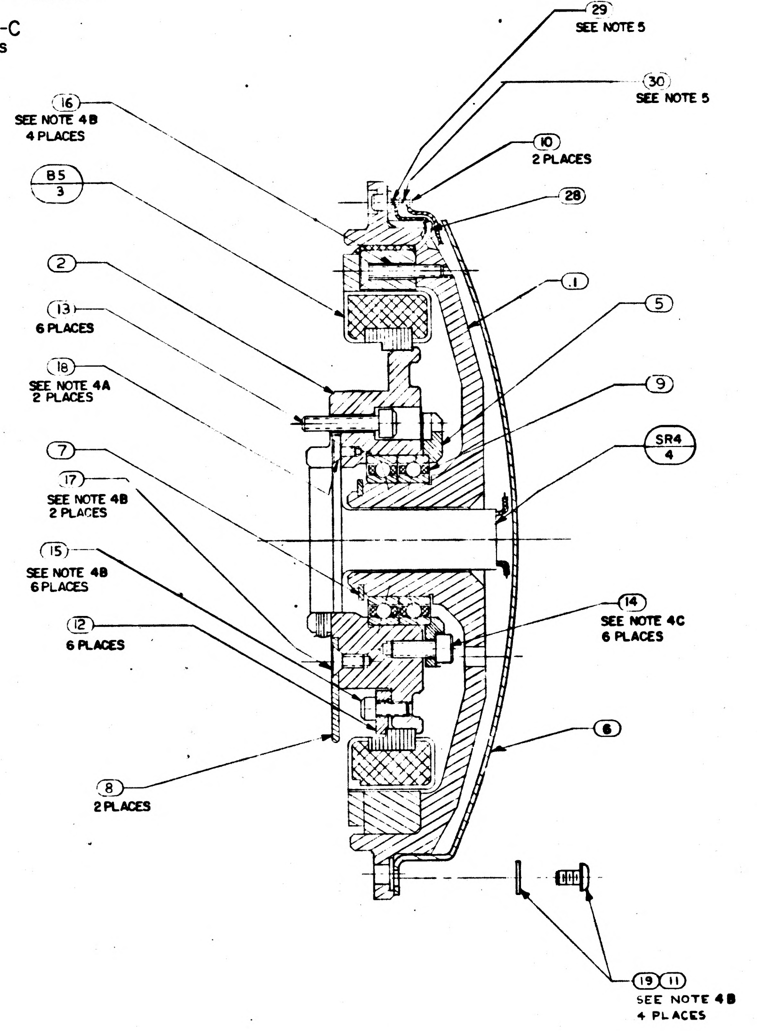
NOTES:

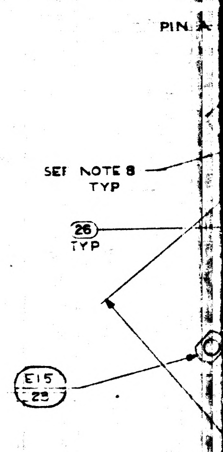
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. COMPLETED ASS'Y SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018610
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ±5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ㉑ & ㉒ PER ND 1002071 USING ㉚
6. HEAT SHRINK SLEEVING ON ㉒ & ㉓ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBERS SHALL BE TWISTED OR TWISTED & SHIELDED WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (15-1, 15-2, 15-3) AND (29-1, 29-2, 29-3) WHICH SHALL BE SHIELDED BUT NOT TWISTED. TWIST PER ND 1002032
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEET 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"

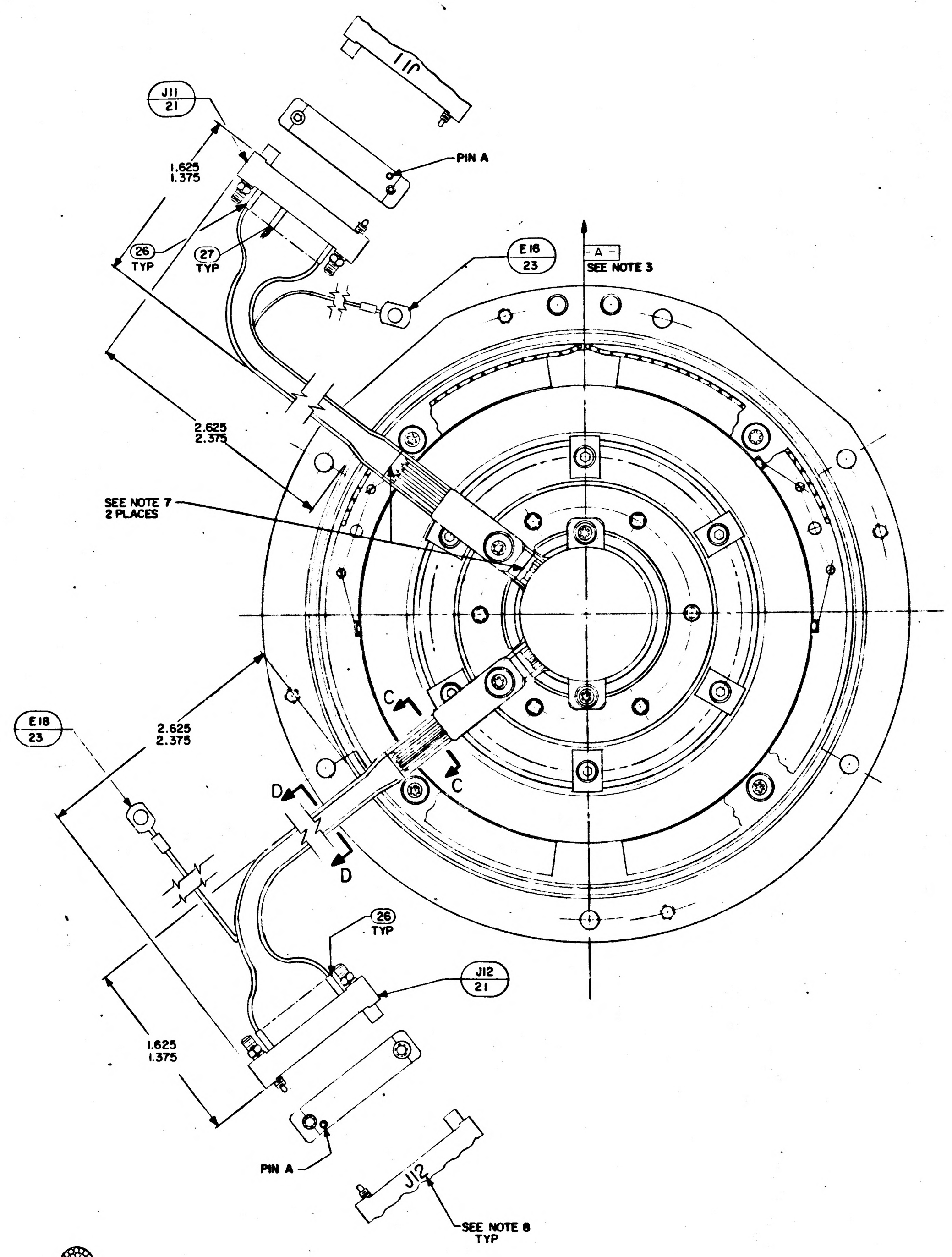
SECTION A-A
2 PLACES

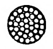

.335 MAX
.130 MAX

SECTION C-C
2 PLACES


29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5
3
28
2
1
13
6 PLACES
5
18
SEE NOTE 4A
2 PLACES
9
7
SR4
4
17
SEE NOTE 4B
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
6
8
2 PLACES
19 11
SEE NOTE 4B
4 PLACES


PIN A
SEE NOTE 8
TYP
26
TYP
E15
29


J11
J11
21
PIN A
1.625
1.375
26
TYP
27
TYP
E16
23
-A-
SEE NOTE 3
2.625
2.375
SEE NOTE 7
2 PLACES
C
C
D
D
E18
23
2.625
2.375
26
TYP
J12
21
1.625
1.375
PIN A
J12
SEE NOTE 8
TYP



SECTION D-D
2 PLACES

JH

2018610	REV B	SHEET 1

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NASA DRAWING NO. 2018610
SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
1		P6-A	13	Y	26		SR4-1				
2					22						
2-A		SHLD-2					E13				
2-1		P6-B	13	Y	27		SR4-2				
2-2		P6-C	13	Y	27		SR4-3				
2-3		P6-D	13	Y	27		SR4-4				
2-4		P6-E	13	Y	27		SR4-5				
2-5		P6-W	13	Y	27		SR4-19				
2-6		P6-X	13	Y	27		SR4-20				
3-1		P6-F	13	Y	27		SR4-6				
3-2		P6-F	13	Y			SR4-7				
3-3		P6-J	13	Y	27		SR4-8				
3-4		P6-J	13	Y			SR4-9				
4		P6-L	13	Y	26		SR4-10				
5		P6-M	13	Y	26		SR4-11				
6		P6-N	13	Y	26		SR4-12				

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REVISION B

NASA DRAWING NO. 2018610
SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
7		P6-P	13	Y	26		SR4-13				
8-1		P6-R	13	Y	26		SR4-14				
8-2		P6-S	13	Y	26		SR4-15				
9		P6-T	13	Y	26		SR4-16				
10-1		P6-U	13	Y	26		SR4-17				
10-2		P6-V	13	Y	26		SR4-18				
11	33	P6-C	13	Y	[illegible]		P6-W	13	Y		
12	24	P6-E	13	Y	[illegible]		P6-X	13	Y		
13-1		P6-Y	13	Y	26		SR4-21				
13-2		P6-Z	13	Y	26		SR4-22				
13-3		P6-a	13	Y	26		SR4-23				
13-4		P6-b	13	Y	26		SR4-24				
13-5		P6-c	13	Y	26		SR4-25				
14		P8-A	13	Y	26		SR4-26				
15		P8-B	13	Y	26		SR4-27				
16		P3-C	13	Y	26		SR4-28				

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NASA DRAWING NO. 2018610
SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
17					22						
17A		SHLD-17					E15				
17-1		P8-D	13	Y	26		SR4-29				
17-2		P3-E	13	Y	26		SR4-30				
17-3		P8-F	13	Y	26		SR4-31				
18		P8-H	13	Y	26		SR4-32				
19		P8-J	13	Y	26		SR4-33				
20		P8-K	13	Y	26		SR4-34				
21-1		P8-L	13	Y	26		SR4-35				
21-2		P8-M	13	Y	26		SR4-36				
22-1		P8-N	13	Y	26		SR4-37				
22-2		P8-P	13	Y	26		SR4-38				
23-1		P8-R	13	Y	26		SR4-39				
23-2		P8-S	13	Y	26		SR4-40				
24	24	P8-T	13	Y	26		B5-1	19	Y		
25	25	P8-U	13	Y	26		B5-2	19	Y		
26		B5-BLK					B5-1	19	Y		
27		B5-WHT					B5-2	19	Y		

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NASA DRAWING NO. 2018610
SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
28		J12-A	13	Y	26		SR4-26				
29		J12-B	13	Y	26		SR4-27				
30		J12-C	13	Y	26		SR4-28				
31					23						
31A		SHLD-31					E18				
31-1		J12-D	13	Y	26		SR4-29				
31-2		J12-E	13	Y	26		SR4-30				
31-3		J12-F	13	Y	26		SR4-31				
32		J12-H	13	Y	26		SR4-32				
33		J12-J	13	Y	26		SR4-33				
34		J12-K	13	Y	26		SR434				
35-1		J12-L	13	Y	26		SR4-35				
35-2		J12-M	13	Y	26		SR4-36				
36-1		J12-N	13	Y	26		SR4-37				
36-2		J12-P	13	Y	26		SR4-38				
37-1		J12-R	13	Y	26		SR4-39				
37-2		J12-S	13	Y	26		SR4-40				

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REVISION B

NASA DRAWING NO.
201861 0
SHEET 6 of 7

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.
38-1		J12-X	13	Y	26		SR4-21				
38-2		J12-Z	13	Y	26		SR4-22				
38-3		J12-a	13	Y	26		SR4-23				
38-4		J12-b	13	Y	26		SR4-24				
38-5		J12-c	13	Y	26		SR4-25				
39		J11-A	13	Y	26		SR4-1				
40					23						
40A		SHLD-40					E16				
40-1		J11-B	13	Y	27		SR4-2				
40-2		J11-C	13	Y	27		SR4-3				
40-3		J11-D	13	Y	27		SR4-4				
40-4		J11-E	13	Y	27		SR4-5				
40-5		J11-W	13	Y	26		SR4-19				
40-6		J11-X	13	Y	26		SR4-20				
41-1		J11-F	13	Y	27		SR4-6				
41-2		J11-F	13	Y			SR4-7				
41-3		J11-J	13	Y	27		SR4-8				
41-4		J11-J	13	Y			SR4-9				

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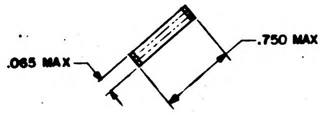
REVISION B

NASA DRAWING NO.
201861 0
SHEET 7 of 7

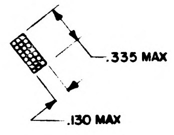
CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.
42		J11-L	13	Y	26		SR4-10				
43		J11-M	13	Y	26		SR4-11				
44		J11-N	13	Y	26		SR4-12				
45		J11-P	13	Y	26		SR4-13				
46-1		J11-R	13	Y	26		SR4-14				
46-2		J11-S	13	Y	26		SR4-15				
47		J11-T	13	Y	26		SR4-16				
48-1		J11-U	13	Y	26		SR4-17				
48-2		J11-V	13	Y	26		SR4-18				
49	33	J11-B	13	Y			J11-C	13	Y		
50	24	J11-D	13	Y			J11-E	13	Y		

REVISIONS TDRR 17167				
SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED PER TDRR 19281	2 JUN 65		
B	REVISED PER TDRR 20662	26 JUL 65		
C	REVISED PER TDRR 21683	31 AUG 65		
D	REVISED PER TDRR 21674	31 AUG 65		

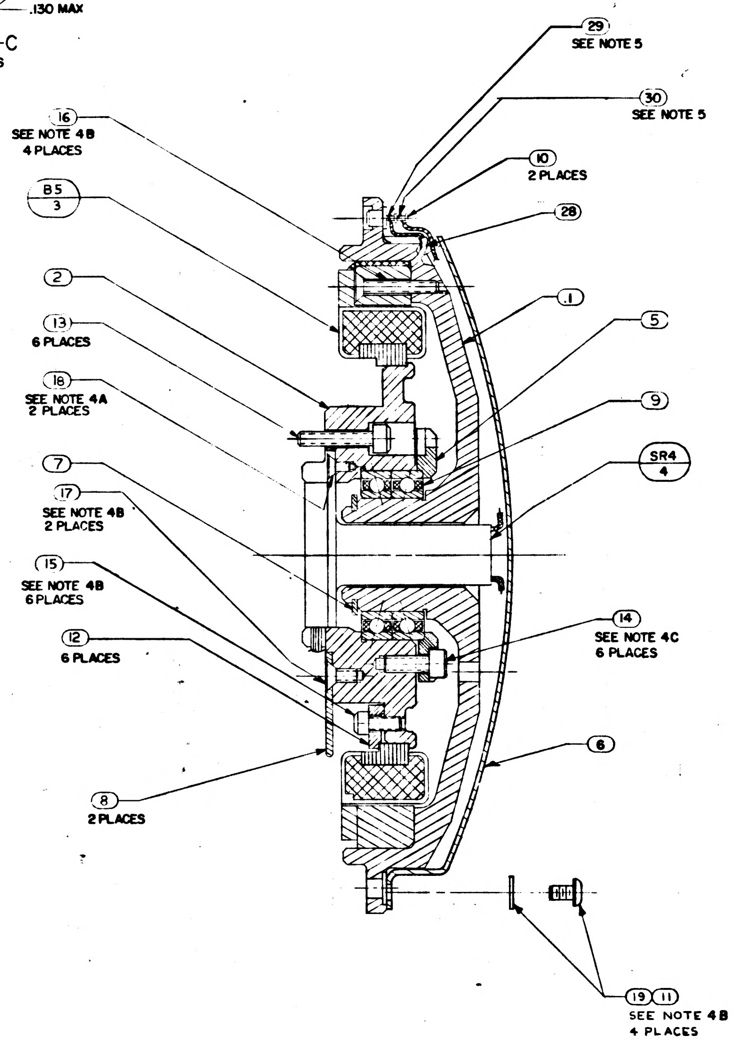
SECTION A -A
2 PLACES

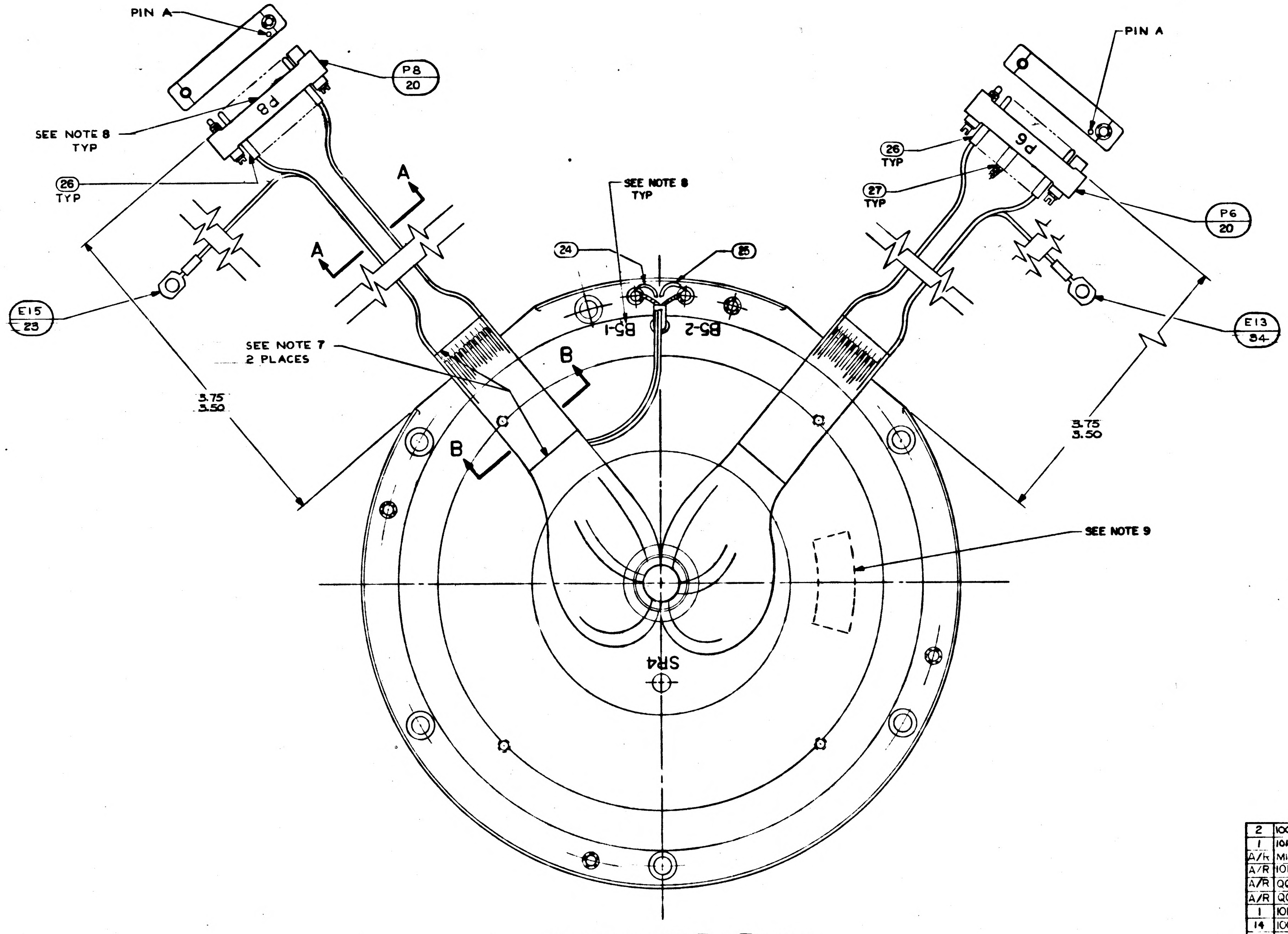

.065 MAX
.750 MAX

SECTION B-B
2 PLACES


.335 MAX
.130 MAX

SECTION C-C
2 PLACES


29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
28
B5
3
2
1
5
13
6 PLACES
18
SEE NOTE 4A
2 PLACES
9
SR4
4
7
17
SEE NOTE 4B
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
6
8
2 PLACES
19
11
SEE NOTE 4B
4 PLACES


PIN A
P8
20
SEE NOTE 8
TYP
26
TYP
A
A
E15
25
SEE NOTE 7
2 PLACES
3.75
3.50
B
B
B5-1
B5-2
SEE NOTE 8
TYP
24
25
PIN A
26
TYP
27
TYP
P6
20
E13
34
3.75
3.50
SEE NOTE 9
SR4

SHOWN WITH ITEMS ⑥ ⑪ & ⑲ REMOVED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000020-13	SHIELD & GROUND ASS'Y	34
1	1010416-3	WIRE, AWG 28E RED 4" LONG	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	1010870	GREASE LUBRICATING	31
A/R	QQ-S-571 SN60	SOLDER	30
A/R	QQ-S-571 SN10	SOLDER	29
1	1010490-054	INSULATION SLEEVING ELEC HEAT SHRINK	28
14	1006776-14	INSULATION, SLEEVING ELEC 5/16 LONG	27
64	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	26
1	1010416-10	WIRE, AWG 28E WHITE 10" LONG	25
1	1010416-1	WIRE, AWG 28E BLACK 14" LONG	24
2	1000020-6	SHIELD AND GROUND ASSY	23
~~2~~	~~1000020-4~~	~~SHIELD AND GROUND ASSY~~	~~22~~
2	1010917-106	CONN ELEC RECEPT 26 PIN	21
2	1010917-806	CONN ELEC PLUG 26 PIN	20
4	1010891-12	SCREW, BUT. HD SELF LKG SOC SPLINE	19
2	1010867-52	SCREW, FLAT HD SELF LKG SOC SPLINE	18
2	1010867-12	SCREW, FLAT HD SELF LKG SOC SPLINE	17
4	1010867-17	SCREW, FLAT HD SELF LKG SOC SPLINE	16
6	1001488-2	SCREW, HEX SOC HD SELF-LOCKING.	15
6	1001488-18	SCREW, HEX SOC HD SELF-LOCKING	14
6	1001489-22	SCREW, HEX SOC HD	13
6	2018745	CLIP, RETAINER TORQUE MOTOR I.& M.A.	12
4	MS15795-703	WASHER, FLAT, METAL, ROUND	11
2	1000100-1	TERMINAL INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP, WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
1	2018783	WIRE GUIDE BRG HSG T. M. M. A.	6
1	2018753	PLATE, BRG RETAINER TORQUE MOT M.A.	5
1	2018624	SLIP RING 4C CONTACT	4
1	2018623	MOTOR, TORQUE DC FRAMELESS	3
1	2018748	SHAFT. STUB TORQUE MOTOR M.A.	2
1	2018749	HOUSING, BRG TORQUE MOTOR M.A.	1

011 LIST OF MATERIALS

2018603	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT

DRAWN Bill Carpenter DATE 6-8-64
CHECKED G. QUINN 3-2-65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL W. J. Rhine 3-4-65
MIT APPROVAL

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INTER GIMBAL
SUB ASSEMBLY
TORQUE MOTOR END
MIDDLE AXIS

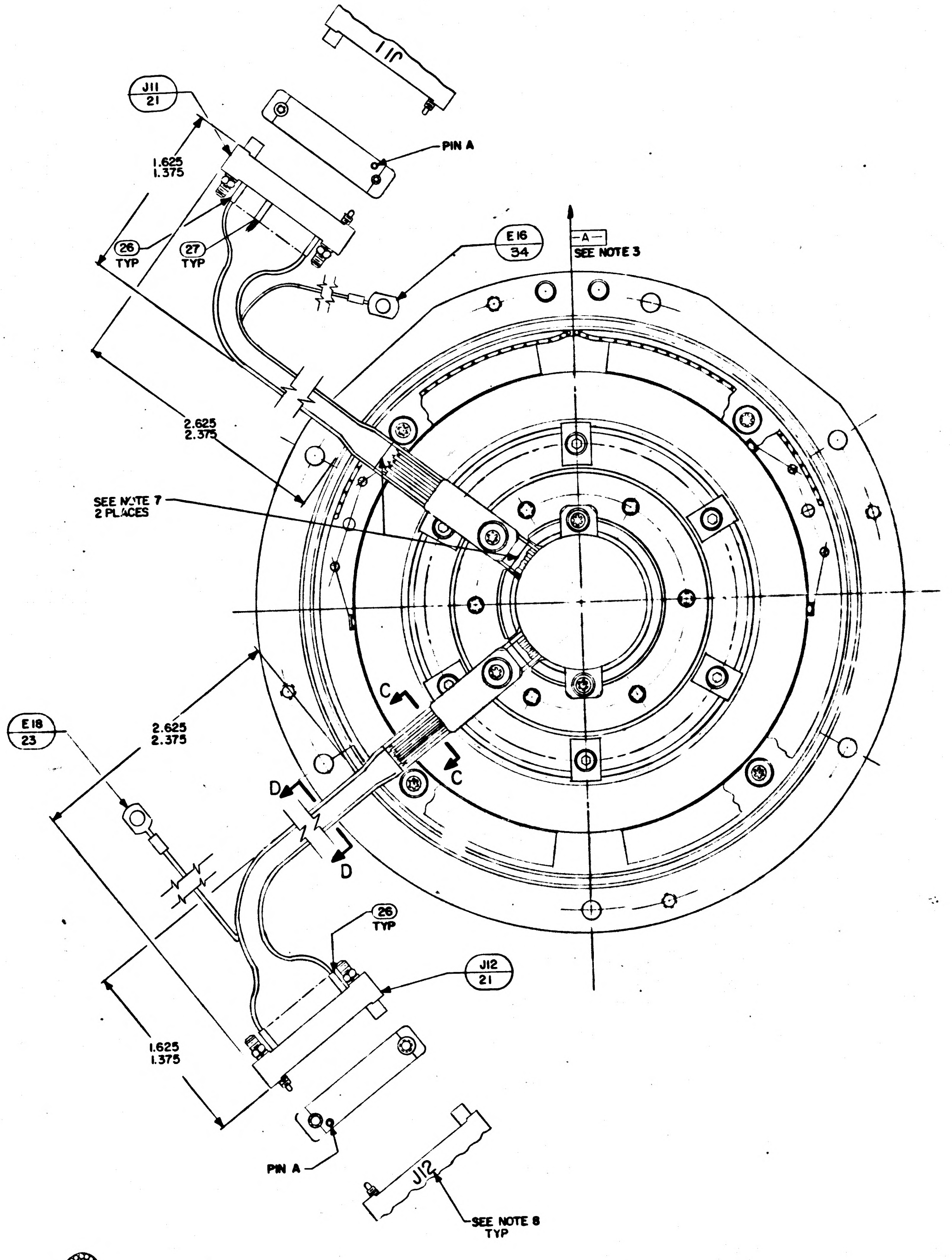
CODE IDENT NO. SIZE J NASA DRAWING NO. 2018610
SCALE 2-1 WT SHEET 1 OF 7

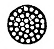
MASTER

	REV	SHEET
2018610	D	1

NOTES:

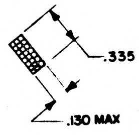
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. COMPLETED ASS'Y SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018610
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ±5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ㉑ & ㉒ PER ND 1002071 USING ㉚
6. HEAT SHRINK SLEEVING ON ㉒ & ㉓ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $^{.10}_{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBERS SHALL BE TWISTED OR TWISTED & SHIELDED WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (15-1, 15-2, 15-3) AND (29-1, 29-2, 29-3) WHICH SHALL BE SHIELDED BUT NOT TWISTED. TWIST PER ND 1002032
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEET 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"


J11
J11 / 21
PIN A
1.625
1.375
26 TYP
27 TYP
E16 / 34
-A-
SEE NOTE 3
2.625
2.375
SEE NOTE 7
2 PLACES
C
C
D
D
E18 / 23
2.625
2.375
26 TYP
J12 / 21
1.625
1.375
PIN A
J12
SEE NOTE 8
TYP

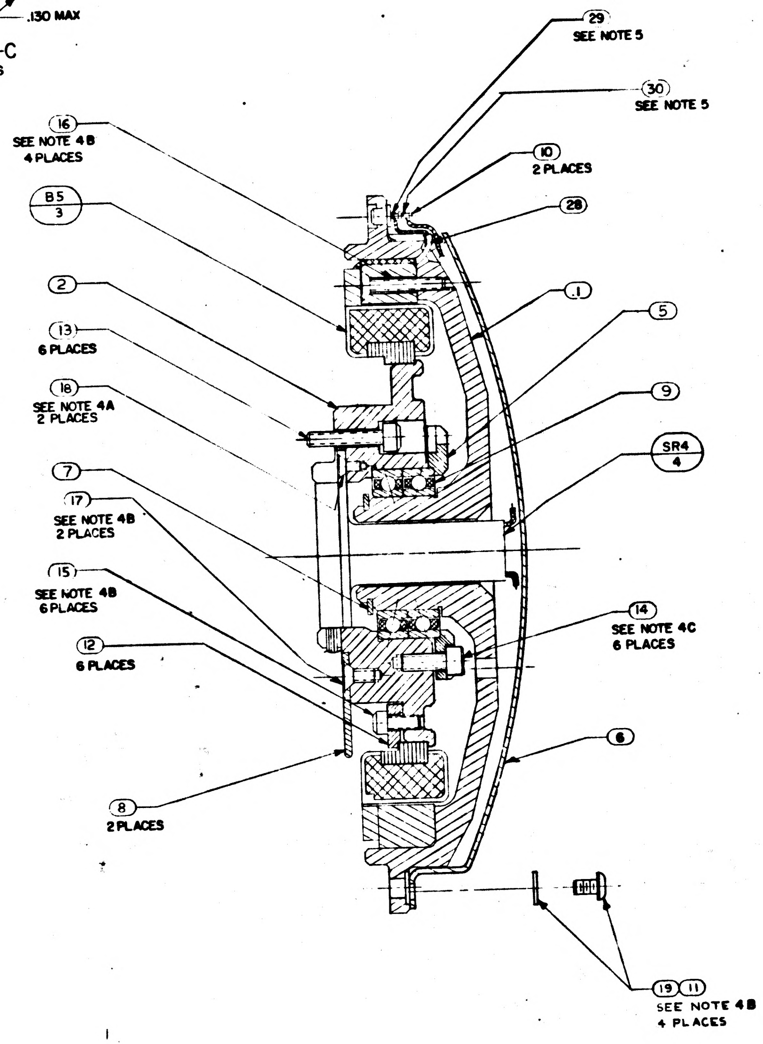


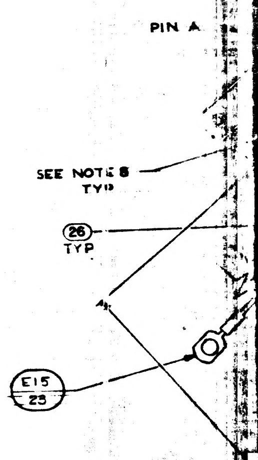
SECTION D-D
2 PLACES

SECTION A-A
2 PLACES


.335 MAX
.130 MAX

SECTION C-C
2 PLACES


29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5 / 3
28
2
1
5
13
6 PLACES
9
18
SEE NOTE 4A
2 PLACES
SR4 / 4
7
17
SEE NOTE 4B
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
6
8
2 PLACES
19 11
SEE NOTE 4B
4 PLACES


PIN A
SEE NOTE 8
TYP
26
TYP
E15 / 23

JH

2018610	REV D	SHEET 1

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REVISION B

NASA DRAWING NO. 2018610
SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.	NO.
1		P6-A	13Y	26		SR4-1			
2				22					
2-A		SHLD-2				E13			
2-1		P6-B	13Y	27		SR4-2			
2-2		P6-C	13Y	27		SR4-3			
2-3		P6-D	13Y	27		SR4-4			
2-4		P6-E	13Y	27		SR4-5			
2-5		P6-W	13Y	27		SR4-19			
2-6		P6-X	13Y	27		SR4-20			
3-1		P6-F	13Y	27		SR4-6			
3-2		P6-F	13Y			SR4-7			
3-3		P6-J	13Y	27		SR4-8			
3-4		P6-J	13Y			SR4-9			
4		P6-L	13Y	26		SR4-10			
5		P6-M	13Y	26		SR4-11			
6		P6-N	13Y	26		SR4-12			

TDRR 17167 MAR 6 1965

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REVISION B

NASA DRAWING NO. 2018610
SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.	NO.
7		P6-P	13Y	26		SR4-13			
8-1		P6-R	13Y	26		SR4-14			
8-2		P6-S	13Y	26		SR4-15			
9		P6-T	13Y	26		SR4-16			
10-1		P6-U	13Y	26		SR4-17			
10-2		P6-V	13Y	26		SR4-18			
11	33	P6-C	13Y	[illegible]		P6-W	13Y		
12	24	P6-E	13Y	[illegible]		P6-X	13Y		
13-1		P6-Y	13Y	26		SR4-21			
13-2		P6-Z	13Y	26		SR4-22			
13-3		P6-a	13Y	26		SR4-23			
13-4		P6-b	13Y	26		SR4-24			
13-5		P6-c	13Y	26		SR4-25			
14		P8-A	13Y	26		SR4-26			
15		P8-B	13Y	26		SR4-27			
16		P8-C	13Y	26		SR4-28			

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REVISION B

NASA DRAWING NO. 2018610
SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.	NO.
17				22					
17A		SHLD-17				E15			
17-1		P8-D	13Y	26		SR4-29			
17-2		P3-E	13Y	26		SR4-30			
17-3		P8-F	13Y	26		SR4-31			
18		P8-H	13Y	26		SR4-32			
19		P8-J	13Y	26		SR4-33			
20		P8-K	13Y	26		SR4-34			
21-1		P8-L	13Y	26		SR4-35			
21-2		P8-M	13Y	26		SR4-36			
22-1		P8-N	13Y	26		SR4-37			
22-2		P8-P	13Y	26		SR4-38			
23-1		P8-R	13Y	26		SR4-39			
23-2		P8-S	13Y	26		SR4-40			
24	24	P8-T	13Y	26		B5-1	19Y		
25	25	P8-U	13Y	26		B5-2	19Y		
26		B5-BLK				B5-1	19Y		
27		B5-WHT				B5-2	19Y		

TDRR 17167 MAR 6 1965

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REVISION B

NASA DRAWING NO. 2018610
SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.	NO.
28		J12-A	13Y	26		SR4-26			
29		J12-B	13Y	26		SR4-27			
30		J12-C	13Y	26		SR4-28			
31				23					
31A		SHLD-31				E18			
31-1		J12-D	13Y	26		SR4-29			
31-2		J12-E	13Y	26		SR4-30			
31-3		J12-F	13Y	26		SR4-31			
32		J12-H	13Y	26		SR4-32			
33		J12-J	13Y	26		SR4-33			
34		J12-K	13Y	26		SR434			
35-1		J12-L	13Y	26		SR4-35			
35-2		J12-M	13Y	26		SR4-36			
36-1		J12-N	13Y	26		SR4-37			
36-2		J12-P	13Y	26		SR4-38			
37-1		J12-R	13Y	26		SR4-39			
37-2		J12-S	13Y	26		SR4-40			

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REVISION B

NASA DRAWING NO.
2018610
SHEET 6 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.
38-1		J12-X	13	Y	26		SR4-21				
38-2		J12-Z	13	Y	26		SR4-22				
38-3		J12-a	13	Y	26		SR4-23				
38-4		J12-b	13	Y	26		SR4-24				
38-5		J12-c	13	Y	26		SR4-25				
39		J11-A	13	Y	26		SR4-1				
40					23						
40A		SHLD-40					E16				
40-1		J11-B	13	Y	27		SR4-2				
40-2		J11-C	13	Y	27		SR4-3				
40-3		J11-D	13	Y	27		SR4-4				
40-4		J11-E	13	Y	27		SR4-5				
40-5		J11-W	13	Y	26		SR4-19				
40-6		J11-X	13	Y	26		SR4-20				
41-1		J11-F	13	Y	27		SR4-6				
41-2		J11-F	13	Y			SR4-7				
41-3		J11-J	13	Y	27		SR4-8				
41-4		J11-J	13	Y			SR4-9				

TDRR 17167 MAR 6 1965

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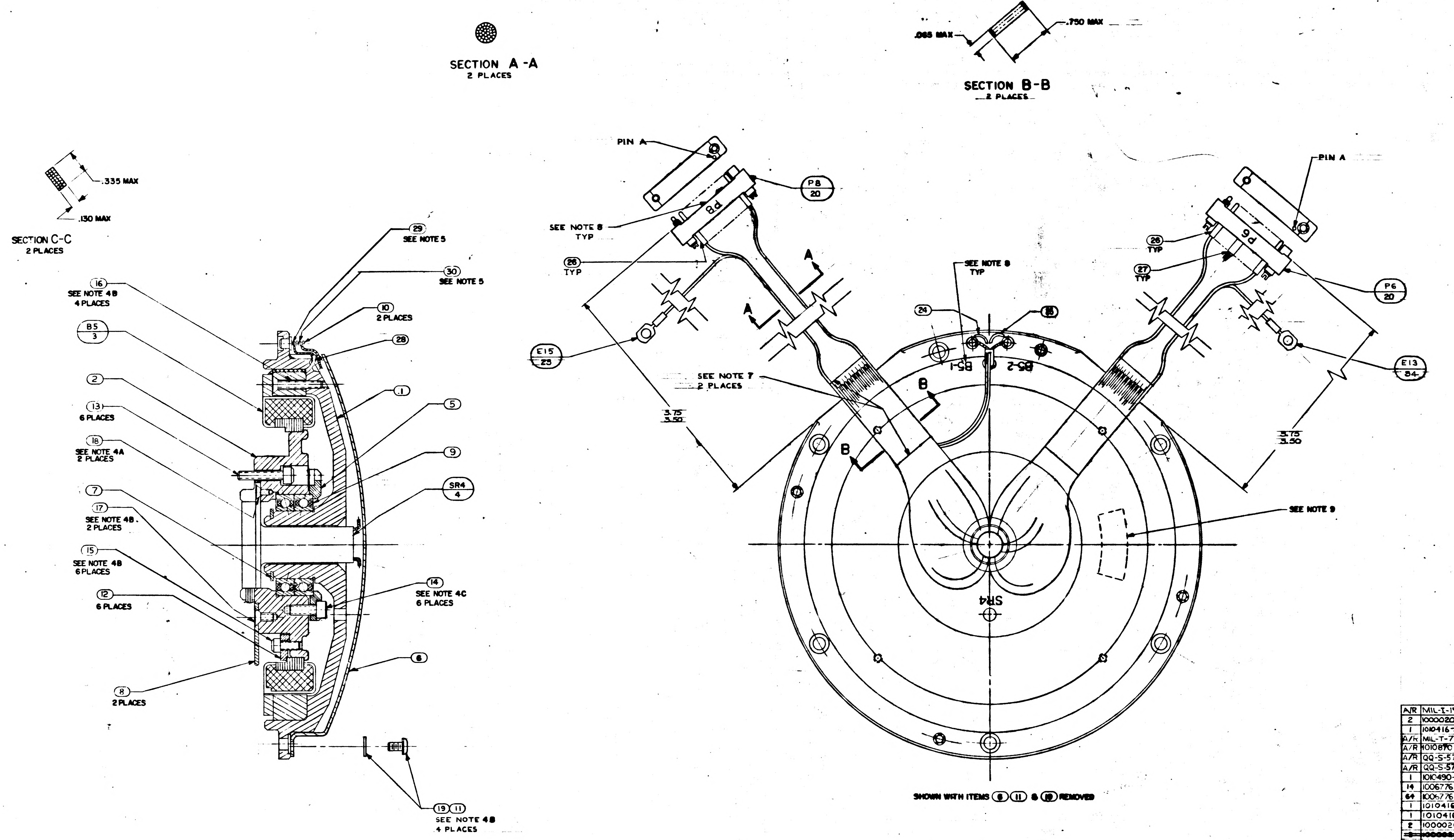
REVISION B

NASA DRAWING NO.
2018610
SHEET 7 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.
42		J11-L	13	Y	26		SR4-10				
43		J11-M	13	Y	26		SR4-11				
44		J11-N	13	Y	26		SR4-12				
45		J11-P	13	Y	26		SR4-13				
46-1		J11-R	13	Y	26		SR4-14				
46-2		J11-S	13	Y	26		SR4-15				
47		J11-T	13	Y	26		SR4-16				
48-1		J11-U	13	Y	26		SR4-17				
48-2		J11-V	13	Y	26		SR4-18				
49	33	J11-H	13	Y			J11-C	13	Y		
50	24	J11-D	13	Y			J11-E	13	Y		

	REVISIONS TDRR 11167		
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 19281	2 Jun 65	
B	REVISED PER TDRR 20662	2 Jul 65	
C	REVISED PER TDRR 21683	31 Aug 65	WK
D	REVISED PER TDRR 21674	31 Aug 65	WK
E	REVISED PER TDRR 26284	23 Feb 66	WK


SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
.085 MAX
.750 MAX
SECTION C-C
2 PLACES
.335 MAX
.130 MAX
29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5
3
28
2
1
13
6 PLACES
5
18
SEE NOTE 4A
2 PLACES
9
SR4
4
7
17
SEE NOTE 4B
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
6
8
2 PLACES
19 11
SEE NOTE 4B
4 PLACES
PIN A
P8
20
SEE NOTE 8
TYP
26
TYP
27
TYP
E15
25
SEE NOTE 8
TYP
24
33
B5-1
B5-2
SEE NOTE 7
2 PLACES
3.75
3.50
B
B
A
A
P6
20
E13
34
SEE NOTE 9
SR4
SHOWN WITH ITEMS 6 11 & 19 REMOVED

A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
2	1000020-13	SHIELD & GROUND ASS'Y	34
1	1010416-3	WIRE, AWG 28E RED 4" LONG	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	1010870	GREASE LUBRICATING	31
A/R	QQ-S-571 SN60	SOLDER	30
A/R	QQ-S-571 SN10	SOLDER	29
1	1010490-054	INSULATION SLEEVING ELEC HEAT SHRINK	28
14	1006776-14	INSULATION, SLEEVING ELEC 5/16 LONG	27
64	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	26
1	1010416-10	WIRE, AWG 28E WHITE 10" LONG	25
1	1010416-1	WIRE, AWG 28E BLACK 14" LONG	24
2	1000020-6	SHIELD AND GROUND ASSY	23
~~2~~	~~1000020-4~~	~~SHIELD AND GROUND ASSY~~	~~22~~
2	1010917-106	CONN ELEC RECEPT 26 PIN	21
2	1010817-806	CONN ELEC PLUG 26 PIN	20
4	1010891-12	SCREW, BUT. HD SELF LKG SOC SPLINE	19
2	1010867-2	SCREW, FLAT HD SELF LKG SOC SPLINE	18
2	1010867-12	SCREW, FLAT HD SELF LKG SOC SPLINE	17
4	1010867-17	SCREW, FLAT HD SELF LKG SOC SPLINE	16
6	1001488-2	SCREW, HEX SOC HD SELF-LOCKING.	15
6	1001488-18	SCREW, HEX SOC HD SELF-LOCKING	14
6	1001489-22	SCREW, HEX SOC HD	13
6	2018745	CLIP, RETAINER TORQUE MOTOR I.&M.A.	12
4	MS15795-703	WASHER, FLAT, METAL, ROUND	11
2	1000100-1	TERMINAL INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP, WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
1	2018783	WIRE GUIDE BRG HSG T. M. M. A.	6
1	2018753	PLATE, BRG RETAINER TORQUE MOT M.A.	5
1	2018624	SLIP RING 40 CONTACT	4
1	2018623	MOTOR, TORQUE DC FRAMELESS	3
1	2018748	SHAFT STUB TORQUE MOTOR M.A.	2
1	2018749	HOUSING, BRG TORQUE MOTOR M.A.	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
011	LIST OF MATERIALS		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

2018605	DL2018610
NEXT ASSY	USED ON
APPLICATION	

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN [illegible] DATE 6-8-64
CHECKED G. QUINN 3-2-65
APPROVAL [illegible] 8 Mar 65
APPROVAL
NASA APPROVAL W. J. [illegible] 3-8-65
MIT APPROVAL W. Kupfer 9 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTER GIMBAL
SUB ASSEMBLY
TORQUE MOTOR END
MIDDLE AXIS

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018610
SCALE 2-1
WT
SHEET 1 OF 2

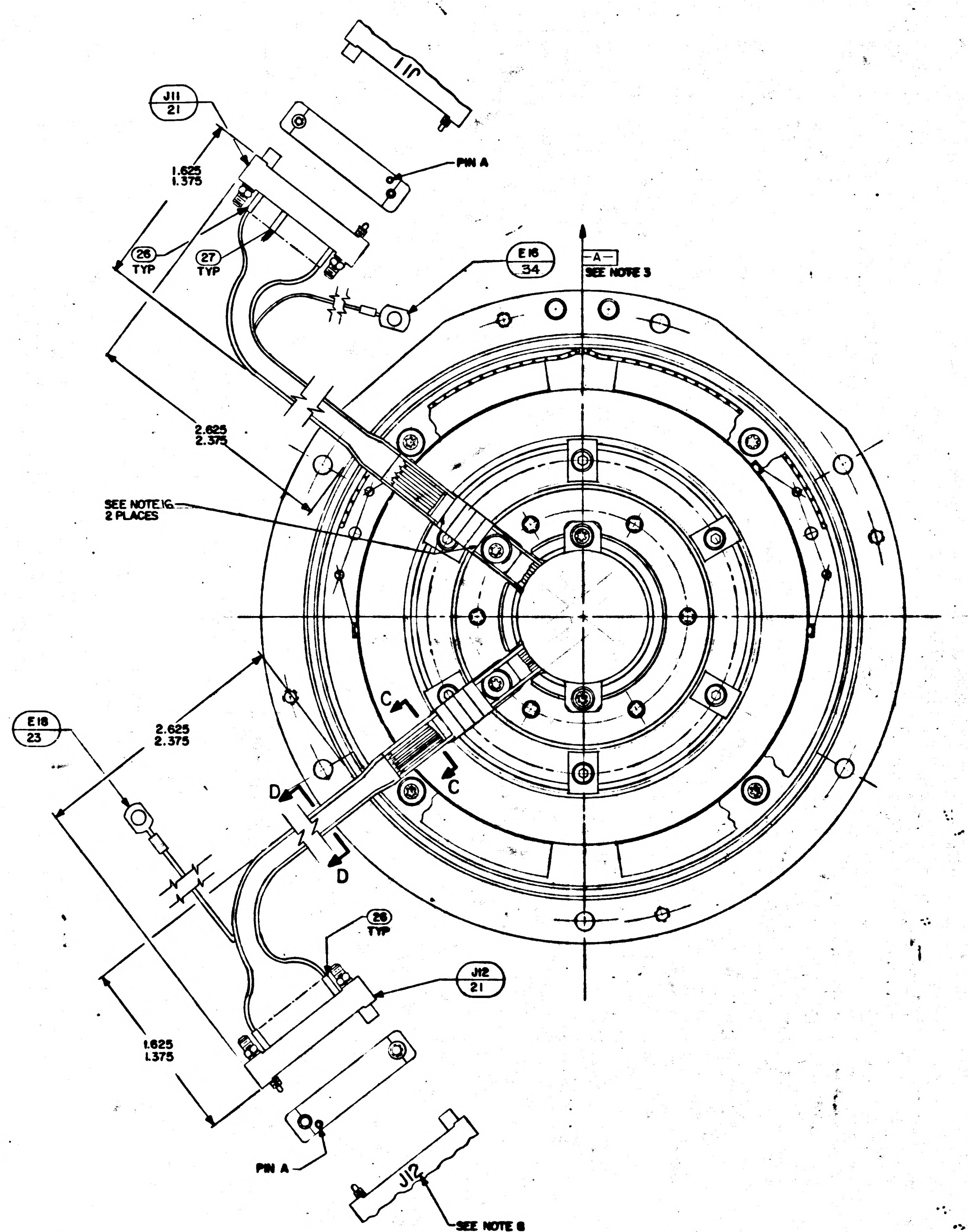
2018610 E 1

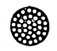
F2

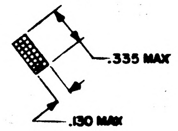
MASTER

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. COMPLETED ASS'Y SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018610
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ±5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   A. 3.5 IN-LB
   B. 5.0 IN-LB
   C. 10.0 IN-LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ㉑ & ㉒ PER ND 1002071 USING ㉚
6. HEAT SHRINK SLEEVING ON ㉒ & ㉓ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBERS SHALL BE TWISTED OR TWISTED & SHIELDED WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (15-1, 15-2, 15-3) AND (29-1, 29-2, 29-3) WHICH SHALL BE SHIELDED BUT NOT TWISTED. TWIST PER ND 1002032
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEET 2 THRU 7 INDICATES THE FOLLOWING:
   A = SHIELD GROUND ON "FROM END"
   B = SHIELD GROUND ON "TO END"
16. TAPE HARNESS IN AREA INDICATED USING ITEM ㉟ TO MAINTAIN HARNESS CONFIGURATION PER SECTION C-C AND SECURE HARNESS TO ITEM ⑧ WITH ITEM ㉟

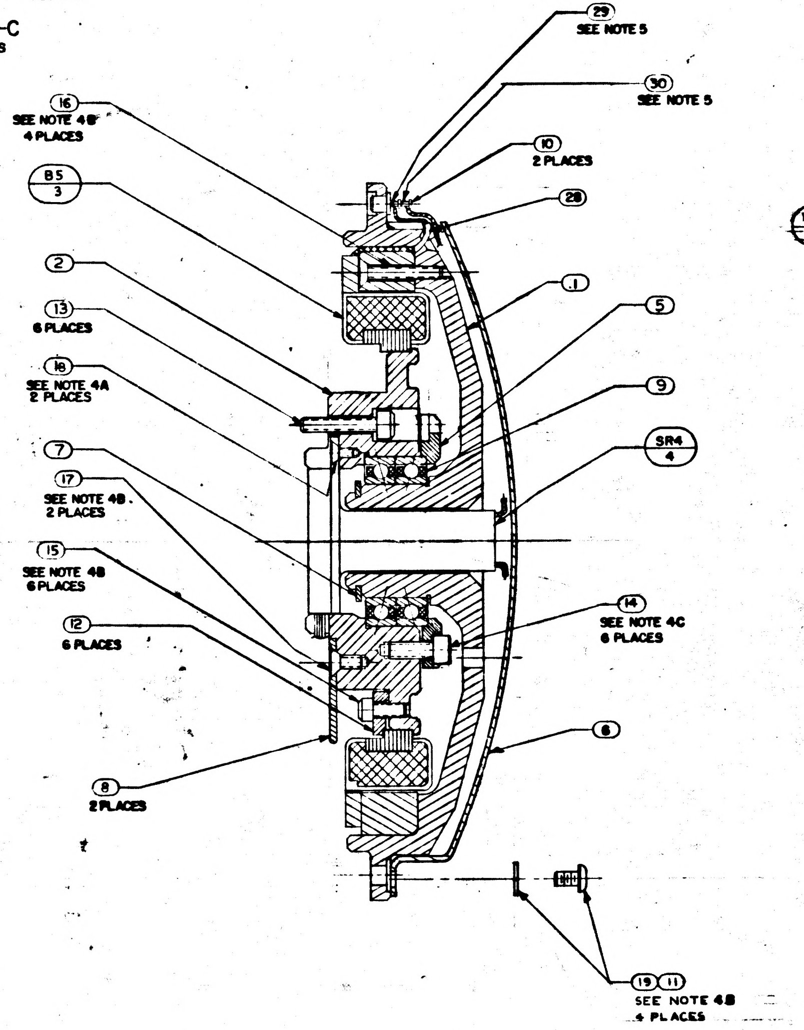

J11
J11/21
PIN A
1.625
1.375
㉖ TYP
㉗ TYP
E16/34
-A- SEE NOTE 3
2.625
2.375
SEE NOTE 16 2 PLACES
C
C
D
D
E18/23
2.625
2.375
㉖ TYP
J12/21
1.625
1.375
PIN A
J12
SEE NOTE 8 TYP

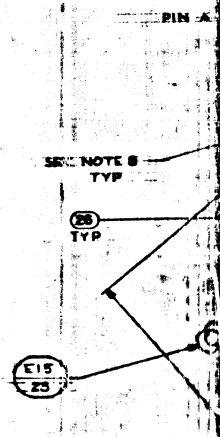

SECTION D-D
2 PLACES


.335 MAX
.130 MAX

SECTION C-C
2 PLACES

SECTION A-A
2 PLACES


㉙ SEE NOTE 5
㉚ SEE NOTE 5
⑯ SEE NOTE 4B 4 PLACES
⑩ 2 PLACES
B5/3
㉘
②
①
⑤
⑬ 6 PLACES
⑱ SEE NOTE 4A 2 PLACES
⑨
SR4/4
⑦
⑰ SEE NOTE 4B 2 PLACES
⑮ SEE NOTE 4B 6 PLACES
⑭ SEE NOTE 4C 6 PLACES
⑫ 6 PLACES
⑥
⑧ 2 PLACES
⑲ ⑪ SEE NOTE 4B 4 PLACES


PIN A
SEE NOTE 8 TYP
㉖ TYP
E15/23

JH

E-1

M.A.
T.M.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION E

NASA DRAWING NO. 2018610
SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TO TERMINATION SPEC FIND NO.
1		P6-A	13Y	26	SR4-1		
2				22			
2-A		SHLD-2			E13		
2-1		P6-B	13Y	27	SR4-2		
2-2		P6-C	13Y	27	SR4-3		
2-3		P6-D	13Y	27	SR4-4		
2-4		P6-E	13Y	27	SR4-5		
2-5		P6-W	13Y	27	SR4-19		
2-6		P6-X	13Y	27	SR4-20		
3-1		P6-F	13Y	27	SR4-6		
3-2		P6-F	13Y		SR4-7		
3-3		P6-J	13Y	27	SR4-8		
3-4		P6-J	13Y		SR4-9		
4		P6-L	13Y	26	SR4-10		
5		P6-M	13Y	26	SR4-11		
6		P6-N	13Y	26	SR4-12		

TDRR 17167 MAR 6 1965

M.A.
T.M.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION E

NASA DRAWING NO. 2018610
SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TO TERMINATION SPEC FIND NO.
7		P6-P	13Y	26	SR4-13		
8-1		P6-R	13Y	26	SR4-14		
8-2		P6-S	13Y	26	SR4-15		
9		P6-T	13Y	26	SR4-16		
10-1		P6-U	13Y	26	SR4-17		
10-2		P6-V	13Y	26	SR4-18		
11	33	P6-C	13Y	[illegible]	P6-W	13Y	
12	24	P6-E	13Y	[illegible]	P6-X	13Y	
13-1		P6-Y	13Y	26	SR4-21		
13-2		P6-Z	13Y	26	SR4-22		
13-3		P6-a	13Y	26	SR4-23		
13-4		P6-b	13Y	26	SR4-24		
13-5		P6-c	13Y	26	SR4-25		
14		P8-A	13Y	26	SR4-26		
15		P8-B	13Y	26	SR4-27		
16		P8-C	13Y	26	SR4-28		

TDRR 17167 MAR 6 1965

M.A.
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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION E

NASA DRAWING NO. 2018610
SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TO TERMINATION SPEC FIND NO.
17				22			
17A		SHLD-17			E15		
17-1		P8-D	13Y	26	SR4-29		
17-2		P3-E	13Y	26	SR4-30		
17-3		P8-F	13Y	26	SR4-31		
18		P8-H	13Y	26	SR4-32		
19		P8-J	13Y	26	SR4-33		
20		P8-K	13Y	26	SR4-34		
21-1		P8-L	13Y	26	SR4-35		
21-2		P8-M	13Y	26	SR4-36		
22-1		P8-N	13Y	26	SR4-37		
22-2		P8-P	13Y	26	SR4-38		
23-1		P8-R	13Y	26	SR4-39		
23-2		P8-S	13Y	26	SR4-40		
24	24	P8-T	13Y	26	B5-1	19Y	
25	25	P8-U	13Y	26	B5-2	19Y	
26		B5-BLK			B5-1	19Y	
27		B5-WHT			B5-2	19Y	

TDRR 17167 MAR 6 1965

M.A.
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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION E

NASA DRAWING NO. 2018610
SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TO TERMINATION SPEC FIND NO.
28		J12-A	13Y	26	SR4-26		
29		J12-B	13Y	26	SR4-27		
30		J12-C	13Y	26	SR4-28		
31				23			
31A		SHLD-31			E18		
31-1		J12-D	13Y	26	SR4-29		
31-2		J12-E	13Y	26	SR4-30		
31-3		J12-F	13Y	26	SR4-31		
32		J12-H	13Y	26	SR4-32		
33		J12-J	13Y	26	SR4-33		
34		J12-K	13Y	26	SR434		
35-1		J12-L	13Y	26	SR4-35		
35-2		J12-M	13Y	26	SR4-36		
36-1		J12-N	13Y	26	SR4-37		
36-2		J12-P	13Y	26	SR4-38		
37-1		J12-R	13Y	26	SR4-39		
37-2		J12-S	13Y	26	SR4-40		

M.A.
T.M.

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HOUSTON TEXAS

REVISION E

NASA DRAWING NO. 2018610
SHEET 6 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TO TERMINATION FIND NO.	SPEC	NO.
38-1		J12-X	13Y	26			SR4-21				
38-2		J12-Z	13Y	26			SR4-22				
38-3		J12-a	13Y	26			SR4-23				
38-4		J12-b	13Y	26			SR4-24				
38-5		J12-c	13Y	26			SR4-25				
39		J11-A	13Y	26			SR4-1				
40				23							
40A		SHLD-40					E16				
40-1		J11-B	13Y	27			SR4-2				
40-2		J11-C	13Y	27			SR4-3				
40-3		J11-D	13Y	27			SR4-4				
40-4		J11-E	13Y	27			SR4-5				
40-5		J11-W	13Y	26			SR4-19				
40-6		J11-X	13Y	26			SR4-20				
41-1		J11-F	13Y	27			SR4-6				
41-2		J11-F	13Y				SR4-7				
41-3		J11-J	13Y	27			SR4-8				
41-4		J11-J	13Y				SR4-9				

TDRR 17167 MAR 6 1965

M.A.
T.M.

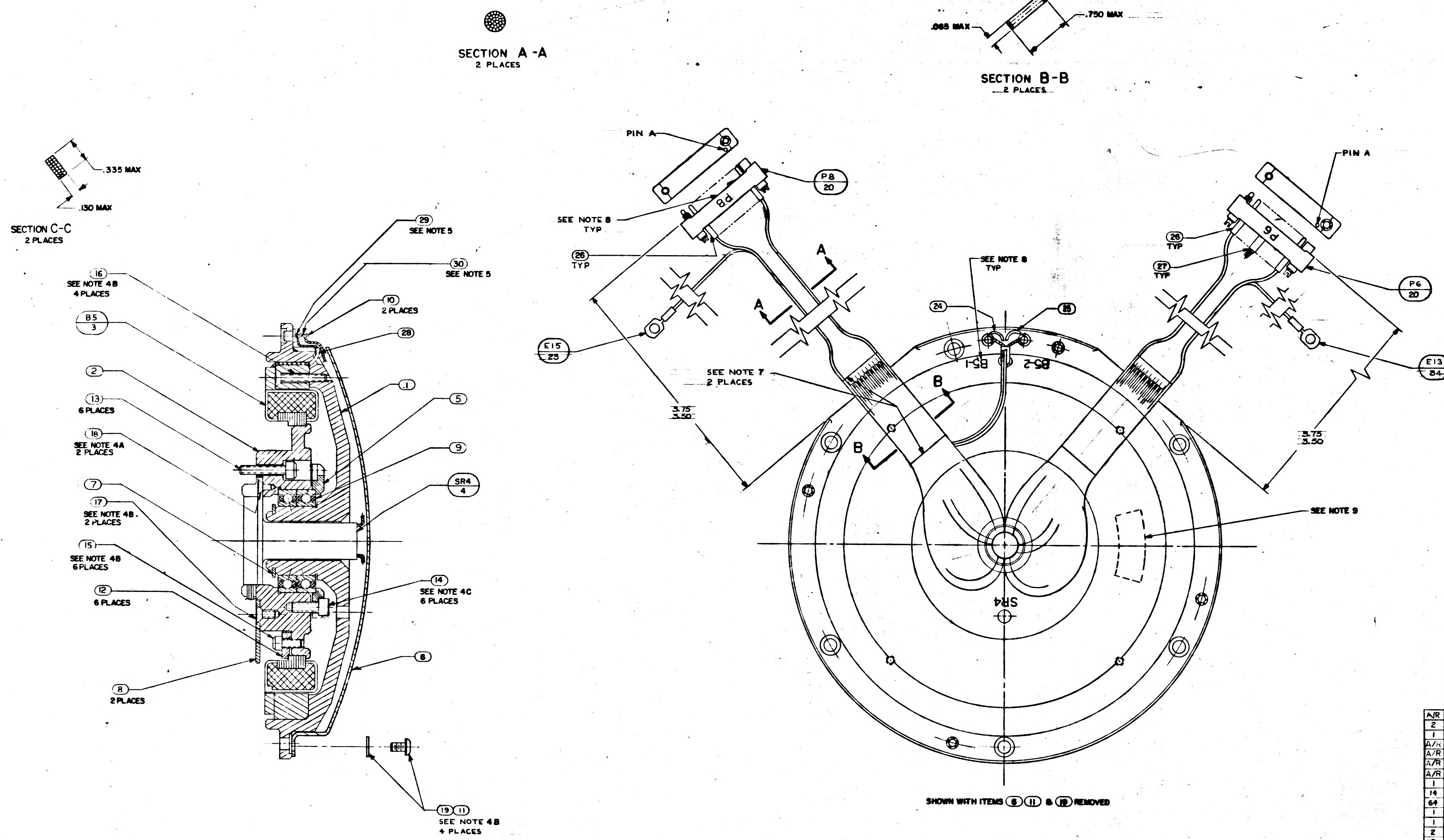
MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION E

NASA DRAWING NO. 2018610
SHEET 7 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TO TERMINATION FIND NO.	SPEC	NO.
42		J11-L	13Y	26			SR4-10				
43		J11-M	13Y	26			SR4-11				
44		J11-N	13Y	26			SR4-12				
45		J11-P	13Y	26			SR4-13				
46-1		J11-R	13Y	26			SR4-14				
46-2		J11-S	13Y	26			SR4-15				
47		J11-T	13Y	26			SR4-16				
48-1		J11-U	13Y	26			SR4-17				
48-2		J11-V	13Y	26			SR4-18				
49	33	J11-H	13Y				J11-G	13Y			
50	24	J11-D	13Y				J11-E	13Y			

REVISIONS TDRR 17167				
SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED PER TDRR 19231	2 Jun 65		WR
B	REVISED PER TDRR 20662	26 Jul 65		WR
C	REVISED PER TDRR 21683	31 Aug 65		WR
D	REVISED PER TDRR 21674	31 Aug 65		WR
E	REVISED PER TDRR 26254	23 Feb 66		WR
F	REVISED PER TDRR 26597			WR


SECTION A -A
2 PLACES
.085 MAX
.750 MAX
SECTION B-B
2 PLACES
.335 MAX
.130 MAX
SECTION C-C
2 PLACES
29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5
3
28
2
1
13
6 PLACES
5
18
SEE NOTE 4A
2 PLACES
9
SR4
4
7
17
SEE NOTE 4B
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
6
8
2 PLACES
19
11
SEE NOTE 4B
4 PLACES
PIN A
P8
20
SEE NOTE 8
TYP
26
TYP
E15
25
SEE NOTE 7
2 PLACES
A
A
B
B
3.75
3.50
24
SEE NOTE 8
TYP
33
B5-1
B5-2
PIN A
26
TYP
27
TYP
P6
20
E13
34
3.75
3.50
SEE NOTE 9
SR4
SHOWN WITH ITEMS 6 11 & 19 REMOVED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
2	1000020-15	SHIELD & GROUND ASS'Y	34
1	1010416-3	WIRE, AWG 28E RED 4" LONG	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	1010870	GREASE LUBRICATING	31
A/R	QQ-S-571 SN60	SOLDER	30
A/R	QQ-S-571 SN10	SOLDER	29
1	1010490-054	INSULATION SLEEVING ELEC HEAT SHRINK	28
14	1006776-14	INSULATION, SLEEVING ELEC 5/16 LONG	27
64	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	26
1	1010416-10	WIRE, AWG 28E WHITE 10" LONG	25
1	1010416-1	WIRE, AWG 28E BLACK 14" LONG	24
2	1000020-6	SHIELD AND GROUND ASSY	23
~~2~~	~~1000020-4~~	~~SHIELD AND GROUND ASSY~~	~~22~~
2	1010917-106	CONN ELEC RECEPT 26 PIN	21
2	1010917-806	CONN ELEC PLUG 26 PIN	20
4	1010891-12	SCREW, BUT. HD SELF LKG SOC SPLINE	19
2	1010867-52	SCREW, FLAT HD SELF LKG SOC SPLINE	18
2	1010867-12	SCREW, FLAT HD SELF LKG SOC SPLINE	17
4	1010867-17	SCREW, FLAT HD SELF LKG SOC SPLINE	16
6	1001488-2	SCREW, HEX SOC HD SELF-LOCKING.	15
6	1001488-18	SCREW, HEX SOC HD SELF-LOCKING	14
6	1001489-22	SCREW, HEX SOC HD	13
6	2018745	CLIP, RETAINER TORQUE MOTOR I.& M.A.	12
4	MS15795-703	WASHER, FLAT, METAL, ROUND	11
2	1000100-1	TERMINAL INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP, WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
1	2018783	WIRE GUIDE BRG HSG T. M. M. A.	6
1	2018753	PLATE, BRG RETAINER TORQUE MOT M.A.	5
1	2018624	SLIP RING 40 CONTACT	4
1	2018623	MOTOR, TORQUE DC FRAMELESS	3
1	2018748	SHAFT STUB TORQUE MOTOR M.A.	2
1	2018749	HOUSING, BRG TORQUE MOTOR M.A.	1

011 LIST OF MATERIALS

2018605	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN R.W. Cimmino DATE 6-8-64
CHECKED G. Quinn 3-2-65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL W. J. Rhine 3-7-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTER GIMBAL
SUB ASSEMBLY
TORQUE MOTOR END
MIDDLE AXIS

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 2018610
SCALE 2-1 | WT | SHEET 1 OF 1

2018610

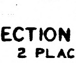
MASTER

	REV	SHEET
2018610	F	1

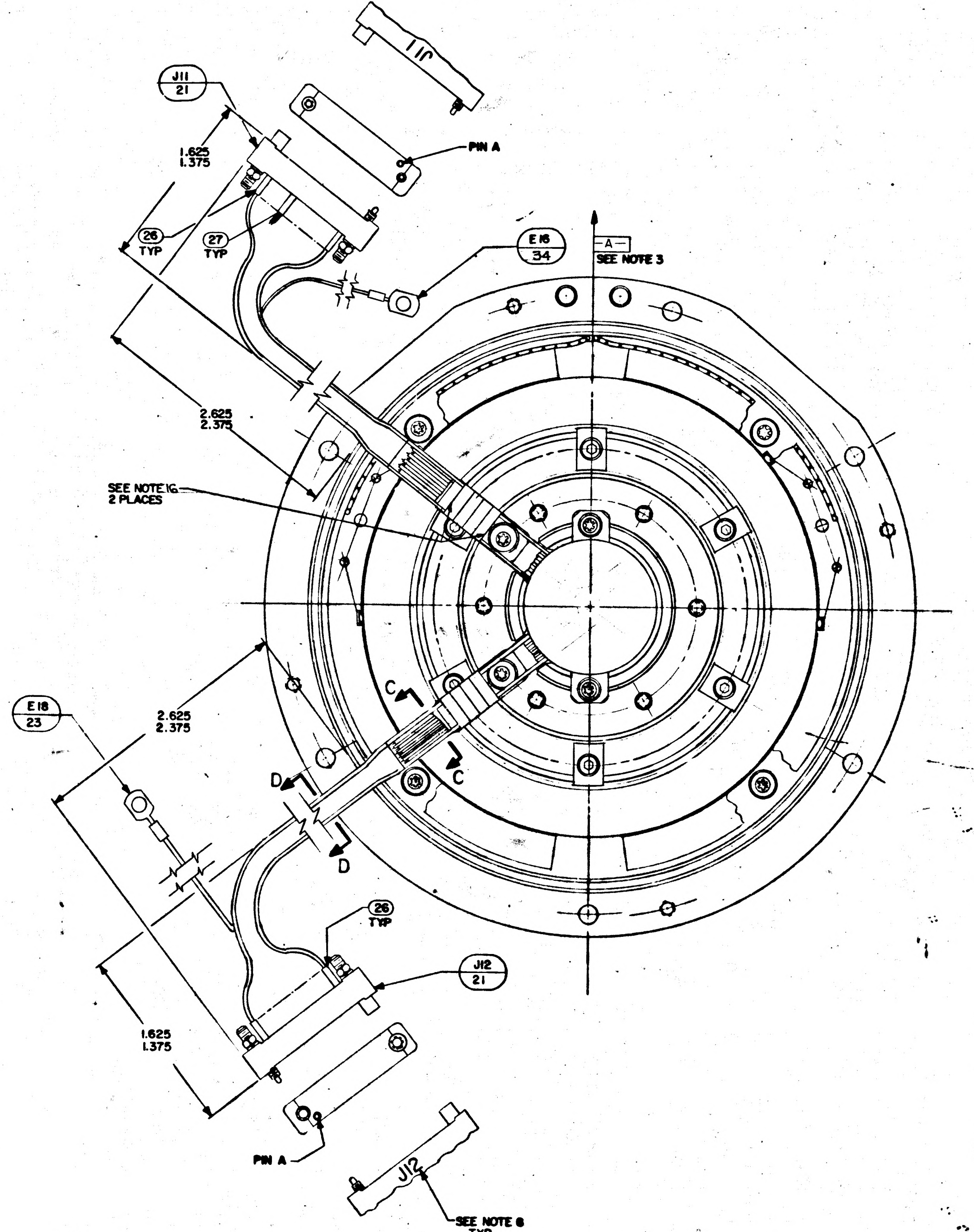
F-2

NOTES:

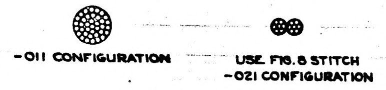
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. COMPLETED ASS'Y SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018610
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ±5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B 5.0 IN-LB
   - C. 10.0 IN-LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ㉑ & ㉒ PER ND 1002071 USING ㉚
6. HEAT SHRINK SLEEVING ON ㉒ & ㉓ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002015
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBERS SHALL BE TWISTED OR TWISTED & SHIELDED WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (15-1, 15-2, 15-3) AND (29-1, 29-2, 29-3) WHICH SHALL BE SHIELDED BUT NOT TWISTED. TWIST PER ND 1002032
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEET 2 THRU 7 INDICATES THE FOLLOWING:
   - A = SHIELD GROUND ON "FROM END"
   - B = SHIELD GROUND ON "TO END"
16. TAPE HARNESS IN AREA INDICATED USING ITEM ㉟ TO MAINTAIN HARNESS CONFIGURATION PER SECTION C-C AND SECURE HARNESS TO ITEM ⑧ WITH ITEM ㉟



SECTION A-A
2 PLACES

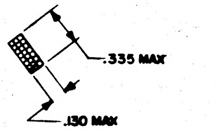


J11
J11 / 21
PIN A
1.625
1.375
26 TYP
27 TYP
E16 / 34
-A-
SEE NOTE 3
2.625
2.375
SEE NOTE 16
2 PLACES
E18 / 23
C
C
D
D
26 TYP
J12 / 21
PIN A
J12
SEE NOTE 8 TYP



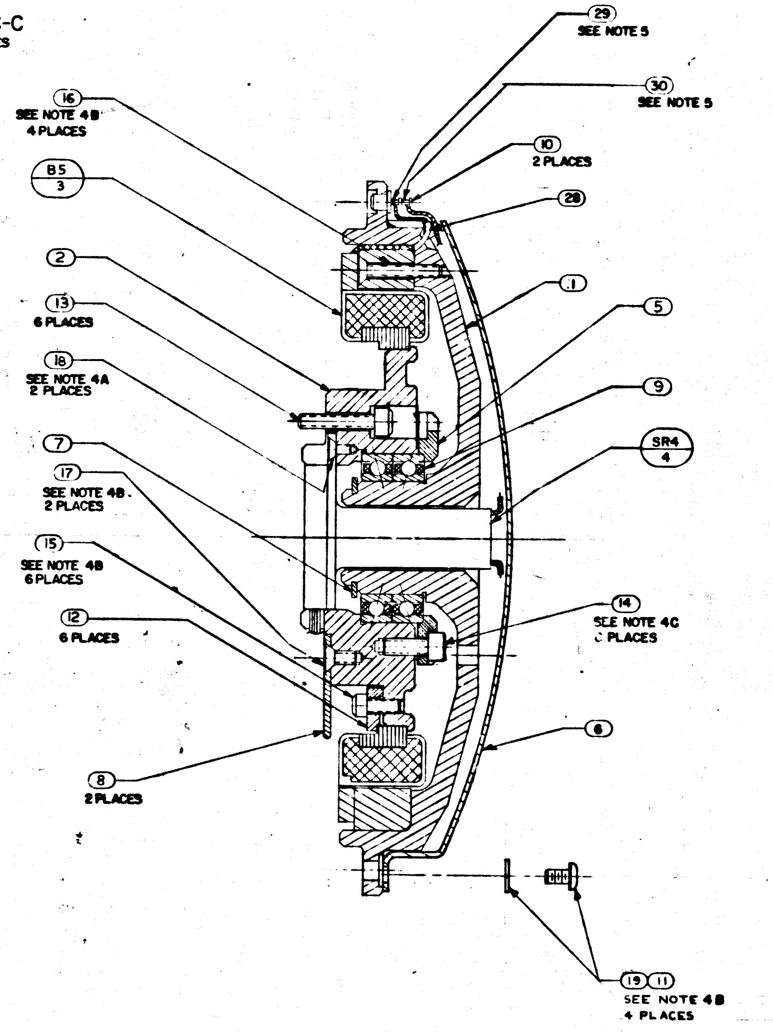
-011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION

SECTION D-D
2 PLACES

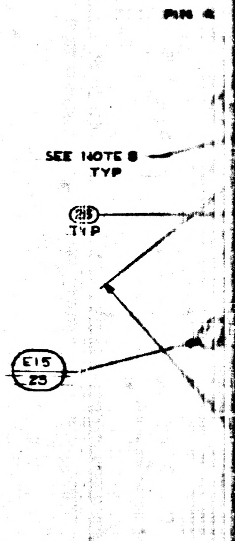


.335 MAX
.130 MAX

SECTION C-C
2 PLACES



29 SEE NOTE 5
30 SEE NOTE 5
16 SEE NOTE 4B 4 PLACES
10 2 PLACES
B5 / 3
28
2
1
13 6 PLACES
5
18 SEE NOTE 4A 2 PLACES
9
7
SR4 / 4
17 SEE NOTE 4B. 2 PLACES
15 SEE NOTE 4B 6 PLACES
14 SEE NOTE 4C 2 PLACES
12 6 PLACES
6
8 2 PLACES
19 11 SEE NOTE 4B 4 PLACES



PIN A
SEE NOTE 8 TYP
TYP
E15 / 25

JH

2018610	F	1

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REVISION E

NASA DRAWING NO.
2018610
SHEET 2 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
1		P6-A	13Y	26		SR4-1			
2				22					
2-A		SHLD-2				E13			
2-1		P6-B	13Y	27		SR4-2			
2-2		P6-C	13Y	27		SR4-3			
2-3		P6-D	13Y	27		SR4-4			
2-4		P6-E	13Y	27		SR4-5			
2-5		P6-W	13Y	27		SR4-19			
2-6		P6-X	13Y	27		SR4-20			
3-1		P6-F	13Y	27		SR4-6			
3-2		P6-F	13Y			SR4-7			
3-3		P6-J	13Y	27		SR4-8			
3-4		P6-J	13Y			SR4-9			
4		P6-L	13Y	26		SR4-10			
5		P6-M	13Y	26		SR4-11			
6		P6-N	13Y	26		SR4-12			

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NASA DRAWING NO.
2018610
SHEET 3 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
7		P6-P	13Y	26		SR4-13			
8-1		P6-R	13Y	26		SR4-14			
8-2		P6-S	13Y	26		SR4-15			
9		P6-T	13Y	26		SR4-16			
10-1		P6-U	13Y	26		SR4-17			
10-2		P6-V	13Y	26		SR4-18			
11	33	P6-C	13Y	[illegible]		P6-W	13Y		
12	24	P6-E	13Y	[illegible]		P6-X	13Y		
13-1		P6-Y	13Y	26		SR4-21			
13-2		P6-Z	13Y	26		SR4-22			
13-3		P6-a	13Y	26		SR4-23			
13-4		P6-b	13Y	26		SR4-24			
13-5		P6-c	13Y	26		SR4-25			
14		P8-A	13Y	26		SR4-26			
15		P8-B	13Y	26		SR4-27			
16		P8-C	13Y	26		SR4-28			

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NASA DRAWING NO.
2018610
SHEET 4 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
17				22					
17A		SHLD-17				E15			
17-1		P8-D	13Y	26		SR4-29			
17-2		P3-E	13Y	26		SR4-30			
17-3		P8-F	13Y	26		SR4-31			
18		P8-H	13Y	26		SR4-32			
19		P8-J	13Y	26		SR4-33			
20		P8-K	13Y	26		SR4-34			
21-1		P8-L	13Y	26		SR4-35			
21-2		P8-M	13Y	26		SR4-36			
22-1		P8-N	13Y	26		SR4-37			
22-2		P8-P	13Y	26		SR4-38			
23-1		P8-R	13Y	26		SR4-39			
23-2		P8-S	13Y	26		SR4-40			
24	24	P8-T	13Y	26		B5-1	19Y		
25	25	P8-U	13Y	26		B5-2	19Y		
26		B5-BLK				B5-1	19Y		
27		B5-WHT				B5-2	19Y		

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NASA DRAWING NO.
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SHEET 5 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
28		J12-A	13Y	26		SR4-26			
29		J12-B	13Y	26		SR4-27			
30		J12-C	13Y	26		SR4-28			
31				23					
31A		SHLD-31				E18			
31-1		J12-D	13Y	26		SR4-29			
31-2		J12-E	13Y	26		SR4-30			
31-3		J12-F	13Y	26		SR4-31			
32		J12-H	13Y	26		SR4-32			
33		J12-J	13Y	26		SR4-33			
34		J12-K	13Y	26		SR434			
35-1		J12-L	13Y	26		SR4-35			
35-2		J12-M	13Y	26		SR4-36			
36-1		J12-N	13Y	26		SR4-37			
36-2		J12-P	13Y	26		SR4-38			
37-1		J12-R	13Y	26		SR4-39			
37-2		J12-S	13Y	26		SR4-40			

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NASA DRAWING NO.
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SHEET 6 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.
38-1		J12-X	13Y	26		SR4-21			
38-2		J12-Z	13Y	26		SR4-22			
38-3		J12-a	13Y	26		SR4-23			
38-4		J12-b	13Y	26		SR4-24			
38-5		J12-c	13Y	26		SR4-25			
39		J11-A	13Y	26		SR4-1			
40				23					
40A		SHLD-40				E16			
40-1		J11-B	13Y	27		SR4-2			
40-2		J11-C	13Y	27		SR4-3			
40-3		J11-D	13Y	27		SR4-4			
40-4		J11-E	13Y	27		SR4-5			
40-5		J11-W	13Y	26		SR4-19			
40-6		J11-X	13Y	26		SR4-20			
41-1		J11-F	13Y	27		SR4-6			
41-2		J11-F	13Y			SR4-7			
41-3		J11-J	13Y	27		SR4-8			
41-4		J11-J	13Y			SR4-9			

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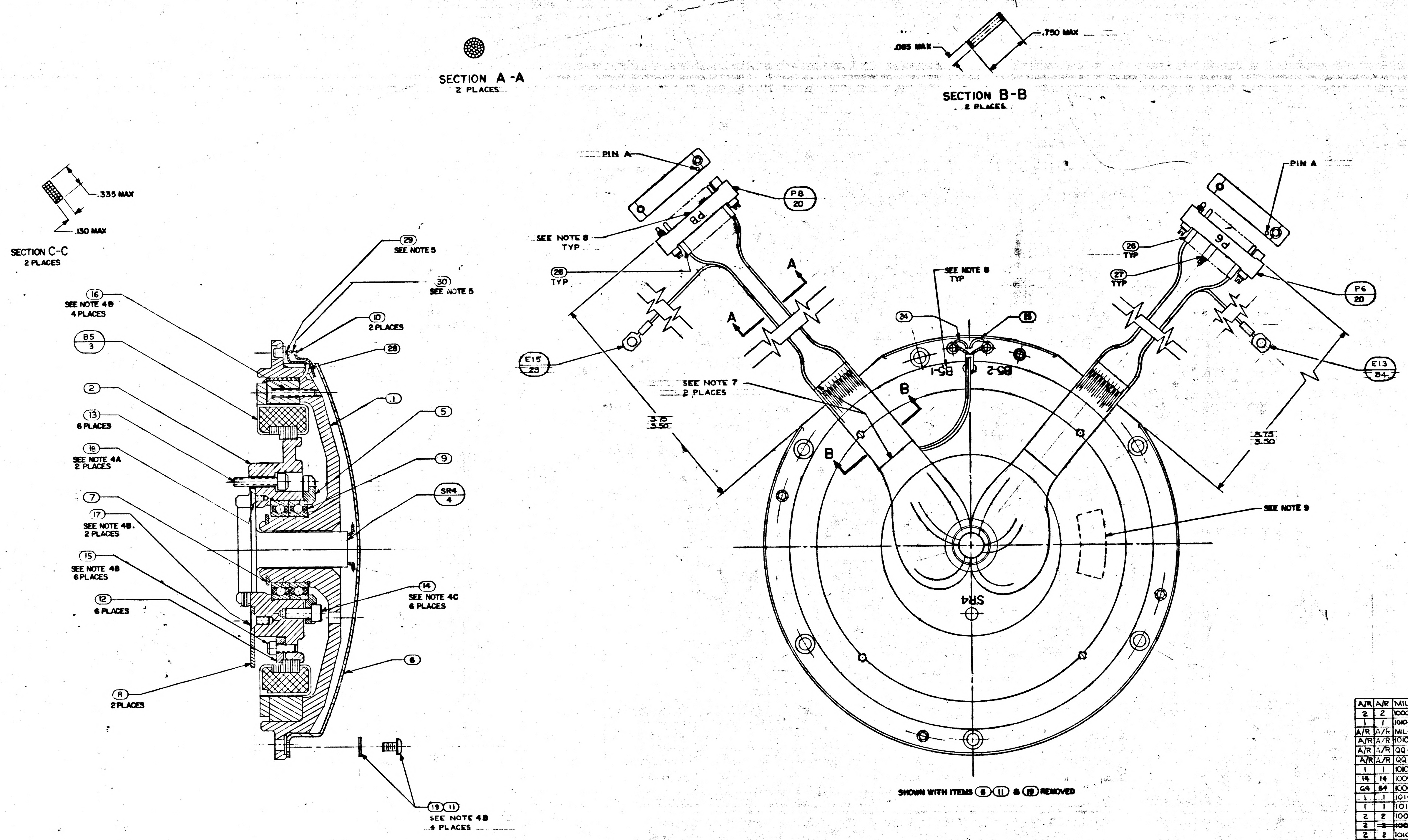
NASA DRAWING NO.
2018610
SHEET 7 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.
42		J11-L	13Y	26		SR4-10			
43		J11-M	13Y	26		SR4-11			
44		J11-N	13Y	26		SR4-12			
45		J11-P	13Y	26		SR4-13			
46-1		J11-R	13Y	26		SR4-14			
46-2		J11-S	13Y	26		SR4-15			
47		J11-T	13Y	26		SR4-16			
48-1		J11-U	13Y	26		SR4-17			
48-2		J11-V	13Y	26		SR4-18			
49	33	J11-H	13Y			J11-GG	13Y		
50	24	J11-D	13Y			J11-EE	13Y		

REVISIONS TDRR 17167				
SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED PER TDRR 19281	2 Jun 65		WK
B	REVISED PER TDRR 20662	26 Jul 65		WK
C	REVISED PER TDRR 21683	31 Aug 65		WK
D	REVISED PER TDRR 21674	31 Aug 65		WK
E	REVISED PER TDRR 26284	23 Feb 66		WK
F	REVISED PER TDRR			WK
G	REVISED TDRR 27774	12 Apr 66		WK



SECTION A-A
2 PLACES
.085 MAX
.750 MAX
SECTION B-B
2 PLACES
.335 MAX
.130 MAX
SECTION C-C
2 PLACES
29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5
3
28
2
1
13
6 PLACES
5
18
SEE NOTE 4A
2 PLACES
9
7
SR4
4
17
SEE NOTE 4B
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
6
8
2 PLACES
19
11
SEE NOTE 4B
4 PLACES
PIN A
P8
20
SEE NOTE 8
TYP
26
TYP
A
A
E15
23
SEE NOTE 7
2 PLACES
B
B
3.75
3.50
SEE NOTE 8
TYP
24
B5-1
B5-2
PIN A
26
TYP
27
TYP
P6
20
E13
34
3.75
3.50
SEE NOTE 9
SR4
SHOWN WITH ITEMS 6 11 & 19 REMOVED

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
2	2	1000020-13	SHIELD & GROUND ASS'Y	34
1	1	1010416-3	WIRE, AWG 28E RED 4" LONG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	A/R	1010870	GREASE LUBRICATING	31
A/R	A/R	QQ-S-571 SN60	SOLDER	30
A/R	A/R	QQ-S-571 SN10	SOLDER	29
1	1	1010490-054	INSULATION SLEEVING ELEC HEAT SHRINK	28
14	14	1005776-14	INSULATION, SLEEVING ELEC 5/16 LONG	27
64	64	1005776-18	INSULATION, SLEEVING ELEC 5/16 LONG	26
1	1	1010416-10	WIRE, AWG 28E WHITE 10" LONG	25
1	1	1010416-1	WIRE, AWG 28E BLACK 14" LONG	24
2	2	1000020-6	SHIELD AND GROUND ASSY	23
2	~~2~~	~~1000020-4~~	~~SHIELD AND GROUND ASSY~~	~~22~~
2	2	1010917-106	CONN ELEC RECEPT 26 PIN	21
2	2	1010817-806	CONN ELEC PLUG 26 PIN	20
4	4	1010891-12	SCREW, BUT. HD SELF LKG SOC SPLINE	19
2	2	1010867-2	SCREW, FLAT HD SELF LKG SOC SPLINE	18
2	2	1010867-12	SCREW, FLAT HD SELF LKG SOC SPLINE	17
4	4	1010867-17	SCREW, FLAT HD SELF LKG SOC SPLINE	16
6	6	1001488-2	SCREW, HEX SOC HD SELF-LOCKING.	15
6	6	1001488-18	SCREW, HEX SOC HD SELF-LOCKING	14
6	6	1001489-22	SCREW, HEX SOC HD	13
6	6	2018745	CLIP, RETAINER TORQUE MOTOR I.G. & M.A.	12
4	4	MS15795-703	WASHER, FLAT, METAL, ROUND	11
2	2	1000100-1	TERMINAL INSULATED	10
1	1	2018621	BALL BEARING DUPLEX	9
2	2	2018731	CLIP, WIRE RETAINER	8
1	1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
1	1	2018783	WIRE GUIDE BRG HSG T. M. M. A.	6
1	1	2018753	PLATE, BRG RETAINER TORQUE MOT. M.A.	5
1	1	2018624	SLIP RING 40 CONTACT	4
1	1	2018623	MOTOR, TORQUE DC FRAMELESS	3
1	1	2018748	SHAFT, STUB TORQUE MOTOR M.A.	2
1	1	2018749	HOUSING, BRG TORQUE MOTOR M.A.	1
021	011	LIST OF MATERIALS		

2018605	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	MATERIAL	DRAWN DATE	INTER GIMBAL SUB ASSEMBLY TORQUE MOTOR END MIDDLE AXIS
APPLICATION		HEAT TREATMENT	CHECKED G. QUINN 3-2-65	CODE IDENT NO.
		FINAL FINISH	APPROVAL	SIZE J
			NASA APPROVAL W. J. R 3-7-65	NASA DRAWING NO. 2018610
			MIT APPROVAL	SCALE 2-1 WT SHEET 1 OF

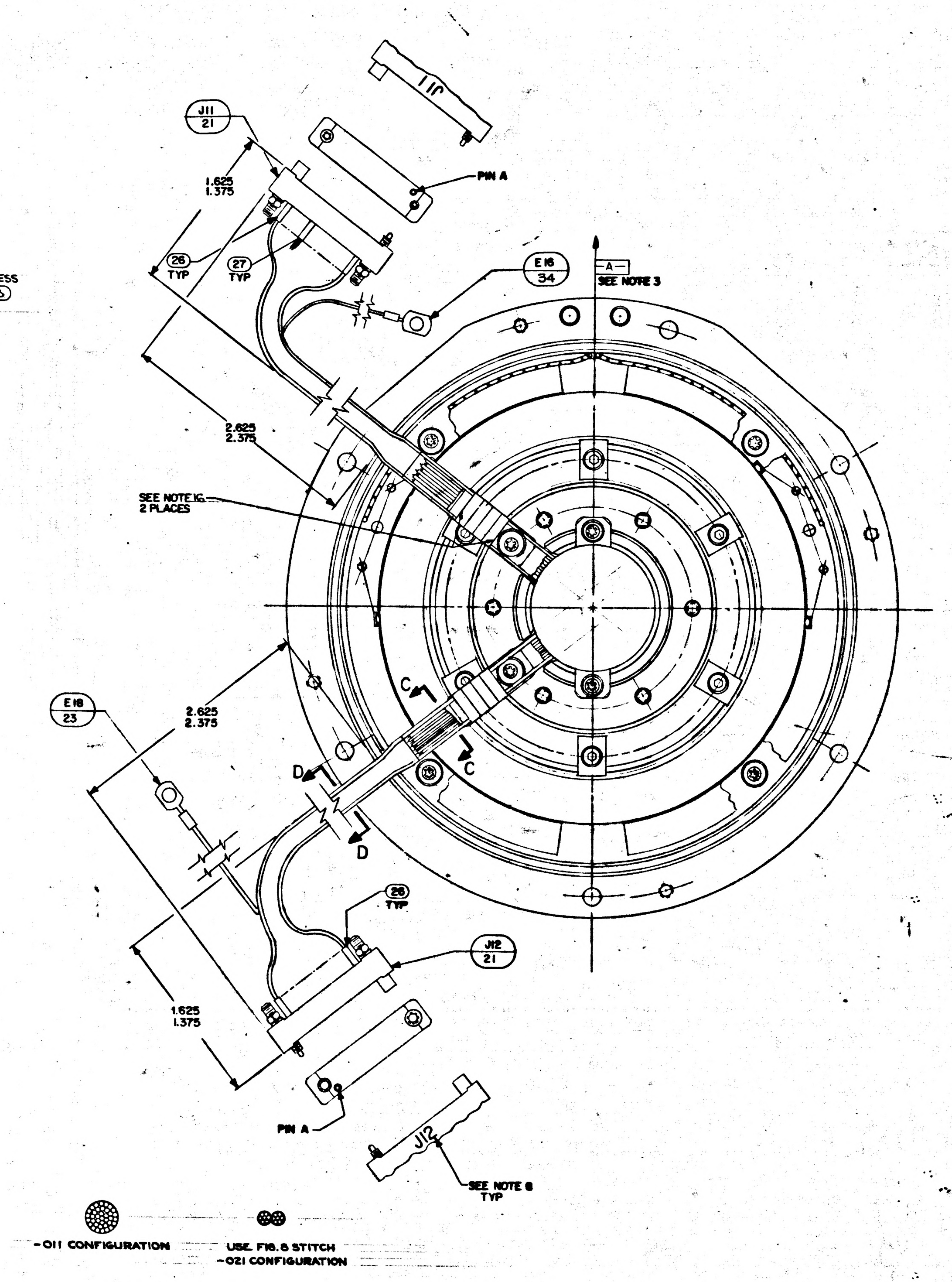
MASTER

2018610	REV G	SHEET 1

F-2

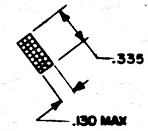
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. COMPLETED ASS'Y SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018610
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ±5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ㉑ & ㉒ PER ND 1002071 USING ㉚
6. HEAT SHRINK SLEEVING ON ㉒ & ㉓ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBERS SHALL BE TWISTED OR TWISTED & SHIELDED WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (15-1, 15-2, 15-3) AND (29-1, 29-2, 29-3) WHICH SHALL BE SHIELDED BUT NOT TWISTED. TWIST PER ND 1002032
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEET 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"
16. TAPE HARNESS IN AREA INDICATED USING ITEM ㉟ TO MAINTAIN HARNESS CONFIGURATION PER SECTION C-C AND SECURE HARNESS TO ITEM ⑧ WITH ITEM ㉟



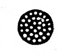
J11
21
PIN A
1.625
1.375
26 TYP
27 TYP
E16
34
-A-
SEE NOTE 3
2.625
2.375
SEE NOTE 16
2 PLACES
E16
23
C
C
D
D
26 TYP
J12
21
PIN A
J12
SEE NOTE 8
TYP
-011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION

SECTION D-D
2 PLACES

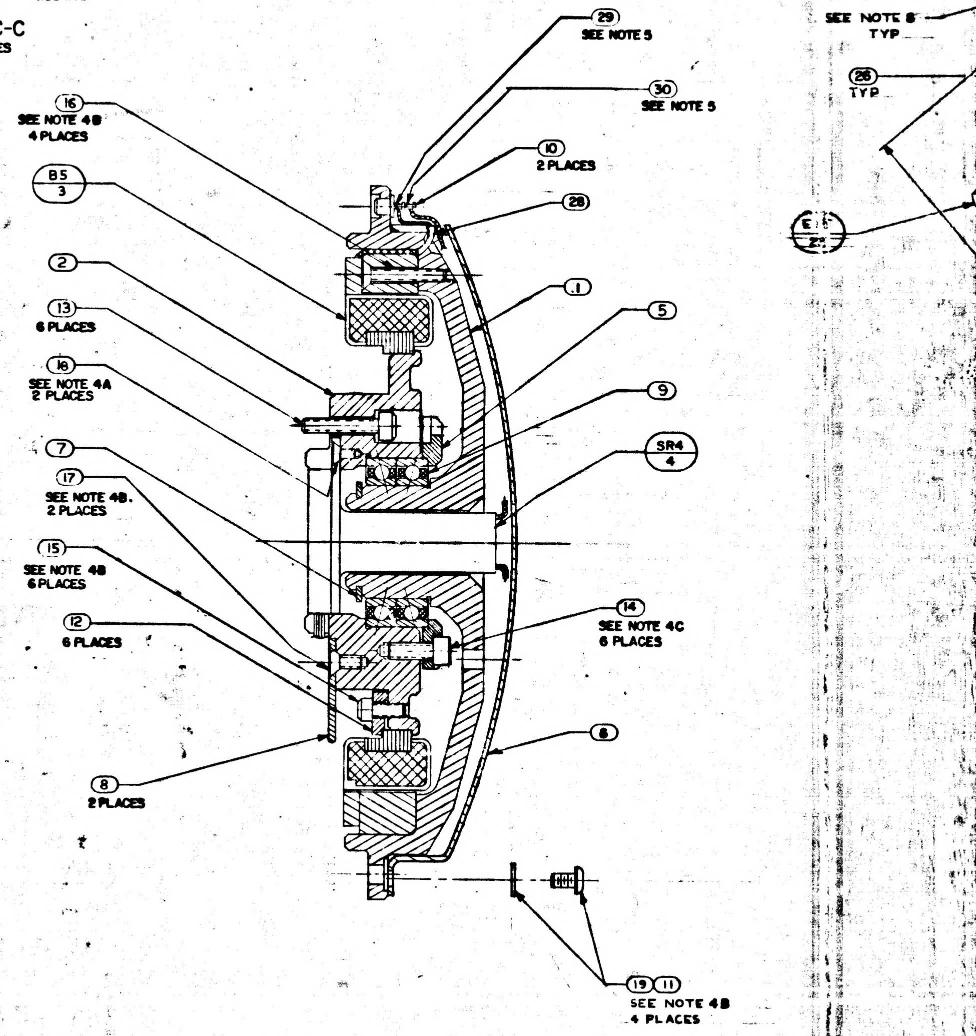


.335 MAX
.130 MAX

SECTION C-C
2 PLACES



SECTION A-A
2 PLACES



29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5
3
28
2
1
13
6 PLACES
5
18
SEE NOTE 4A
2 PLACES
9
7
SR4
4
17
SEE NOTE 4B
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
6
8
2 PLACES
19
11
SEE NOTE 4B
4 PLACES
SEE NOTE 8
TYP
26
TYP
PIN

JH

2018610 | REV G | SHEET 1

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REVISION F

NASA DRAWING NO. 2018610
SHEET 2 of 7

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	NO.
1		P6-A	13Y	26		SR4-1			
2				22					
2-A		SHLD-2				E13			
2-1		P6-B	13Y	27		SR4-2			
2-2		P6-C	13Y	27		SR4-3			
2-3		P6-D	13Y	27		SR4-4			
2-4		P6-E	13Y	27		SR4-5			
2-5		P6-W	13Y	27		SR4-19			
2-6		P6-X	13Y	27		SR4-20			
3-1		P6-F	13Y	27		SR4-6			
3-2		P6-F	13Y			SR4-7			
3-3		P6-J	13Y	27		SR4-8			
3-4		P6-J	13Y			SR4-9			
4		P6-L	13Y	26		SR4-10			
5		P6-M	13Y	26		SR4-11			
6		P6-N	13Y	26		SR4-12			

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NASA DRAWING NO. 2018610
SHEET 3 of 7

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	NO.
7		P6-P	13Y	26		SR4-13			
8-1		P6-R	13Y	26		SR4-14			
8-2		P6-S	13Y	26		SR4-15			
9		P6-T	13Y	26		SR4-16			
10-1		P6-U	13Y	26		SR4-17			
10-2		P6-V	13Y	26		SR4-18			
11	33	P6-C	13Y			P6-W	13Y		
12	24	P6-E	13Y			P6-X	13Y		
13-1		P6-Y	13Y	26		SR4-21			
13-2		P6-Z	13Y	26		SR4-22			
13-3		P6-a	13Y	26		SR4-23			
13-4		P6-b	13Y	26		SR4-24			
13-5		P6-c	13Y	26		SR4-25			
14		P8-A	13Y	26		SR4-26			
15		P8-B	13Y	26		SR4-27			
16		P8-C	13Y	26		SR4-28			

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REVISION F

NASA DRAWING NO. 2018610
SHEET 4 of 7

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	NO.
17				22					
17A		SHLD-17				E15			
17-1		P8-D	13Y	26		SR4-29			
17-2		P3-E	13Y	26		SR4-30			
17-3		P8-F	13Y	26		SR4-31			
18		P8-H	13Y	26		SR4-32			
19		P8-J	13Y	26		SR4-33			
20		P8-K	13Y	26		SR4-34			
21-1		P8-L	13Y	26		SR4-35			
21-2		P8-M	13Y	26		SR4-36			
22-1		P8-N	13Y	26		SR4-37			
22-2		P8-P	13Y	26		SR4-38			
23-1		P8-R	13Y	26		SR4-39			
23-2		P8-S	13Y	26		SR4-40			
24	24	P8-T	13Y	26		B5-1	19Y		
25	25	P8-U	13Y	26		B5-2	19Y		
26		B5-BLK				B5-1	19Y		
27		B5-WHT				B5-2	19Y		

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REVISION F

NASA DRAWING NO. 2018610
SHEET 5 of 7

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	NO.
28		J12-A	13Y	26		SR4-26			
29		J12-B	13Y	26		SR4-27			
30		J12-C	13Y	26		SR4-28			
31				23					
31A		SHLD-31				E18			
31-1		J12-D	13Y	26		SR4-29			
31-2		J12-E	13Y	26		SR4-30			
31-3		J12-F	13Y	26		SR4-31			
32		J12-H	13Y	26		SR4-32			
33		J12-J	13Y	26		SR4-33			
34		J12-K	13Y	26		SR434			
35-1		J12-L	13Y	26		SR4-35			
35-2		J12-M	13Y	26		SR4-36			
36-1		J12-N	13Y	26		SR4-37			
36-2		J12-P	13Y	26		SR4-38			
37-1		J12-R	13Y	26		SR4-39			
37-2		J12-S	13Y	26		SR4-40			

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REVISION F

NASA DRAWING NO. 2018610
SHEET 6 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	TO NO.
38-1			J12-X	13	Y	26		SR4-21				
38-2			J12-Z	13	Y	26		SR4-22				
38-3			J12-a	13	Y	26		SR4-23				
38-4			J12-b	13	Y	26		SR4-24				
38-5			J12-c	13	Y	26		SR4-25				
39			J11-A	13	Y	26		SR4-1				
40						23						
40A			SHLD-40					E16				
40-1			J11-B	13	Y	27		SR4-2				
40-2			J11-C	13	Y	27		SR4-3				
40-3			J11-D	13	Y	27		SR4-4				
40-4			J11-E	13	Y	27		SR4-5				
40-5			J11-W	13	Y	26		SR4-19				
40-6			J11-X	13	Y	26		SR4-20				
41-1			J11-F	13	Y	27		SR4-6				
41-2			J11-F	13	Y			SR4-7				
41-3			J11-J	13	Y	27		SR4-8				
41-4			J11-J	13	Y			SR4-9				

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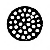
REVISION F

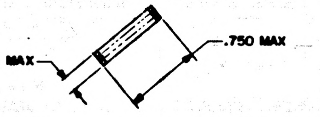
NASA DRAWING NO. 2018610
SHEET 7 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	TO NO.
42			J11-L	13	Y	26		SR4-10				
43			J11-M	13	Y	26		SR4-11				
44			J11-N	13	Y	26		SR4-12				
45			J11-P	13	Y	26		SR4-13				
46-1			J11-R	13	Y	26		SR4-14				
46-2			J11-S	13	Y	26		SR4-15				
47			J11-T	13	Y	26		SR4-16				
48-1			J11-U	13	Y	26		SR4-17				
48-2			J11-V	13	Y	26		SR4-18				
49	33		J11-H	13	Y			J11-G	13	Y		
50	24		J11-D	13	Y			J11-E	13	Y		

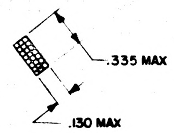
SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17167			
A	REVISED PER TDRR 19281	2 Jun 65		WK
B	REVISED PER TDRR 20662	26 Jul 65		WK
C	REVISED PER TDRR 21683	31 Aug 65		WK
D	REVISED PER TDRR 21674	31 Aug 65		WK
E	REVISED PER TDRR 26254	23 Feb 66		WK
F	REVISED PER TDRR 26597	7 Mar 66		WK
G	REVISED TDRR 27774	12 Apr 66		WK
H	REVISED TDRR 28287	2 May 66		WK



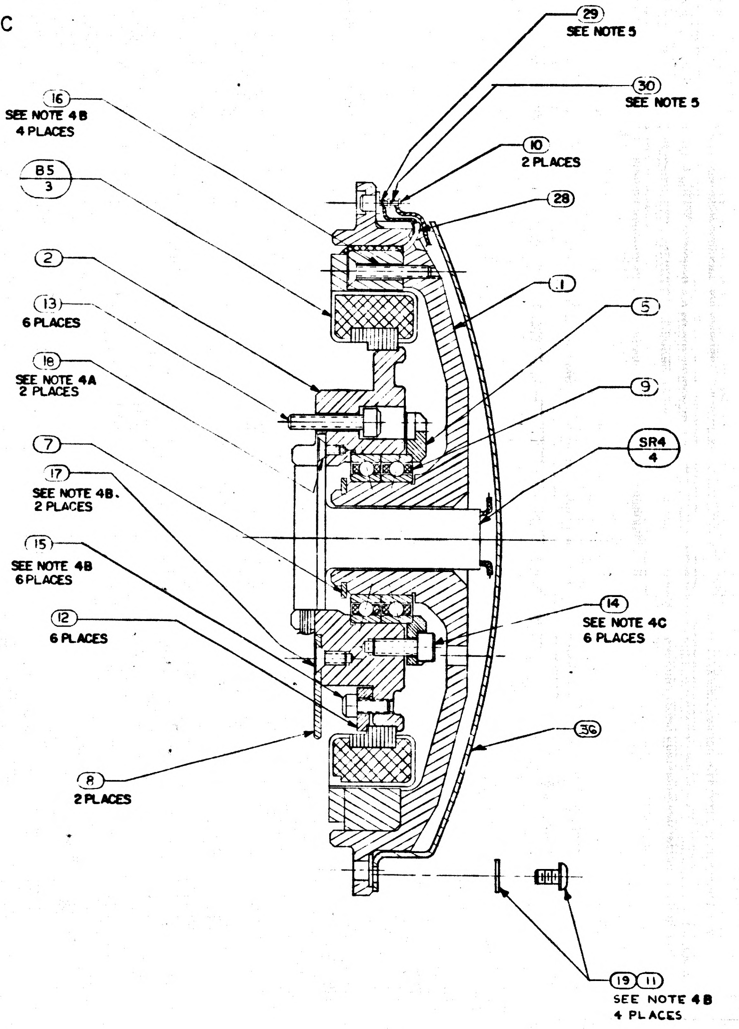
SECTION A-A
2 PLACES

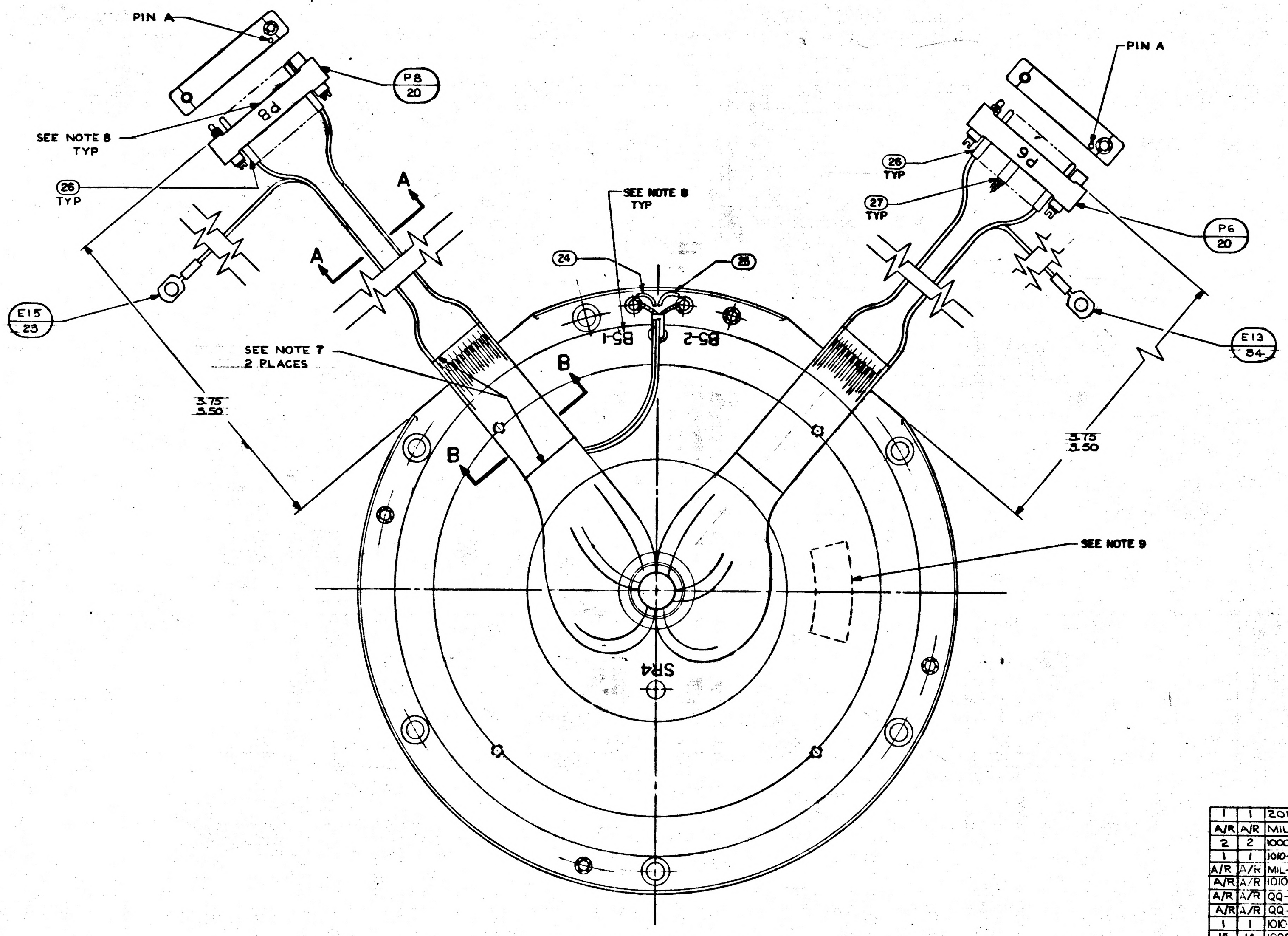

.065 MAX
.750 MAX

SECTION B-B
2 PLACES


.335 MAX
.130 MAX

SECTION C-C
2 PLACES


29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5
3
28
2
1
13
6 PLACES
5
18
SEE NOTE 4A
2 PLACES
9
7
SR4
4
17
SEE NOTE 4B.
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
36
8
2 PLACES
19
11
SEE NOTE 4B
4 PLACES


PIN A
P8
20
SEE NOTE 8
TYP
26
TYP
A
A
E15
23
SEE NOTE 7
2 PLACES
3.75
3.50
B
B
SEE NOTE 8
TYP
24
25
B5-1
B5-2
PIN A
26
TYP
27
TYP
P6
20
E13
34
3.75
3.50
SEE NOTE 9
SR4

SHOWN WITH ITEMS ⑥ ⑪ & ⑲ REMOVED

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1	2018847	WIRE GUIDE, BRG HSG, T.M., M.A.	36
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
2	2	1000020-13	SHIELD & GROUND ASS'Y	34
1	1	1010416-3	WIRE, AWG 28E RED 4" LONG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	A/R	1010870	GREASE LUBRICATING	31
A/R	A/R	QQ-S-571 SN60	SOLDER	30
A/R	A/R	QQ-S-571 SN10	SOLDER	29
1	1	1010490-054	INSULATION SLEEVING ELEC HEAT SHRINK	28
14	14	1006776-14	INSULATION, SLEEVING ELEC 5/16 LONG	27
64	64	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	26
1	1	1010416-10	WIRE, AWG 28E WHITE 10" LONG	25
1	1	1010416-1	WIRE, AWG 28E BLACK 14" LONG	24
2	2	1000020-6	SHIELD AND GROUND ASSY	23
~~2~~	~~2~~	~~1000020-4~~	~~SHIELD AND GROUND ASSY~~	~~22~~
2	2	1010917-106	CONN ELEC RECEPT 26 PIN	21
2	2	1010917-806	CONN ELEC PLUG 26 PIN	20
4	4	1010891-12	SCREW, BUT. HD SELF LKG SOC SPLINE	19
2	2	1010867-32	SCREW, FLAT HD SELF LKG SOC SPLINE	18
2	2	1010867-12	SCREW, FLAT HD SELF LKG SOC SPLINE	17
4	4	1010867-17	SCREW, FLAT HD SELF LKG SOC SPLINE	16
6	6	1001488-2	SCREW, HEX SOC HD SELF-LOCKING	15
6	6	1001488-18	SCREW, HEX SOC HD SELF-LOCKING	14
6	6	1001489-22	SCREW, HEX SOC HD	13
6	6	2018745	CLIP, RETAINER TORQUE MOTOR I.& M.A.	12
4	4	MS15795-703	WASHER, FLAT, METAL, ROUND	11
2	2	1000100-1	TERMINAL INSULATED	10
1	1	2018621	BALL BEARING DUPLEX	9
2	2	2018731	CLIP, WIRE RETAINER	8
1	1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
~~1~~	~~1~~	~~2018783~~	~~WIRE GUIDE BRG HSG T. M. M. A.~~	~~6~~
1	1	2018753	PLATE, BRG RETAINER TORQUE MOT. M.A.	5
1	1	2018624	SLIP RING 40 CONTACT	4
1	1	2018623	MOTOR, TORQUE D C FRAMELESS	3
1	1	2018748	SHAFT, STUB TORQUE MOTOR M.A.	2
1	1	2018749	HOUSING, BRG TORQUE MOTOR M.A.	1
021	011	LIST OF MATERIALS		

2018603	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Bill Cuccinoco DATE 6-8-64
CHECKED G. QUINN 3-2-65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL W. J. Rhine 3-?-65
MIT APPROVAL

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INTER GIMBAL
SUB ASSEMBLY
TORQUE MOTOR END
MIDDLE AXIS

CODE IDENT NO. SIZE J NASA DRAWING NO. 2018610
SCALE 2-1 WT SHEET 1 OF 7

MASTER

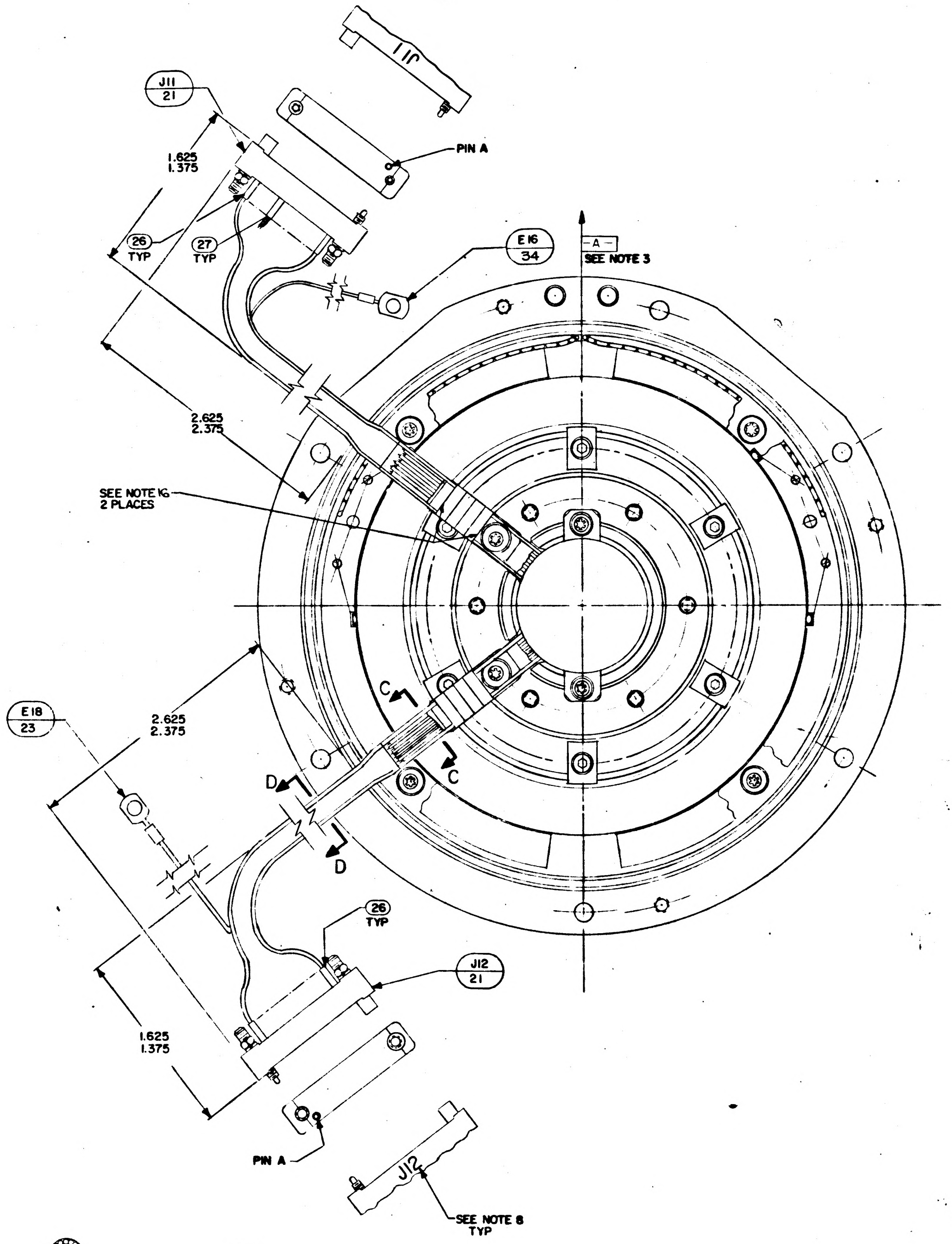
2018610 REV H SHEET 1

2018610 H

F-2

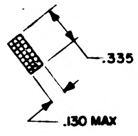
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. COMPLETED ASSY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018610
3. ECCENTRICITY MARKS ON BOTH RACES OF (9) TO BE ALIGNED WITHIN ±5° OF [-A-] AND IN THE DIRECTION OF THE ARROW WHEN (1) & (2) ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF (31) TO INSIDE DIAMETER OF (9) AND TO FAYING SURFACE OF (1) BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ±7%
   A. 3.5 IN-LB
   B. 5.0 IN-LB
   C. 10.0 IN-LB
5. SOLDER LEADS FROM (3) TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING (29). SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR (21) & (22) PER ND 1002071 USING (30)
6. HEAT SHRINK SLEEVING ON (22) & (23) AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT (2) FROM HOUSING BEARING (1) OR REMOVE TORQUE MOTOR (3) WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR (3)
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBERS SHALL BE TWISTED OR TWISTED & SHIELDED WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (15-1, 15-2, 15-3) AND (29-1, 29-2, 29-3) WHICH SHALL BE SHIELDED BUT NOT TWISTED. TWIST PER ND 1002032
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEET 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"
16. TAPE HARNESS IN AREA INDICATED USING ITEM (35) TO MAINTAIN HARNESS CONFIGURATION PER SECTION C-C AND SECURE HARNESS TO ITEM (8) WITH ITEM (35)


J11
J11 / 21
PIN A
1.625
1.375
26 TYP
27 TYP
E16 / 34
-A-
SEE NOTE 3
2.625
2.375
SEE NOTE 16
2 PLACES
C
C
D
D
E18 / 23
2.625
2.375
26 TYP
J12 / 21
1.625
1.375
PIN A
J12
SEE NOTE 8
TYP

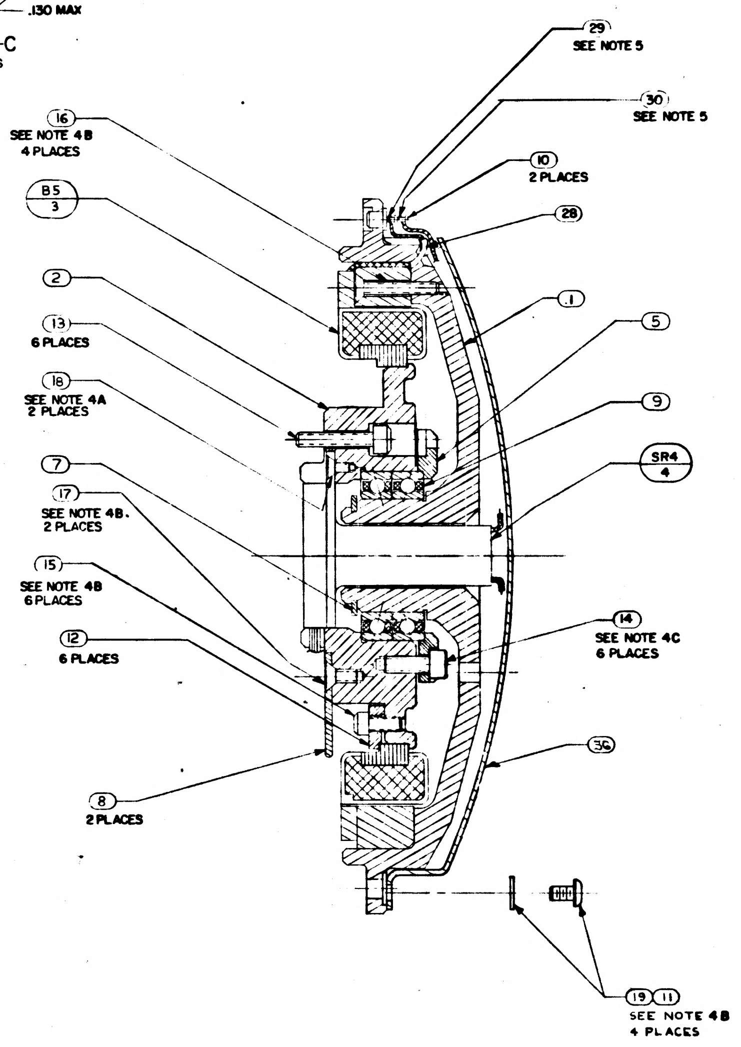
-011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION

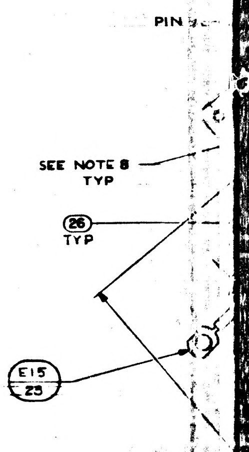
SECTION D-D
2 PLACES


.335 MAX
.130 MAX

SECTION C-C
2 PLACES

SECTION A-A
2 PLACES


29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5 / 3
28
2
.1
13
6 PLACES
5
18
SEE NOTE 4A
2 PLACES
9
SR4 / 4
7
17
SEE NOTE 4B.
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
36
8
2 PLACES
19 11
SEE NOTE 4B
4 PLACES


PIN
SEE NOTE 8
TYP
26
TYP
E15 / 23

	REV	SHEET
2018610	H	1

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REVISION H

NASA DRAWING NO. 2018610
SHEET 2 of 7

CONDUCTOR		FROM			TO		
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.
1		P6-A	13Y	26	SR4-1		
2				22			
2-A		SHLD-2			E13		
2-1		P6-B	13Y	27	SR4-2		
2-2		P6-C	13Y	27	SR4-3		
2-3		P6-D	13Y	27	SR4-4		
2-4		P6-E	13Y	27	SR4-5		
2-5		P6-W	13Y	27	SR4-19		
2-6		P6-X	13Y	27	SR4-20		
3-1		P6-F	13Y	27	SR4-6		
3-2		P6-F	13Y		SR4-7		
3-3		P6-J	13Y	27	SR4-8		
3-4		P6-J	13Y		SR4-9		
4		P6-L	13Y	26	SR4-10		
5		P6-M	13Y	26	SR4-11		
6		P6-N	13Y	26	SR4-12		

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REVISION H

NASA DRAWING NO. 2018610
SHEET 3 of 7

CONDUCTOR		FROM			TO		
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.
7		P6-P	13Y	26	SR4-13		
8-1		P6-R	13Y	26	SR4-14		
8-2		P6-S	13Y	26	SR4-15		
9		P6-T	13Y	26	SR4-16		
10-1		P6-U	13Y	26	SR4-17		
10-2		P6-V	13Y	26	SR4-18		
11	33	P6-C	13Y	[illegible]	P6-W	13Y	
12	24	P6-E	13Y	[illegible]	P6-X	13Y	
13-1		P6-Y	13Y	26	SR4-21		
13-2		P6-Z	13Y	26	SR4-22		
13-3		P6-a	13Y	26	SR4-23		
13-4		P6-b	13Y	26	SR4-24		
13-5		P6-c	13Y	26	SR4-25		
14		P8-A	13Y	26	SR4-26		
15		P8-B	13Y	26	SR4-27		
16		P3-C	13Y	26	SR4-28		

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REVISION H

NASA DRAWING NO. 2018610
SHEET 4 of 7

CONDUCTOR		FROM			TO		
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.
17				22			
17A		SHLD-17			E15		
17-1		P8-D	13Y	26	SR4-29		
17-2		P3-E	13Y	26	SR4-30		
17-3		P8-F	13Y	26	SR4-31		
18		P8-H	13Y	26	SR4-32		
19		P8-J	13Y	26	SR4-33		
20		P8-K	13Y	26	SR4-34		
21-1		P8-L	13Y	26	SR4-35		
21-2		P8-M	13Y	26	SR4-36		
22-1		P8-N	13Y	26	SR4-37		
22-2		P8-P	13Y	26	SR4-38		
23-1		P8-R	13Y	26	SR4-39		
23-2		P8-S	13Y	26	SR4-40		
24	24	P8-T	13Y	26	B5-1	19Y	
25	25	P8-U	13Y	26	B5-2	19Y	
26		B5-BLK			B5-1	19Y	
27		B5-WHT			B5-2	19Y	

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NASA DRAWING NO. 2018610
SHEET 5 of 7

CONDUCTOR		FROM			TO		
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.
28		J12-A	13Y	26	SR4-26		
29		J12-B	13Y	26	SR4-27		
30		J12-C	13Y	26	SR4-28		
31				23			
31A		SHLD-31			E18		
31-1		J12-D	13Y	26	SR4-29		
31-2		J12-E	13Y	26	SR4-30		
31-3		J12-F	13Y	26	SR4-31		
32		J12-H	13Y	26	SR4-32		
33		J12-J	13Y	26	SR4-33		
34		J12-K	13Y	26	SR434		
35-1		J12-L	13Y	26	SR4-35		
35-2		J12-M	13Y	26	SR4-36		
36-1		J12-N	13Y	26	SR4-37		
36-2		J12-P	13Y	26	SR4-38		
37-1		J12-R	13Y	26	SR4-39		
37-2		J12-S	13Y	26	SR4-40		

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NASA DRAWING NO. 2018610
SHEET 6 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	TO NO.
38-1		J12-X	13Y	26		SR4-21			
38-2		J12-Z	13Y	26		SR4-22			
38-3		J12-a	13Y	26		SR4-23			
38-4		J12-b	13Y	26		SR4-24			
38-5		J12-c	13Y	26		SR4-25			
39		J11-A	13Y	26		SR4-1			
40				23					
40A		SHLD-40				E16			
40-1		J11-B	13Y	27		SR4-2			
40-2		J11-C	13Y	27		SR4-3			
40-3		J11-D	13Y	27		SR4-4			
40-4		J11-E	13Y	27		SR4-5			
40-5		J11-W	13Y	25		SR4-19			
40-6		J11-X	13Y	26		SR4-20			
41-1		J11-F	13Y	27		SR4-6			
41-2		J11-F	13Y			SR4-7			
41-3		J11-J	13Y	27		SR4-8			
41-4		J11-J	13Y			SR4-9			

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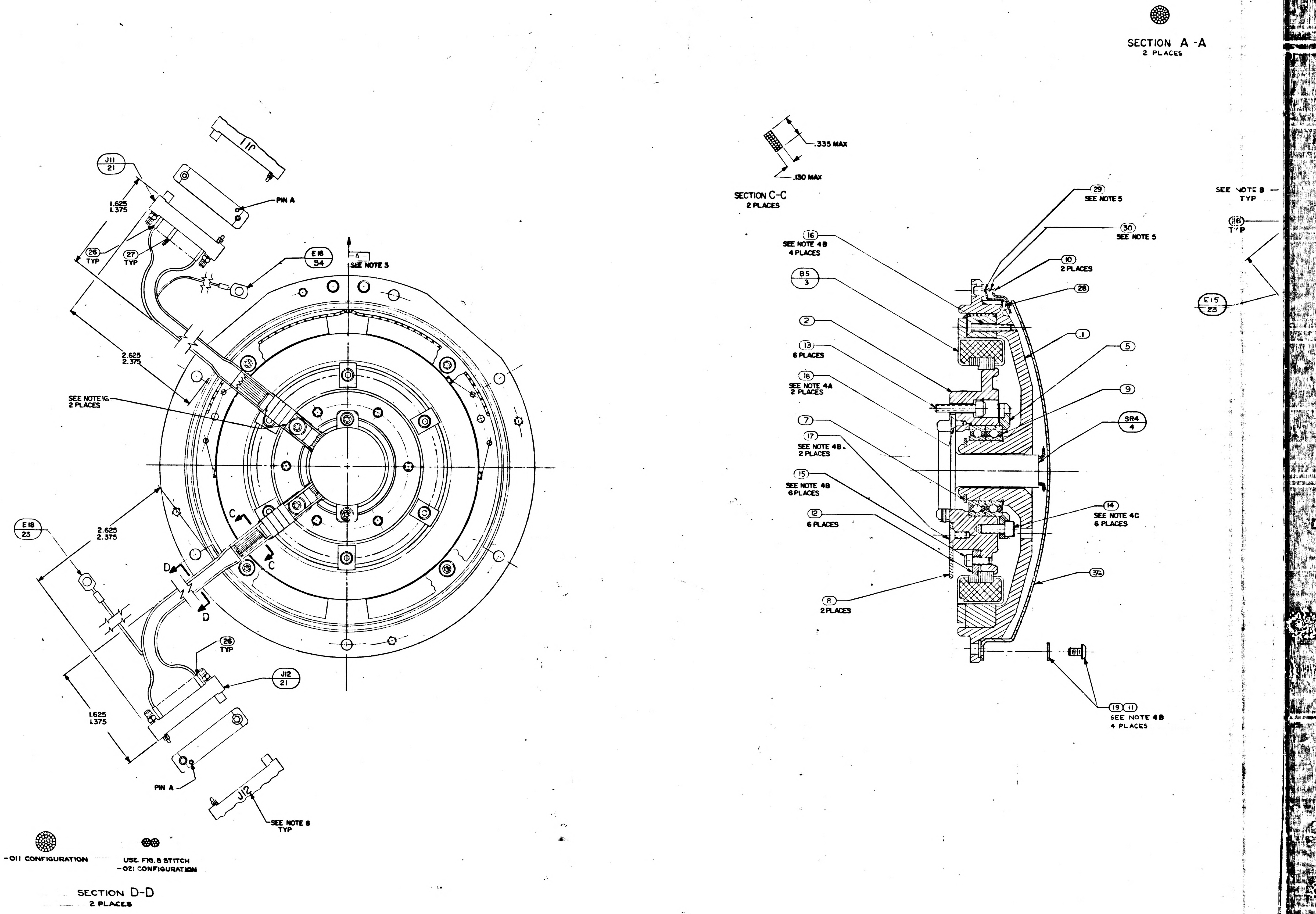
NASA DRAWING NO. 2018610
SHEET 7 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	TO NO.
42		J11-L	13Y	26		SR4-10			
43		J11-M	13Y	26		SR4-11			
44		J11-N	13Y	26		SR4-12			
45		J11-P	13Y	26		SR4-13			
46-1		J11-R	13Y	26		SR4-14			
46-2		J11-S	13Y	26		SR4-15			
47		J11-T	13Y	26		SR4-16			
48-1		J11-U	13Y	26		SR4-17			
48-2		J11-V	13Y	26		SR4-18			
49	33	J11-B	13Y			J11-C	13Y		
50	24	J11-D	13Y			J11-E	13Y		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. COMPLETED ASS'Y SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018610
3. ECCENTRICITY MARKS ON BOTH RACES OF (9) TO BE ALIGNED WITHIN ±5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN (1) & (2) ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF (31) TO INSIDE DIAMETER OF (9) AND TO FAYING SURFACE OF (1) BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
5. SOLDER LEADS FROM (3) TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING (29). SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR (21) & (22) PER ND 1002071 USING (30)
6. HEAT SHRINK SLEEVING ON (22) & (23) AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT (2) FROM HOUSING BEARING (1) OR REMOVE TORQUE MOTOR (3) WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR (3)
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBERS SHALL BE TWISTED OR TWISTED & SHIELDED WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (15-1, 15-2, 15-3) AND (29-1, 29-2, 29-3) WHICH SHALL BE SHIELDED BUT NOT TWISTED. TWIST PER ND 1002032
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEET 2 THRU 7 INDICATES THE FOLLOWING:
   - A = SHIELD GROUND ON "FROM END"
   - B = SHIELD GROUND ON "TO END"
16. TAPE HARNESS IN AREA INDICATED USING ITEM (35) TO MAINTAIN HARNESS CONFIGURATION PER SECTION C-C AND SECURE HARNESS TO ITEM (8) WITH ITEM (35)



J11
21
J11
PIN A
1.625
1.375
26 TYP
27 TYP
E16
34
-A-
SEE NOTE 3
2.625
2.375
SEE NOTE 16
2 PLACES
E18
23
2.625
2.375
C
C
D
D
26 TYP
J12
21
1.625
1.375
PIN A
J12
SEE NOTE 8 TYP
-011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION
.335 MAX
.130 MAX
29 SEE NOTE 5
30 SEE NOTE 5
16 SEE NOTE 4B 4 PLACES
B5
3
10 2 PLACES
28
2
1
13 6 PLACES
5
18 SEE NOTE 4A 2 PLACES
9
SR4
4
7
17 SEE NOTE 4B 2 PLACES
15 SEE NOTE 4B 6 PLACES
14 SEE NOTE 4C 6 PLACES
12 6 PLACES
34
8 2 PLACES
19 11 SEE NOTE 4B 4 PLACES
SEE NOTE 8 TYP
16 TYP
E15
23

SECTION D-D
2 PLACES

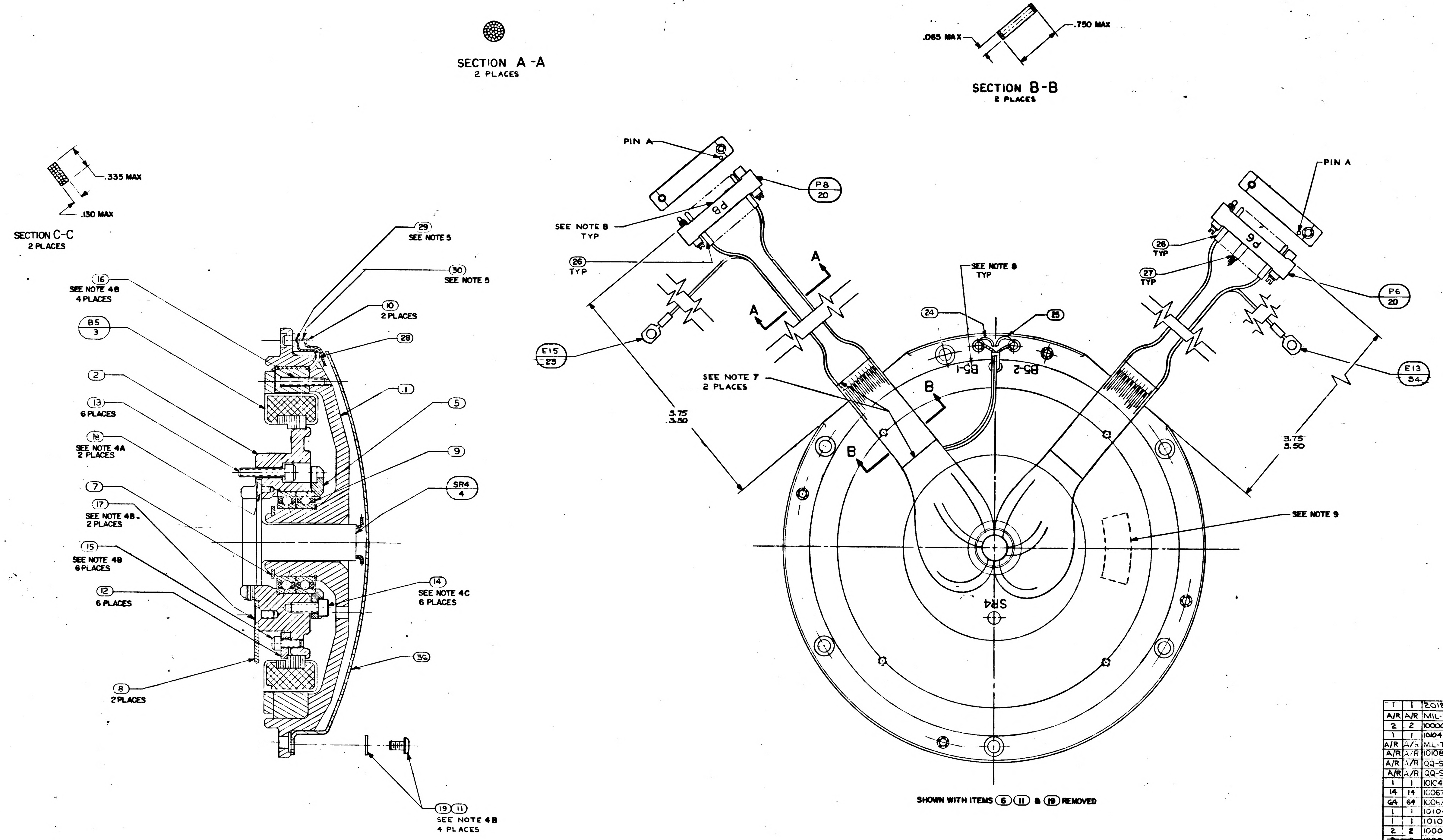
SECTION C-C
2 PLACES

SECTION A-A
2 PLACES

2018610	REV J	SHEET 1

1/2018610

REVISIONS TDRR 17167				
SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED PER TDRR 19281	2 JUN 65		WK
B	REVISED PER TDRR 20662	26 Jul 65		WK
C	REVISED PER TDRR 21683	31 Aug 65		WK
D	REVISED PER TDRR 21674	31 Aug 65		WK
E	REVISED PER TDRR 26254	23 Feb 66		WK
F	REVISED PER TDRR 26597	7 Mar 66		WK
G	REVISED TDRR 27774	12 Apr 66		WK
H	REVISED TDRR 28287	2 May 66		WK
J	REVISED PER TDRR 32851	3 FEB 67	JC	


SECTION A-A
2 PLACES
.065 MAX
.750 MAX
SECTION B-B
2 PLACES
.335 MAX
.130 MAX
SECTION C-C
2 PLACES
29 SEE NOTE 5
30 SEE NOTE 5
16 SEE NOTE 4B 4 PLACES
10 2 PLACES
B5 3
28
2
1
13 6 PLACES
5
18 SEE NOTE 4A 2 PLACES
9
7
SR4 4
17 SEE NOTE 4B 2 PLACES
15 SEE NOTE 4B 6 PLACES
14 SEE NOTE 4C 6 PLACES
12 6 PLACES
36
8 2 PLACES
19 11 SEE NOTE 4B 4 PLACES
PIN A
P8 20
P8
SEE NOTE 8 TYP
26 TYP
A
A
E15 25
SEE NOTE 7 2 PLACES
3.75
3.50
B
B
24
25
SEE NOTE 8 TYP
B5-1
B5-2
PIN A
P6
26 TYP
27 TYP
P6 20
E13 34
3.75
3.50
SEE NOTE 9
SR4

SHOWN WITH ITEMS ⑥ ⑪ & ⑲ REMOVED

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1	2018847	WIRE GUIDE, BRG HSG, T.M., M.A.	36
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	35
2	2	1000020-13	SHIELD & GROUND ASS'Y	34
1	1	1010416-3	WIRE, AWG 28E RED 4" LONG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	A/R	1010870	GREASE LUBRICATING	31
A/R	A/R	QQ-S-571 SN60	SOLDER	30
A/R	A/R	QQ-S-571 SN10	SOLDER	29
1	1	1010490-054	INSULATION SLEEVING ELEC HEAT SHRINK	28
14	14	1006776-14	INSULATION, SLEEVING ELEC 5/16 LONG	27
64	64	1006776-18	INSULATION, SLEEVING ELEC 5/16 LONG	26
1	1	1010416-10	WIRE, AWG 28E WHITE 10" LONG	25
1	1	1010416-1	WIRE, AWG 28E BLACK 14" LONG	24
2	2	1000020-6	SHIELD AND GROUND ASSY	23
~~2~~	~~2~~	~~1000020-4~~	~~SHIELD AND GROUND ASSY~~	~~22~~
2	2	1010917-106	CONN ELEC RECEPT 26 PIN	21
2	2	1010917-806	CONN ELEC PLUG 26 PIN	20
4	4	1010891-12	SCREW, BUT. HD SELF LKG SOC SPLINE	19
2	2	1010867-32	SCREW, FLAT HD SELF LKG SOC SPLINE	18
2	2	1010867-12	SCREW, FLAT HD SELF LKG SOC SPLINE	17
4	4	1010867-17	SCREW, FLAT HD SELF LKG SOC SPLINE	16
6	6	1001488-2	SCREW, HEX SOC HD SELF-LOCKING.	15
6	6	1001488-18	SCREW, HEX SOC HD SELF-LOCKING	14
6	6	1001489-22	SCREW, HEX SOC HD	13
6	6	2018745	CLIP, RETAINER TORQUE MOTOR I.& M.A.	12
4	4	MS15795-703	WASHER, FLAT, METAL, ROUND	11
2	2	1000100-1	TERMINAL INSULATED	10
1	1	2018621	BALL BEARING DUPLEX	9
2	2	2018731	CLIP, WIRE RETAINER	8
1	1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
~~1~~	~~1~~	~~2018783~~	~~WIRE GUIDE BRG HSG T. M. M.A.~~	~~6~~
1	1	2018753	PLATE, BRG RETAINER TORQUE MOT M.A.	5
1	1	2018624	SLIP RING 40 CONTACT	4
1	1	2018623	MOTOR, TORQUE DC FRAMELESS	3
1	1	2018748	SHAFT, STUB TORQUE MOTOR M.A.	2
1	1	2018749	HOUSING, BRG TORQUE MOTOR M.A.	1
021	011	LIST OF MATERIALS		

2018603	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	MIT INSTRUMENTATION LAB Cambridge, Mass. DWG. NO. CONTRACT DRAWN RW Carpenter DATE 6-8-64 CHECKED G. QUINN 3-2-65 APPROVAL 8 Mar 65 APPROVAL NASA APPROVAL W J Rhine 3-9-65 MIT APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS INTER GIMBAL SUB ASSEMBLY TORQUE MOTOR END MIDDLE AXIS
NEXT ASSY	USED ON			CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018610
APPLICATION				SCALE 2-1 WT SHEET 1 OF 7

2018610

2018610	REV SHEET J 1

2/-2018610

TDRR 17167 MAR 6 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
17				22					
17A		SHLD-17				E15			
17-1		P8-D	17Y	26		SR4-29			
17-2		P3-E	17Y	26		SR4-30			
17-3		P8-F	17Y	26		SR4-31			
18		P8-H	17Y	26		SR4-32			
19		P8-J	17Y	26		SR4-33			
20		P8-K	17Y	26		SR4-34			
21-1		P8-L	17Y	26		SR4-35			
21-2		P8-M	17Y	26		SR4-36			
22-1		P8-N	17Y	26		SR4-37			
22-2		P8-P	17Y	26		SR4-38			
23-1		P8-R	17Y	26		SR4-39			
23-2		P8-S	17Y	26		SR4-40			
24	24	P8-T	17Y	26		B5-1	25Y		
25	25	P8-U	17Y	26		B5-2	25Y		
26		B5-BLK				B5-1	25Y		
27		B5-WHT				B5-2	25Y		

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2018610
SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
1		P6-A	17Y	26		SR4-1			
2				22					
2-A		SHLD-2				E13			
2-1		P6-B	17Y	27		SR4-2			
2-2		P6-C	17Y	27		SR4-3			
2-3		P6-D	17Y	27		SR4-4			
2-4		P6-E	17Y	27		SR4-5			
2-5		P6-W	17Y	27		SR4-19			
2-6		P6-X	17Y	27		SR4-20			
3-1		P6-F	17Y	27		SR4-6			
3-2		P6-F	17Y			SR4-7			
3-3		P6-J	17Y	27		SR4-8			
3-4		P6-J	17Y			SR4-9			
4		P6-L	17Y	26		SR4-10			
5		P6-M	17Y	26		SR4-11			
6		P6-N	17Y	26		SR4-12			

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SHEET 2 of 7

TDRR 17167 MAR 6 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
28		J12-A	17Y	26		SR4-26			
29		J12-B	17Y	26		SR4-27			
30		J12-C	17Y	26		SR4-28			
31				23					
31A		SHLD-31				E18			
31-1		J12-D	17Y	26		SR4-29			
31-2		J12-E	17Y	26		SR4-30			
31-3		J12-F	17Y	26		SR4-31			
32		J12-H	17Y	26		SR4-32			
33		J12-J	17Y	26		SR4-33			
34		J12-K	17Y	26		SR434			
35-1		J12-L	17Y	26		SR4-35			
35-2		J12-M	17Y	26		SR4-36			
36-1		J12-N	17Y	26		SR4-37			
36-2		J12-P	17Y	26		SR4-38			
37-1		J12-R	17Y	26		SR4-39			
37-2		J12-S	17Y	26		SR4-40			

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SHEET 5 of 7

TDRR 17167. MAR 6 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
7		P6-P	17Y	26		SR4-13			
8-1		P6-R	17Y	26		SR4-14			
8-2		P6-S	17Y	26		SR4-15			
9		P6-T	17Y	26		SR4-16			
10-1		P6-U	17Y	26		SR4-17			
10-2		P6-V	17Y	26		SR4-18			
11	33	P6-C	17Y			P6-W	17Y		
12	24	P6-E	17Y			P6-X	17Y		
13-1		P6-Y	17Y	26		SR4-21			
13-2		P6-Z	17Y	26		SR4-22			
13-3		P6-a	17Y	26		SR4-23			
13-4		P6-b	17Y	26		SR4-24			
13-5		P6-c	17Y	26		SR4-25			
14		P8-A	17Y	26		SR4-26			
15		P8-B	17Y	26		SR4-27			
16		P3-C	17Y	26		SR4-28			

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NASA DRAWING NO. 2018610
SHEET 6 of 7

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET T/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET T/N	TERMINATION SPEC FIND NO.	NO.
38-1		J12-X	17Y	26		SR4-21			
38-2		J12-Z	17Y	26		SR4-22			
38-3		J12-a	17Y	26		SR4-23			
38-4		J12-b	17Y	26		SR4-24			
38-5		J12-c	17Y	26		SR4-25			
39		J11-A	17Y	26		SR4-1			
40				23					
40A		SHLD-40				E16			
40-1		J11-B	17Y	27		SR4-2			
40-2		J11-C	17Y	27		SR4-3			
40-3		J11-D	17Y	27		SR4-4			
40-4		J11-E	17Y	27		SR4-5			
40-5		J11-W	17Y	26		SR4-19			
40-6		J11-X	17Y	26		SR4-20			
41-1		J11-F	17Y	27		SR4-6			
41-2		J11-F	17Y			SR4-7			
41-3		J11-J	17Y	27		SR4-8			
41-4		J11-J	17Y			SR4-9			

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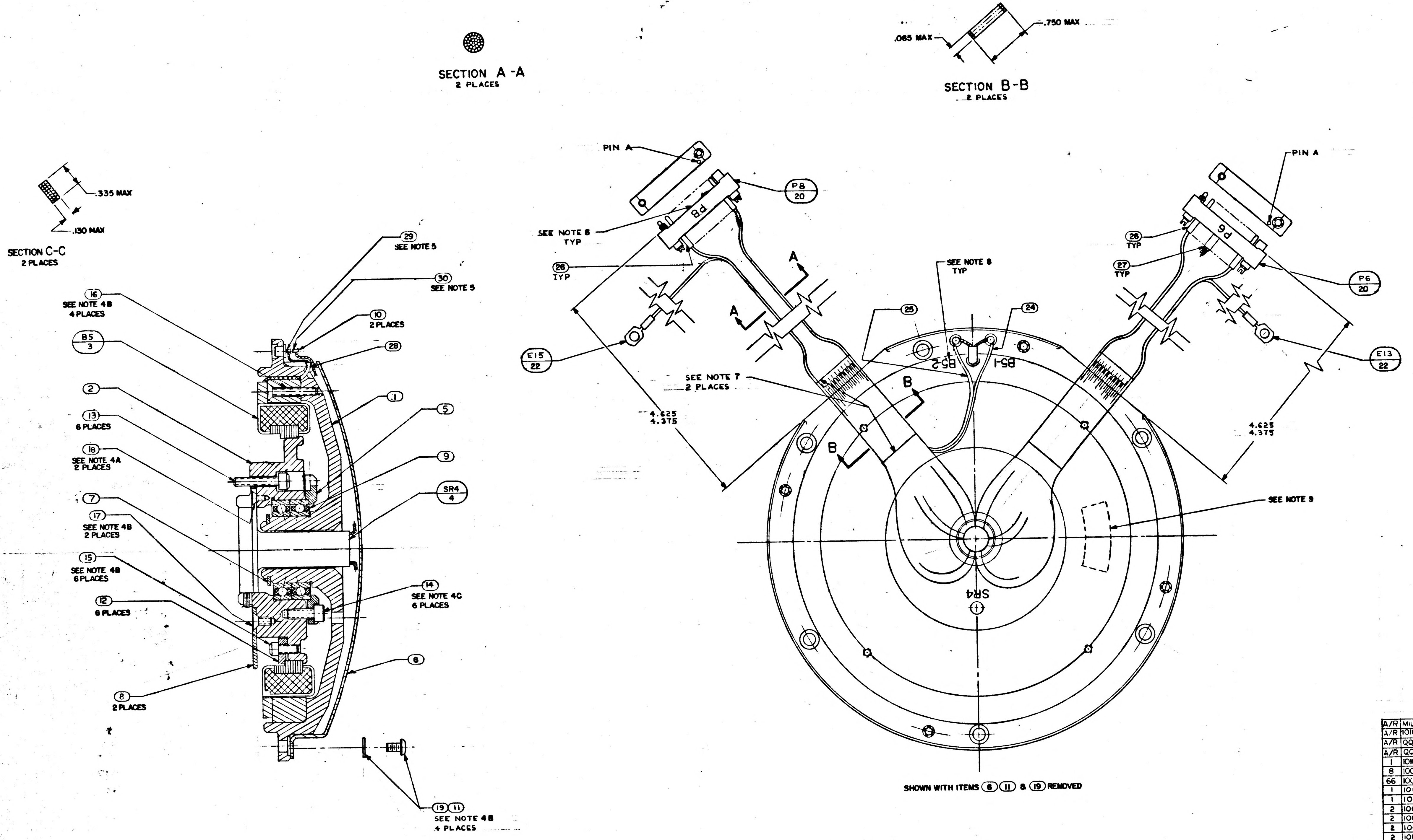
NASA DRAWING NO. 2018610
SHEET 7 of 7

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET T/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET T/N	TERMINATION SPEC FIND NO.	NO.
42		J11-L	17Y	26		SR4-10			
43		J11-M	17Y	26		SR4-11			
44		J11-N	17Y	26		SR4-12			
45		J11-P	17Y	26		SR4-13			
46-1		J11-R	17Y	26		SR4-14			
46-2		J11-S	17Y	26		SR4-15			
47		J11-T	17Y	26		SR4-16			
48-1		J11-U	17Y	26		SR4-17			
48-2		J11-V	17Y	26		SR4-18			
49	33	J11-B	17Y			J11-C	17Y		
50	24	J11-D	17Y			J11-E	17Y		

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 17167		



SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
.065 MAX
.750 MAX
SECTION C-C
2 PLACES
.335 MAX
.130 MAX
29 SEE NOTE 5
30 SEE NOTE 5
10 2 PLACES
28
16 SEE NOTE 4B 4 PLACES
B5 3
1
5
2
13 6 PLACES
9
18 SEE NOTE 4A 2 PLACES
SR4 4
7
17 SEE NOTE 4B 2 PLACES
15 SEE NOTE 4B 6 PLACES
14 SEE NOTE 4C 6 PLACES
12 6 PLACES
6
8 2 PLACES
19 11 SEE NOTE 4B 4 PLACES
PIN A
P8 20
SEE NOTE 8 TYP
26 TYP
27 TYP
P6 20
E15 22
E13 22
SEE NOTE 8 TYP
25
24
A
B
SEE NOTE 7 2 PLACES
4.625
4.375
SEE NOTE 9
B5-2
B5-1
SR4
P8
P6

SHOWN WITH ITEMS ⑥ ⑪ & ⑲ REMOVED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
A/R	1010870	GREASE LUBRICATING	31
A/R	QQ-S-571 SN60	SOLDER	30
A/R	QQ-S-571 SN10	SOLDER	29
1	1010490-054	INSULATION SLEEVING ELEC HEAT SHRINK	28
8	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	27
66	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	26
1	1010416-10	WIRE, AWG 28E WHITE 10" LONG	25
1	1010416-1	WIRE, AWG 28E BLACK 10" LONG	24
2	1000020-6	SHIELD AND GROUND ASSY	23
2	1000020-4	SHIELD AND GROUND ASSY	22
2	1000122	CONN ELEC RECEPT 26 PIN	21
2	1000123	CONN ELEC PLUG 26 PIN	20
4	1010891-12	SCREW, BUT. HD SELF LKG SOC SPLINE	19
2	1010867-2	SCREW, FLAT HD SELF LKG SOC SPLINE	18
2	1010867-12	SCREW, FLAT HD SELF LKG SOC SPLINE	17
4	1010867-17	SCREW, FLAT HD SELF LKG SOC SPLINE	16
6	1001488-2	SCREW, HEX SOC HD SELF-LOCKING.	15
6	1001488-18	SCREW, HEX SOC HD SELF-LOCKING	14
6	1001489-22	SCREW HEX SOC HD	13
6	2018745	CLIP, RETAINER TORQUE MOTOR L & M.A.	12
4	MS15795-703	WASHER, FLAT, METAL, ROUND	11
2	1000100-1	TERMINAL INSULATED	10
1	2018621	BALL BEARING DUPLEX	9
2	2018731	CLIP, WIRE RETAINER	8
1	MS 16624-4075	RING, RETAINING EXTERNAL BASIC	7
1	2018783	WIRE GUIDE BRG HSG T. M. M. A.	6
1	2018753	PLATE, BRG RETAINER TORQUE MOT. M.A.	5
1	2018624	SLIP RING 4C CONTACT	4
1	2018623	MOTOR, TORQUE DC FRAMELESS	3
1	2018748	SHAFT, STUB TORQUE MOTOR M.A.	2
1	2018749	HOUSING, BRG TORQUE MOTOR M.A.	1

011 LIST OF MATERIALS

2018603	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DRAWN Bud Cuomo DATE 6-8-64 CHECKED G. QUINN 3-2-65 APPROVAL 8 Mar 65 APPROVAL NASA APPROVAL W J Rhine 3-8-65 MIT APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS INTER GIMBAL SUB ASSEMBLY TORQUE MOTOR END MIDDLE AXIS	CODE IDENT NO. SIZE J NASA DRAWING NO. 2018610 SCALE 2-1 WT SHEET 1 OF 7
NEXT ASSY	USED ON				
APPLICATION					

2018610

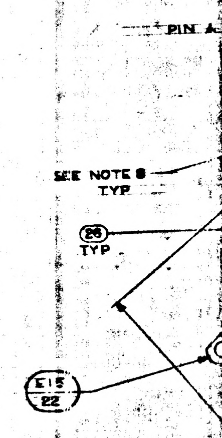
2018610	REV	SHEET 1

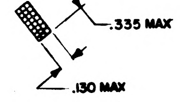
E-2

NOTES:

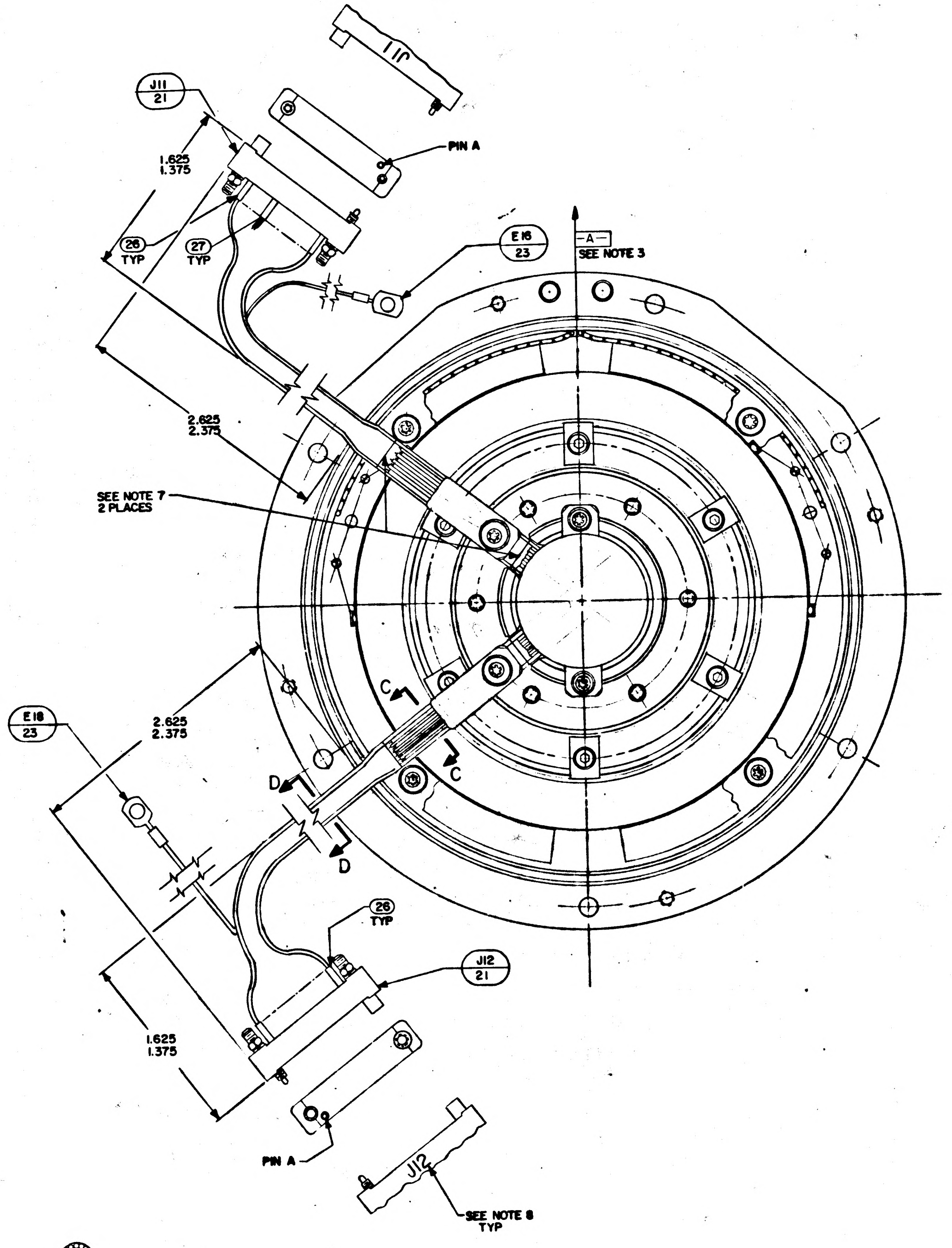
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS 2007203
3. ECCENTRICITY MARKS ON BOTH RACES OF ⑨ TO BE ALIGNED WITHIN ±5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① & ② ARE IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉛ TO INSIDE DIAMETER OF ⑨ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
5. SOLDER LEADS FROM ③ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉙. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ㉑ & ㉒ PER ND 1002071 USING ㉚
6. HEAT SHRINK SLEEVING ON ㉒ & ㉓ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ③ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ③
12. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NUMBERS SHALL BE TWISTED OR TWISTED & SHIELDED WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (15-1, 15-2, 15-3) AND (29-1, 29-2, 29-3) WHICH SHALL BE SHIELDED BUT NOT TWISTED. TWIST PER ND 1002032
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEET 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"

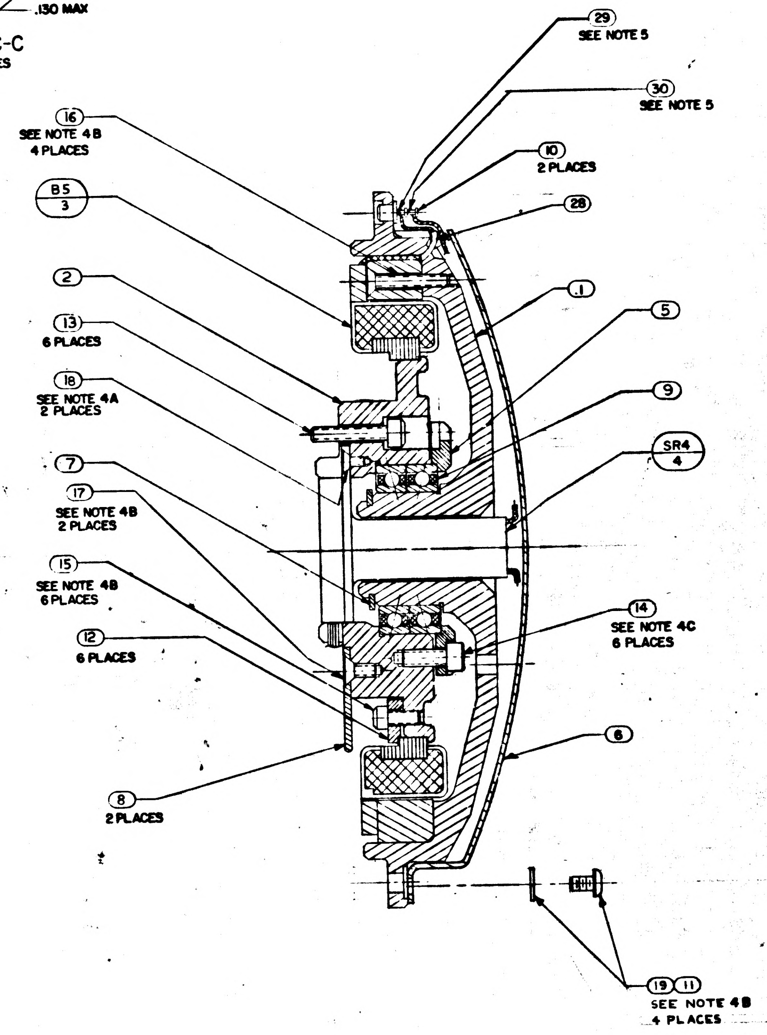
SECTION A-A
2 PLACES

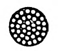

PIN A
SEE NOTE 8
TYP
26
TYP
E15
22


.335 MAX
.130 MAX

SECTION C-C
2 PLACES


J11
J11
21
PIN A
1.625
1.375
26
TYP
27
TYP
E16
23
-A-
SEE NOTE 3
2.625
2.375
SEE NOTE 7
2 PLACES
C
C
E18
23
2.625
2.375
D
D
26
TYP
J12
21
1.625
1.375
PIN A
J12
SEE NOTE 8
TYP


29
SEE NOTE 5
30
SEE NOTE 5
16
SEE NOTE 4B
4 PLACES
10
2 PLACES
B5
3
28
2
1
13
6 PLACES
5
18
SEE NOTE 4A
2 PLACES
9
7
SR4
4
17
SEE NOTE 4B
2 PLACES
15
SEE NOTE 4B
6 PLACES
14
SEE NOTE 4C
6 PLACES
12
6 PLACES
6
8
2 PLACES
19
11
SEE NOTE 4B
4 PLACES



SECTION D-D
2 PLACES

JH

2018610	REV	SHEET
		1

TDRR 17167 MAR 6 1965

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NASA DRAWING NO.
2018610
SHEET 4 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	FROM T I N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TO T I N	TO TERMINATION SPEC FIND NO.
17				22			
17A		SHLD-17			E15		
17-1		P8-D	13Y	26	SR4-29		
17-2		P3-E	13Y	26	SR4-30		
17-3		P8-F	13Y	26	SR4-31		
18		P8-H	13Y	26	SR4-32		
19		P8-J	13Y	26	SR4-33		
20		P8-K	13Y	26	SR4-34		
21-1		P8-L	13Y	26	SR4-35		
21-2		P8-M	13Y	26	SR4-36		
22-1		P8-N	13Y	26	SR4-37		
22-2		P8-P	13Y	26	SR4-38		
23-1		P8-R	13Y	26	SR4-39		
23-2		P8-S	13Y	26	SR4-40		
24	24	P8-T	13Y	26	B5-1	13Y	
25	25	P8-U	13Y	26	B5-2	13Y	
26		B5-BLK			B5-1	13Y	
27		B5-WHT			B5-2	13Y	

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NASA DRAWING NO.
2018610
SHEET 2 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	FROM T I N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TO T I N	TO TERMINATION SPEC FIND NO.
1		P6-A	13Y	26	SR4-1		
2				22			
2-A		SHLD-2			E13		
2-1		P6-B	13Y	27	SR4-2		
2-2		P6-B	13Y		SR4-3		
2-3		P6-D	13Y	27	SR4-4		
2-4		P6-D	13Y		SR4-5		
3-1		P6-F	13Y	27	SR4-6		
3-2		P6-F	13Y		SR4-7		
3-3		P6-J	13Y	27	SR4-8		
3-4		P6-J	13Y		SR4-9		
4		P6-L	13Y	26	SR4-10		
5		P6-M	13Y	26	SR4-11		
6		P6-N	13Y	26	SR4-12		

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NASA DRAWING NO.
2018610
SHEET 5 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	FROM T I N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TO T I N	TO TERMINATION SPEC FIND NO.
28		J12-A	13Y	26	SR4-26		
29		J12-B	13Y	26	SR4-27		
30		J12-C	13Y	26	SR4-28		
31				23			
31A		SHLD-31			E18		
31-1		J12-D	13Y	26	SR4-29		
31-2		J12-E	13Y	26	SR4-30		
31-3		J12-F	13Y	26	SR4-31		
32		J12-H	13Y	26	SR4-32		
33		J12-J	13Y	26	SR4-33		
34		J12-K	13Y	26	SR434		
35-1		J12-L	13Y	26	SR4-35		
35-2		J12-M	13Y	26	SR4-36		
36-1		J12-N	13Y	26	SR4-37		
36-2		J12-P	13Y	26	SR4-38		
37-1		J12-R	13Y	26	SR4-39		
37-2		J12-S	13Y	26	SR4-40		

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—

NASA DRAWING NO.
2018610
SHEET 3 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	FROM T I N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TO T I N	TO TERMINATION SPEC FIND NO.
7		P6-P	13Y	26	SR4-13		
8-1		P6-R	13Y	26	SR4-14		
8-2		P6-S	13Y	26	SR4-15		
9		P6-T	13Y	26	SR4-16		
10-1		P6-U	13Y	26	SR4-17		
10-2		P6-V	13Y	26	SR4-18		
11		P6-W	13Y	26	SR4-19		
12		P6-X	13Y	26	SR4-20		
13-1		P6-Y	13Y	26	SR4-21		
13-2		P6-Z	13Y	26	SR4-22		
13-3		P6-a	13Y	26	SR4-23		
13-4		P6-b	13Y	26	SR4-24		
13-5		P6-c	13Y	26	SR4-25		
14		P8-A	13Y	26	SR4-26		
15		P8-B	13Y	26	SR4-27		
16		P8-C	13Y	26	SR4-28		

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NASA DRAWING NO. 2018610
SHEET 6 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	FROM: STRIP	FROM: T/N	FROM: TERMINATION FIND NO.	FROM: SPEC NO.	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TO: T/N	TO: TERMINATION FIND NO.	TO: SPEC NO.
38-1			J12-X	13	Y	26		SR4-21			
38-2			J12-Z	13	Y	26		SR4-22			
38-3			J12-a	13	Y	26		SR4-23			
38-4			J12-b	13	Y	26		SR4-24			
38-5			J12-c	13	Y	26		SR4-25			
39			J11-A	13	Y	26		SR4-1			
40						23					
40A			SHLD-40					E16			
40-1			J11-B	13	Y	27		SR4-2			
40-2			J11-B	13	Y			SR4-3			
40-3			J11-D	13	Y	27		SR4-4			
40-4			J11-D	13	Y			SR4-5			
41-1			J11-F	13	Y	27		SR4-6			
41-2			J11-F	13	Y			SR4-7			
41-3			J11-J	13	Y	27		SR4-8			
41-4			J11-J	13	Y			SR4-9			

TDRR 17167 MAR 6 1965

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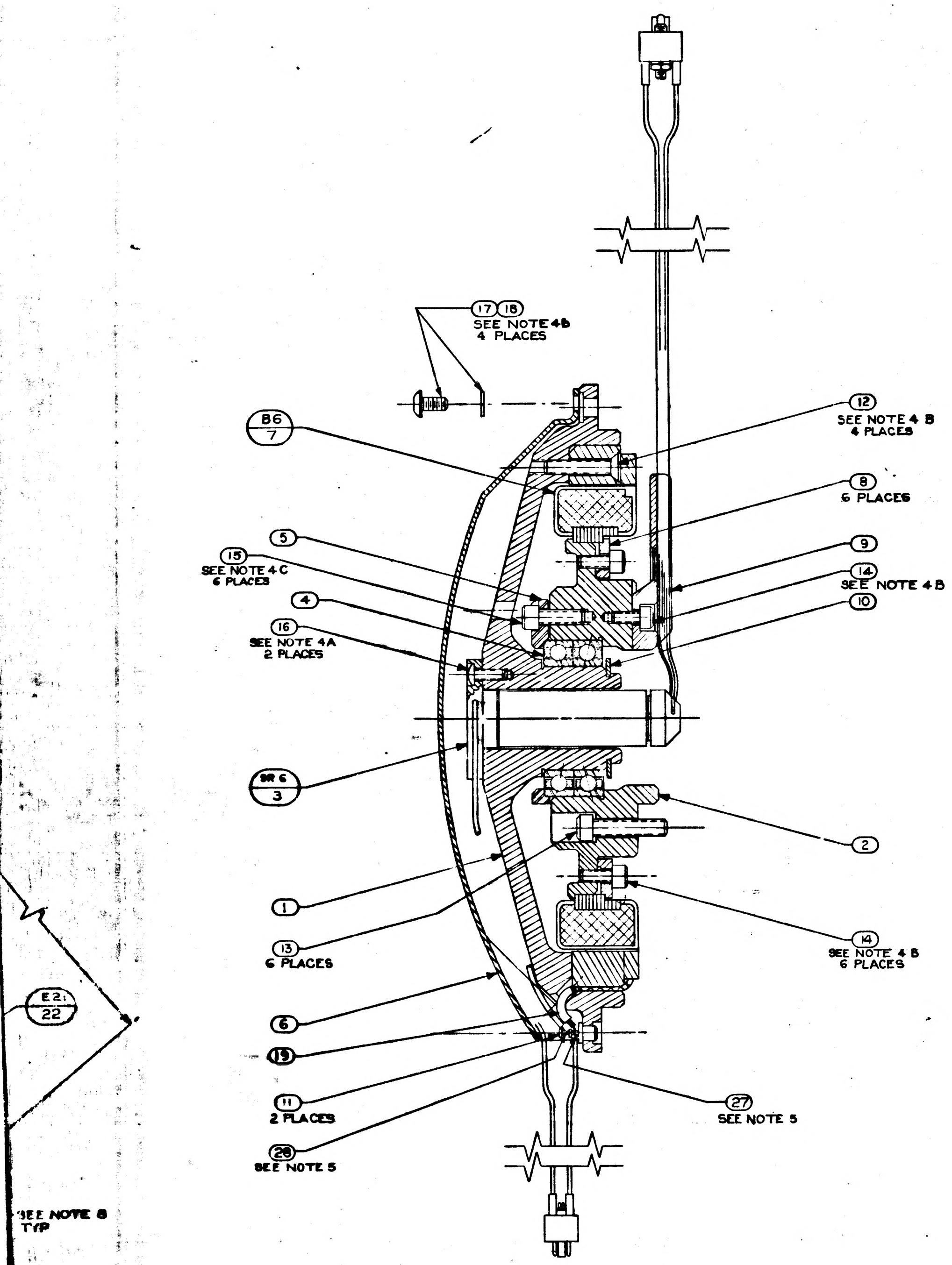
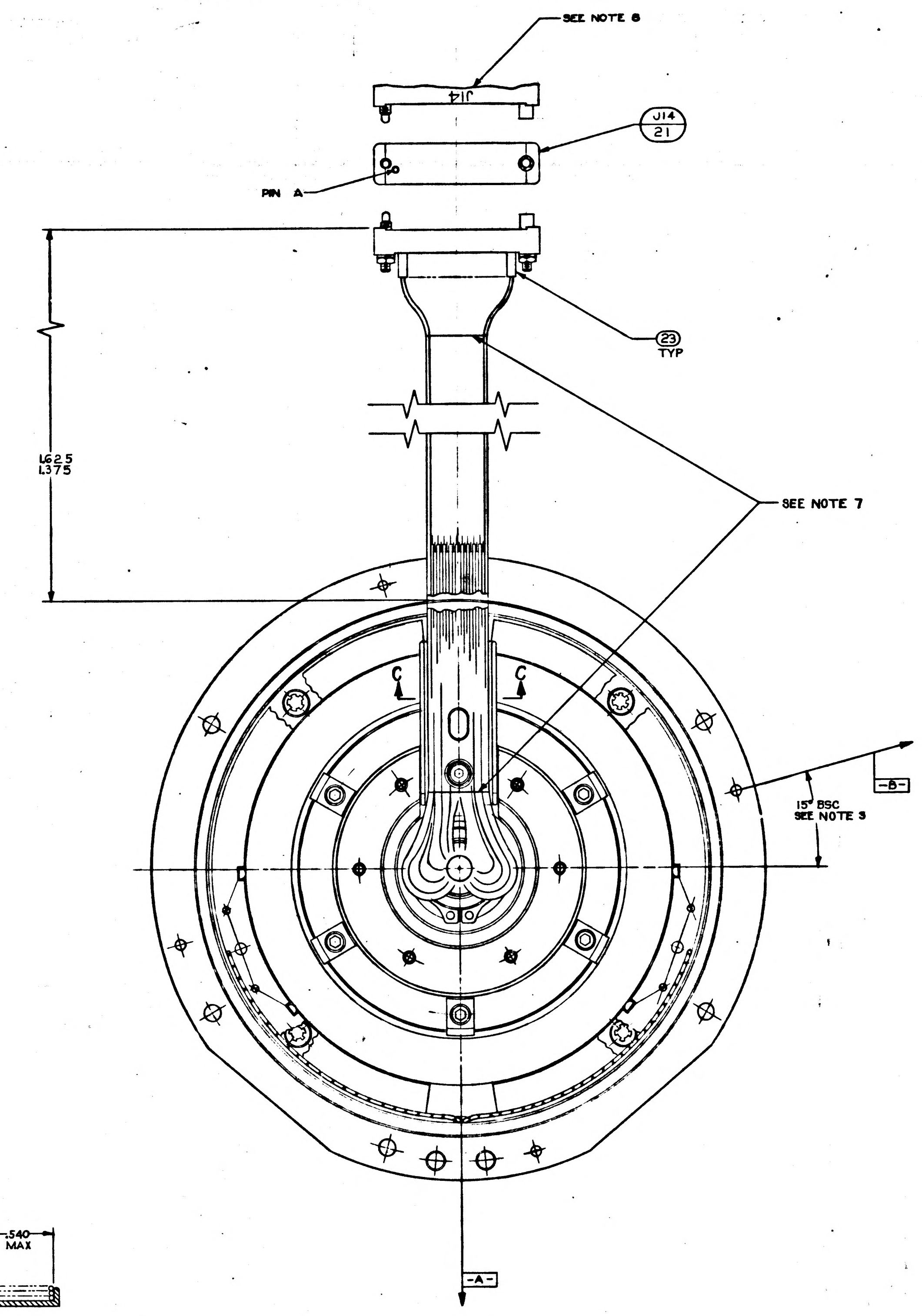
REVISION —

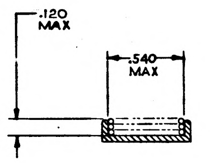
NASA DRAWING NO. 2018610
SHEET 7 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	FROM: STRIP	FROM: T/N	FROM: TERMINATION FIND NO.	FROM: SPEC NO.	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TO: T/N	TO: TERMINATION FIND NO.	TO: SPEC NO.
42			J11-L	13	Y	26		SR4-10			
43			J11-M	13	Y	26		SR4-11			
44			J11-N	13	Y	26		SR4-12			
45			J11-P	13	Y	26		SR4-13			
46-1			J11-R	13	Y	26		SR4-14			
46-2			J11-S	13	Y	26		SR4-15			
47			J11-T	13	Y	26		SR4-16			
48-1			J11-U	13	Y	26		SR4-17			
48-2			J11-V	13	Y	26		SR4-18			
49			J11-W	13	Y	26		SR4-19			
50			J11-X	13	Y	26		SR4-20			

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 1683		
A	REVISED TDRR 17687		


17 18
SEE NOTE 4B
4 PLACES
BB 6
7
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
5
15
SEE NOTE 4 C
6 PLACES
9
14
SEE NOTE 4 B
4
10
16
SEE NOTE 4A
2 PLACES
BR 6
3
2
1
13
6 PLACES
14
SEE NOTE 4 B
6 PLACES
6
19
11
2 PLACES
27
SEE NOTE 5
26
SEE NOTE 5
E21
22
SEE NOTE 8
TYP


SEE NOTE 8
J14
J14
21
PIN A
23
TYP
1.625
1.375
SEE NOTE 7
C
C
-B-
15° BSC
SEE NOTE 3
-A-


.120
MAX
.540
MAX

SECTION C-C

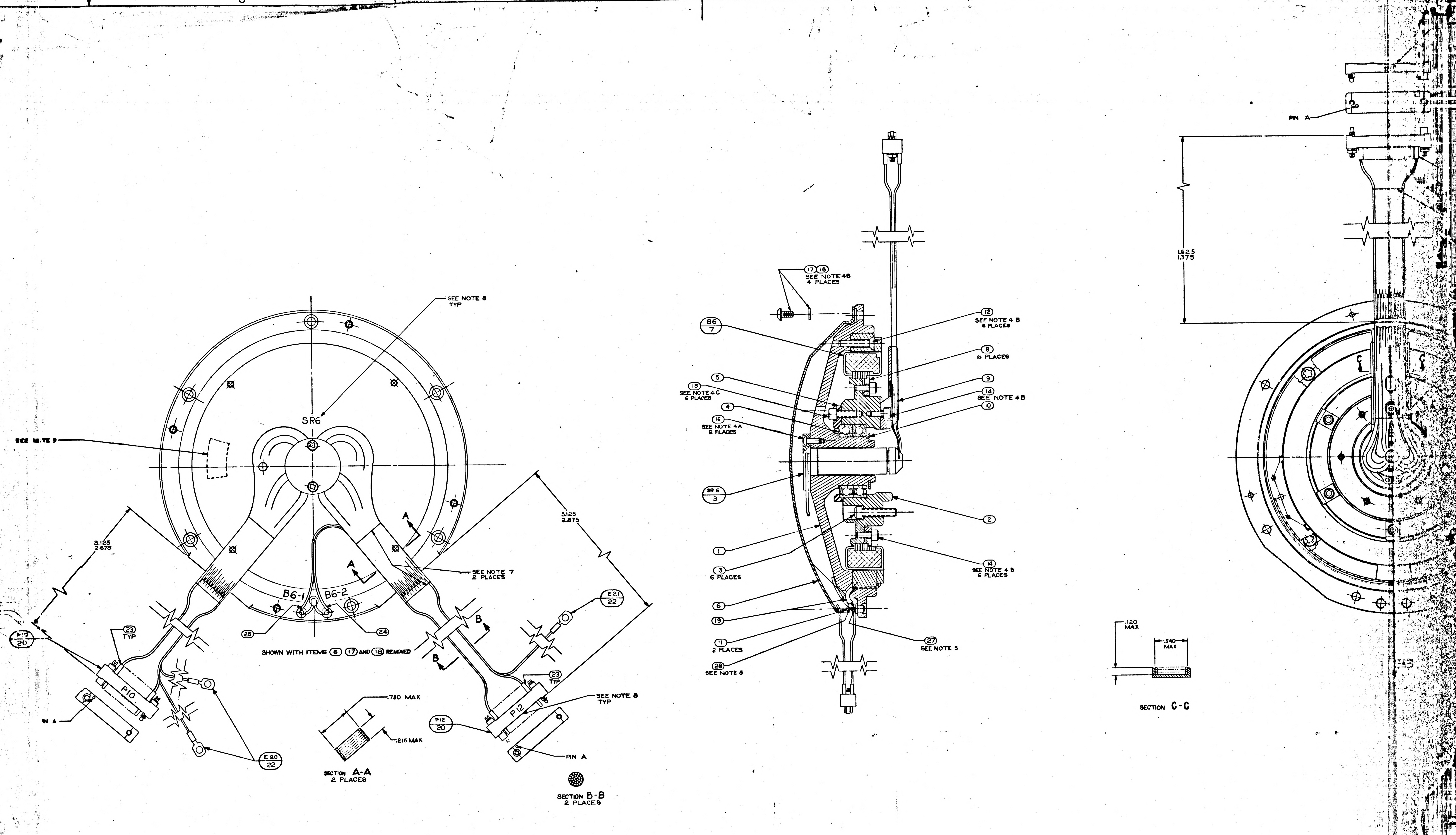
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	29
A/R	QQ-S-571 SN60	SOLDER	28
A/R	QQ-S-571 SN10	SOLDER	27
A/R	1010870	GREASE, LUBRICATING	26
1	1010416-1	WIRE, AWG 28E BLACK 8" LONG	25
1	1010416-10	WIRE, AWG 28E WHITE 8" LONG	24
82	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	23
3	1000020-4	SHIELD AND GROUND ASS'Y	22
1	1010813-1	CONN ELEC RECEPT 44 PIN	21
2	1000123	CONN ELEC PLUG 26 PIN	20
1	1010490-054	INSULATION SLEEVING, ELEC HEAT SHRINK	19
4	MS15795-703	WASHER, FLAT, METAL, ROUND	18
4	1010891-12	SCREW BUTTON HD SELF LKG SOC SPLINE	17
2	1010891-2	SCREW BUTTON HD SELF LKG SOC SPLINE	16
6	1001488-18	SCREW HEX SOC HD SELF-LOCKING	15
7	1001488-2	SCREW HEX SOC HD SELF-LOCKING	14
6	1001489-22	SCREW HEX SOC HD	13
4	1010867-17	SCREW FLAT HD SELF LOCKING SOC SPLINE	12
2	1000100-1	TERMINAL INSULATED	11
1	MS-16624-4075	RING RETAINING EXTERNAL BASIC	10
1	2018715	RETAINER WIRE INNER AXIS	9
6	2018745	CLIP RETAINER TORQUE MOTOR INNER AXIS	8
1	2018623	MOTOR TORQUE DC FRAMELESS	7
1	2018781	WIRE GUIDE BRG HSG T.M. I.A.	6
1	2018747	PLATE BEARING RETAINER T.M. I.A.	5
1	2018621	BALL BEARING DUPLEX	4
1	2018634	SLIP RING ASS'Y ELEC 40 CONTACT	3
1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS	2
1	2018746	HOUSING, BEARING TORQUE MOTOR I.A.	1
011	LIST OF MATERIALS		

2013604	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DRAWN L. Morse DATE 6-8-64 CHECKED G. QUINN 2-17-65 APPROVAL APPROVAL NASA APPROVAL MIT APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS INTER-GIMBAL SUB-ASSEMBLY TORQUE MOTOR INNER AXIS
NEXT ASSY	USED ON			CODE IDENT NO. SIZE J NASA DRAWING NO. 2018611
APPLICATION				SCALE 2/1 WT SHEET 1 OF 7

2018611 REV A SHEET 1

F3

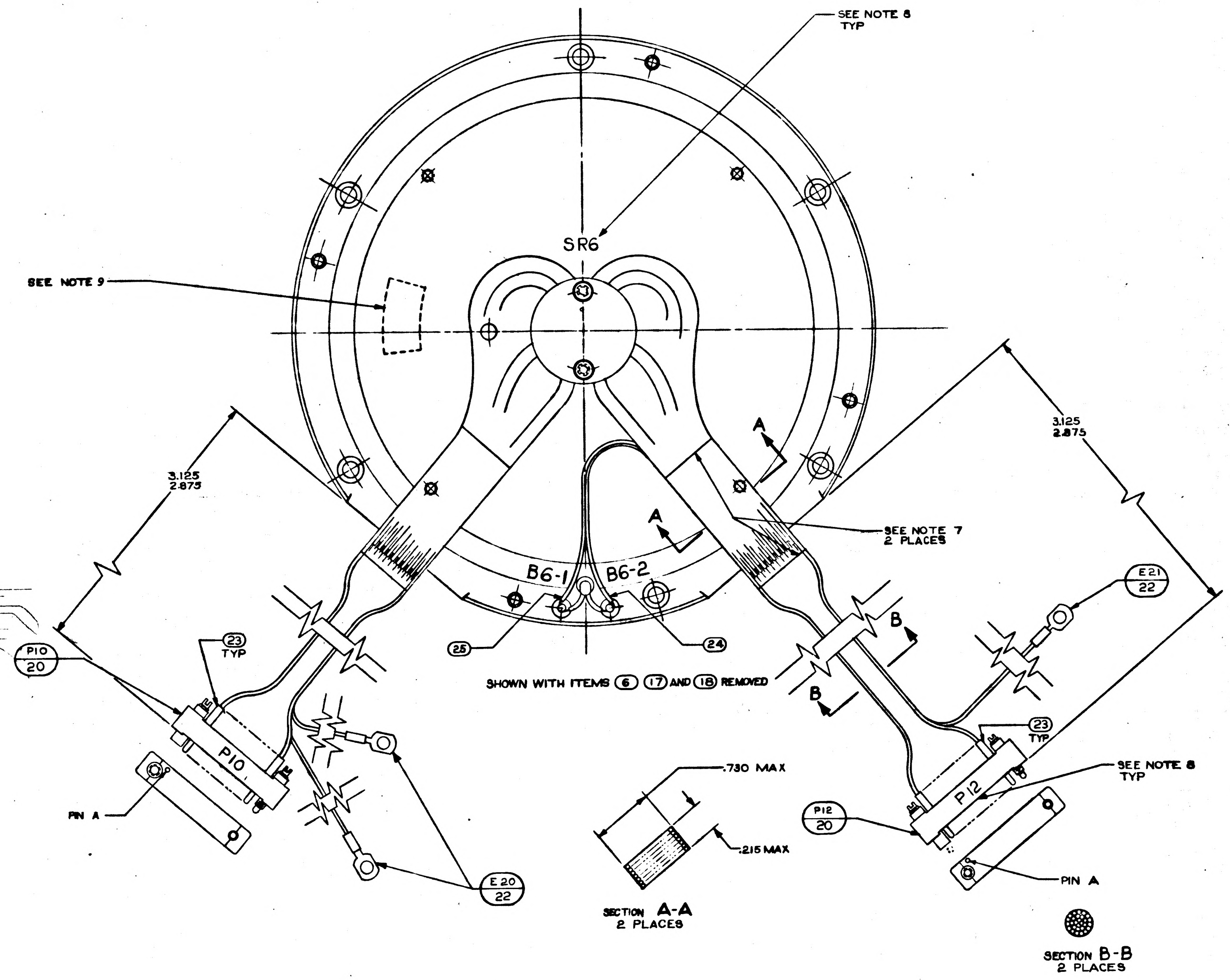
1/34

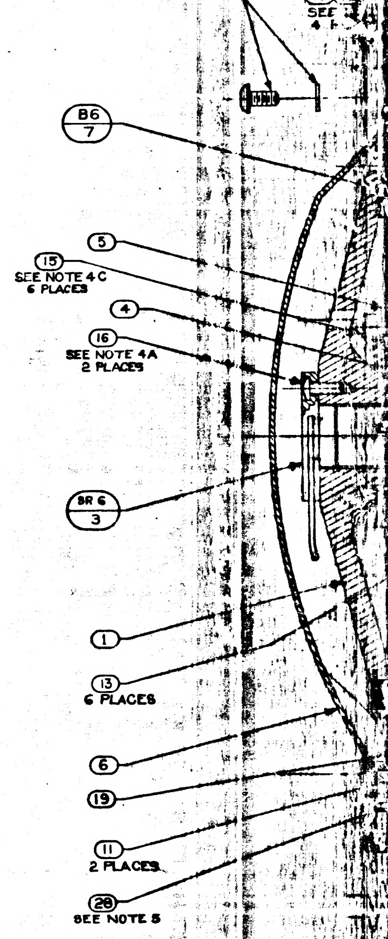

SEE NOTE 8
TYP
SR6
SEE NOTE 9
3.125
2.875
3.125
2.875
A
A
SEE NOTE 7
2 PLACES
B6-1
B6-2
25
24
E21
22
B
B
P10
20
23
TYP
P10
PIN A
E20
22
SHOWN WITH ITEMS 6 17 AND 18 REMOVED
.730 MAX
.215 MAX
SECTION A-A
2 PLACES
P12
20
P12
23
TYP
SEE NOTE 8
TYP
PIN A
SECTION B-B
2 PLACES
17 18
SEE NOTE 4B
4 PLACES
B6
7
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
5
9
15
SEE NOTE 4 C
6 PLACES
14
SEE NOTE 4 B
10
4
16
SEE NOTE 4A
2 PLACES
SR 6
3
2
1
13
6 PLACES
14
SEE NOTE 4 B
6 PLACES
6
19
11
2 PLACES
27
SEE NOTE 5
28
SEE NOTE 5
PIN A
1.625
1.375
C
C
.120
MAX
.540
MAX
SECTION C-C

2018611	REV A	SHEET 1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE AND TEST PER THE REQUIREMENTS OF PS 2007203
3. ECCENTRICITY MARKS ON THE OUTER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ② IS IN THE POSITION SHOWN
   THE ECCENTRICITY MARKS ON THE INNER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-B-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① IS ~~IN~~ THE POSITION SHOWN
   APPLY A THIN COAT OF ㉖ TO INSIDE DIAMETER OF ④ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ⑦ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉗ SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑳ AND ㉑ PER ND1002071 USING ㉘ WIRE INSULATION SHALL BE WITHIN .06 OF SOLDERED CONNECTION
6. HEAT SHRINK SLEEVING ON ㉒ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1062032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ⑦ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ⑦
12. YES OR NO IN TINNED COLUMN OF SHEETS 2 THRU INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NO. SHALL BE TWISTED TOGETHER PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3) & (15-1, 15-2, 15-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"


SEE NOTE 8
TYP
SR6
SEE NOTE 9
3.125
2.875
3.125
2.875
A
A
B6-1
B6-2
SEE NOTE 7
2 PLACES
E21
22
B
B
P10
20
23
TYP
P10
PIN A
25
24
SHOWN WITH ITEMS 6 17 AND 18 REMOVED
E20
22
.730 MAX
.215 MAX
SECTION A-A
2 PLACES
23
TYP
P12
P12
20
SEE NOTE 8
TYP
PIN A
SECTION B-B
2 PLACES


17
SEE
4
B6
7
5
15
SEE NOTE 4 C
6 PLACES
4
16
SEE NOTE 4 A
2 PLACES
BR 6
3
1
13
6 PLACES
6
19
11
2 PLACES
28
SEE NOTE 5

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NASA DRAWING NO.
201861 1
SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
1				22					
1-A		SHLD-1				E20			
1-1		P10-A	13Y	23		SR6-1			
1-2		P10-B	13Y	23		SR6-2			
1-3		P10-C	13Y	23		SR6-3			
2		P10-D	13Y	23		SR6-4			
3		P10-E	13Y	23		SR6-5			
4-1		P10-F	13Y	23		SR6-6			
4-2		P10-H	13Y	23		SR6-7			
5-1		P10-J	13Y	23		SR6-8			
5-2		P10-K	13Y	23		SR6-9			
6-1		P10-L	13Y	23		SR6-10			
6-2		P10-M	13Y	23		SR6-11			
7				22					
7-A		SHLD-7				E20			
7-1		P10-N	13Y	23		SR6-12			
7-2		P10-P	13Y	23		SR6-13			
7-3		P10-R	13Y	23		SR6-14			

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NASA DRAWING NO.
201861 1
SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
8		P10-S	13Y	23		SR6-15			
9		P10-T	13Y	23		SR6-16			
10-1		P10-U	13Y	23		SR6-17			
10-2		P10-V	13Y	23		SR6-18			
11-1		P10-W	13Y	23		SR6-19			
11-2		P10-X	13Y	23		SR6-20			
12		P12-A	13Y	23		SR6-26			
13		P12-B	13Y	23		SR6-27			
14		P12-C	13Y	23		SR6-28			
15				23					
15-A		SHLD-15		23		E21			
15-1		P12-D	13Y	23		SR6-29			
15-2		P12-E	13Y	23		SR6-30			
15-3		P12-F	13Y	23		SR6-31			
16		P12-H	13Y	23		SR6-32			
17		P12-J	13Y	23		SR6-33			
18		P12-K	13Y	23		SR6-34			

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NASA DRAWING NO.
201861 1
SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
19-1		P12-L	13Y	23		SR6-35			
19-2		P12-M	13Y	23		SR6-36			
20-1		P12-N	13Y	23		SR6-37			
20-2		P12-P	13Y	23		SR6-38			
21	25	P12-R	13Y	23		B6-1	13Y		
22	24	P12-S	13Y	23		B6-2	13Y		
23		B6-BLK				B6-1	13Y		
24		B6-WHT				B6-2	13Y		
25		P12-T	13Y	23		SR6-39			
26		P12-U	13Y	23		SR6-40			
27-1		p12-Y	13Y	23		SR6-21			
27-2		P12-Z	13Y	23		SR6-22			
27-3		P12-a	13Y	23		SR6-23			
27-4		P12-b	13Y	23		SR6-24			
27-5		P12-c	13Y	23		SR6-25			

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NASA DRAWING NO.
201861 1
SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
28		J14-A	13Y	23		SR6-1			
29		J14-B	13Y	23		SR6-2			
30		J13-C	13Y	23		SR6-3			
31		J14-D	13Y	23		SR6-4			
32		J14-E	13Y	23		SR6-5			
33-1		J14-F	13Y	23		SR6-6			
33-2		J14-H	13Y	23		SR6-7			
34-1		J14-J	13Y	23		SR6-8			
34-2		J14-K	13Y	23		SR6-9			
35-1		J14-L	13Y	23		SR6-10			
35-2		J14-M	13Y	23		SR6-11			
36		J14-N	13Y	23		SR6-12			
37		J14-P	13Y	23		SR6-13			
38		J14-R	13Y	23		SR6-14			

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NASA DRAWING NO. 2018611
SHEET 6 of 7

CONDUCTOR			FROM					TO			
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC NO.
39			J14-S	13	Y	23		SR6-15			
40			J14-T	13	Y	23		SR6-16			
41-1			J14-U	13	Y	23		SR6-17			
41-2			J14-V	13	Y	23		SR6-18			
42-1			J14-W	13	Y	23		SR6-19			
42-2			J14-X	13	Y	23		SR6-20			
43-1			J14-Y	13	Y	23		SR6-21			
43-2			J14-Z	13	Y	23		SR6-22			
43-3			J14-AA	13	Y	23		SR6-23			
43-4			J14-BB	13	Y	23		SR6-24			
43-5			J14-CC	13	Y	23		SR6-25			
44			J14-DD	13	Y	23		SR6-26			
45			J14-EE	13	Y	23		SR6-27			
46			J14-FF	13	Y	23		SR6-28			

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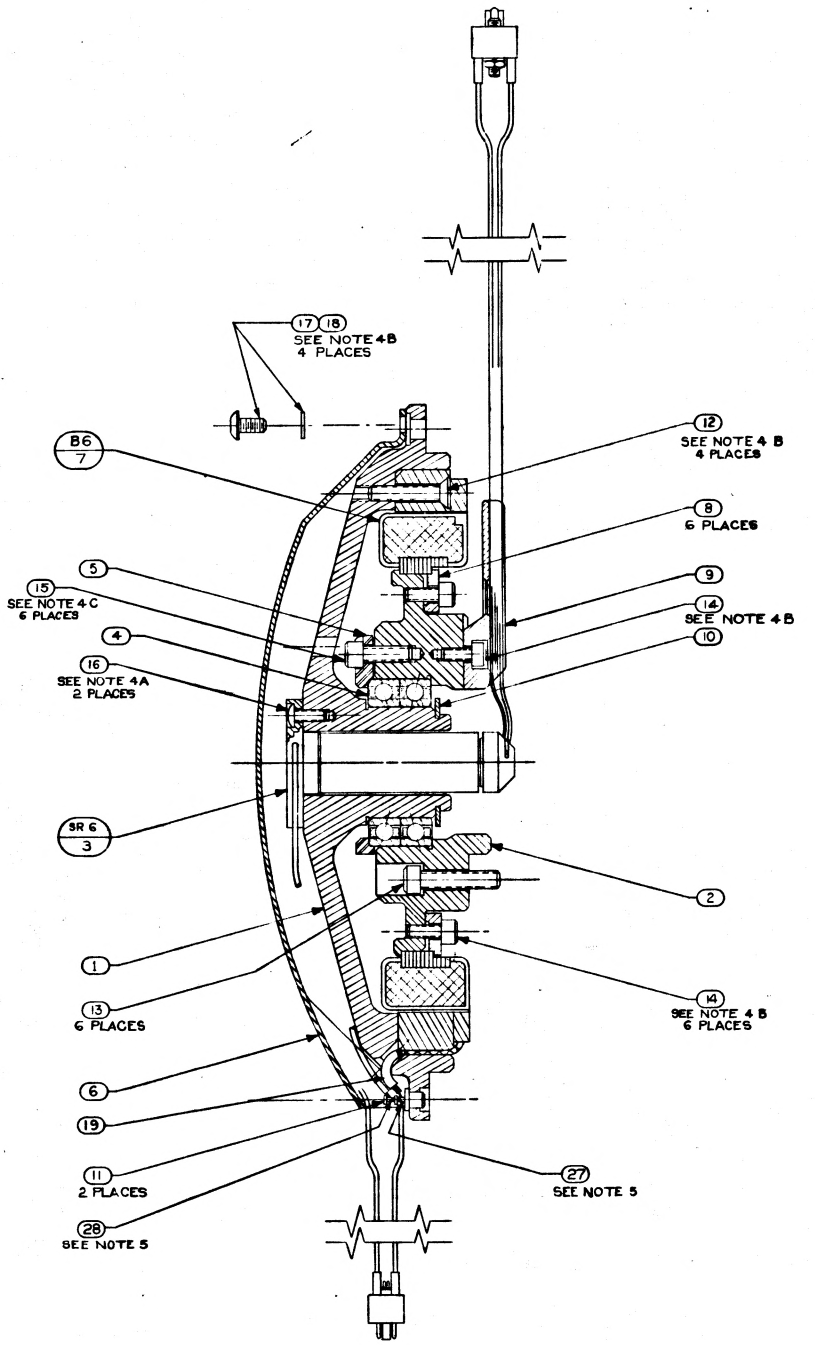
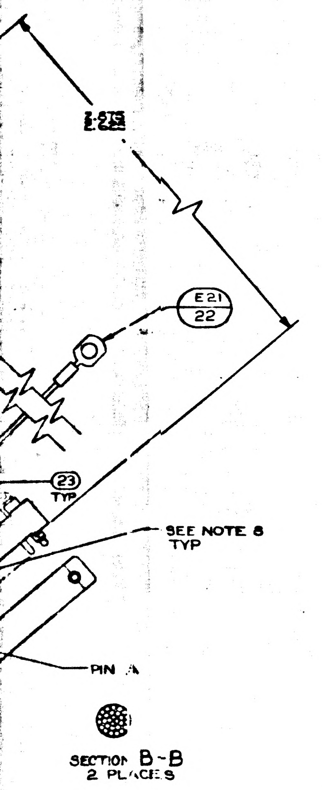
NASA DRAWING NO. 2018611
SHEET 7 of 7

CONDUCTOR			FROM					TO			
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC NO.
47			J14-HH	13	Y	23		SR6-29			
48			J14-JJ	13	Y	23		SR6-30			
49			J14-KK	13	Y	23		SR6-31			
50			J14-LL	13	Y	23		SR6-32			
51			J14-MM	13	Y	23		SR6-33			
52			J14-NN	13	Y	23		SR6-34			
53-1			J14-PP	13	Y	23		SR6-35			
53-2			J14-RR	13	Y	23		SR6-36			
54-1			J14-SS	13	Y	23		SR6-37			
54-2			J14-TT	13	Y	23		SR6-38			
55			J14-UU	13	Y	23		SR6-39			
56			J14-VV	13	Y	23		SR6-40			

SYM	DESCRIPTION	DATE	APPROVAL	
REVISIONS TDRR 16813				
A	REVISED TDRR 17687	8Mar65		
B	REVISED TDRR 19268	2Jun65		

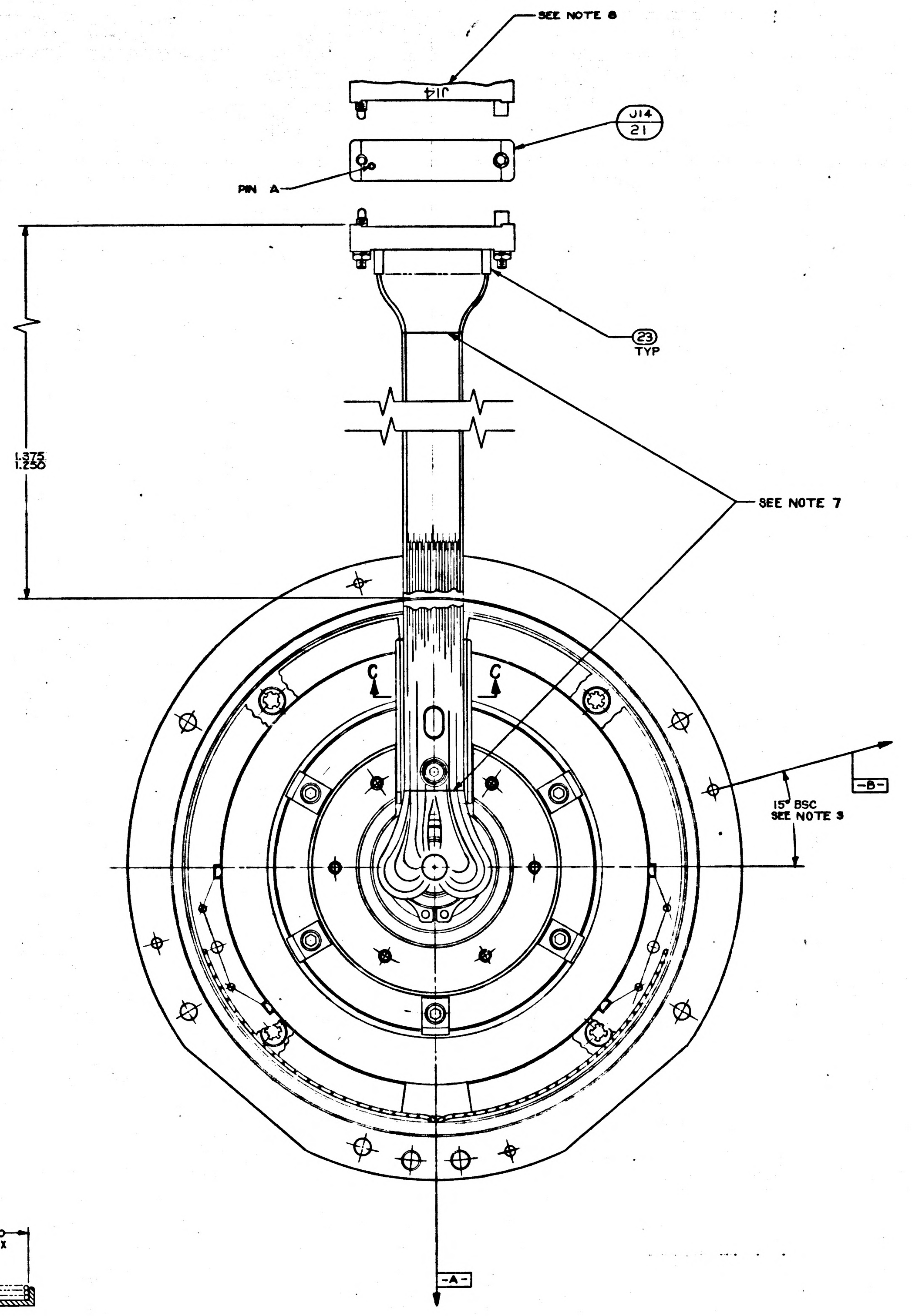


17 18
SEE NOTE 4B
4 PLACES
B6
7
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
5
9
15
SEE NOTE 4 C
6 PLACES
14
SEE NOTE 4 B
4
10
16
SEE NOTE 4A
2 PLACES
SR 6
3
2
1
13
6 PLACES
14
SEE NOTE 4 B
6 PLACES
6
19
11
2 PLACES
27
SEE NOTE 5
28
SEE NOTE 5

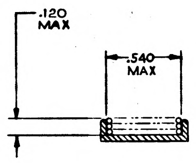


1.375
1.250
E21
22
23
TYP
SEE NOTE 8
TYP
PIN A

SECTION B-B
2 PLACES



SEE NOTE 8
J14
J14
21
PIN A
23
TYP
1.375
1.250
SEE NOTE 7
C
C
15° BSC
SEE NOTE 3
-B-
-A-



.120
MAX
.540
MAX

SECTION C-C

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	29
A/R	QQ-S-571 SN60	SOLDER	28
A/R	QQ-S-571 SN10	SOLDER	27
A/R	1010870	GREASE, LUBRICATING	26
1	1010416-1	WIRE, AWG 28E BLACK 8" LONG	25
1	1010416-10	WIRE, AWG 28E WHITE 8" LONG	24
82	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	23
3	1000020-4	SHIELD AND GROUND ASSY	22
1	1010813-1	CONN ELEC RECEPT 44 PIN	21
2	1000123	CONN ELEC PLUG 26 PIN	20
1	1010490-054	INSULATION SLEEVING, ELEC HEAT SHRINK	19
4	MS15795-703	WASHER, FLAT, METAL, ROUND	18
4	1010891-12	SCREW BUTTON HD SELF LKG SOC SPLINE	17
2	1010891-2	SCREW BUTTON HD SELF LKG SOC SPLINE	16
6	1001488-18	SCREW HEX SOC HD SELF-LOCKING	15
7	1001488-2	SCREW HEX SOC HD SELF-LOCKING	14
6	1001489-22	SCREW HEX SOC HD	13
4	1010867-17	SCREW FLAT HD SELF LOCKING SOC SPLINE	12
2	1000100-1	TERMINAL INSULATED	11
1	MS-16624-4075	RING RETAINING EXTERNAL BASIC	10
1	2018715	RETAINER WIRE INNER AXIS	9
6	2018745	CLIP RETAINER TORQUE MOTOR INNER AXIS	8
1	2018623	MOTOR TORQUE DC FRAMELESS	7
1	2018781	WIRE GUIDE BRG HSG T.M. I.A.	6
1	2018747	PLATE BEARING RETAINER T.M. I.A.	5
1	2018621	BALL BEARING DUPLEX	4
1	2018634	SLIP RING ASSY ELEC 40 CONTACT	3
1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS	2
1	2018746	HOUSING BEARING TORQUE MOTOR I.A.	1
011	LIST OF MATERIALS		

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN L. Morse DATE 6-8-64
CHECKED G. QUINN 2-17-65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL L Hafel

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HOUSTON, TEXAS

INTER-GIMBAL SUB-ASSEMBLY
TORQUE MOTOR
INNER AXIS

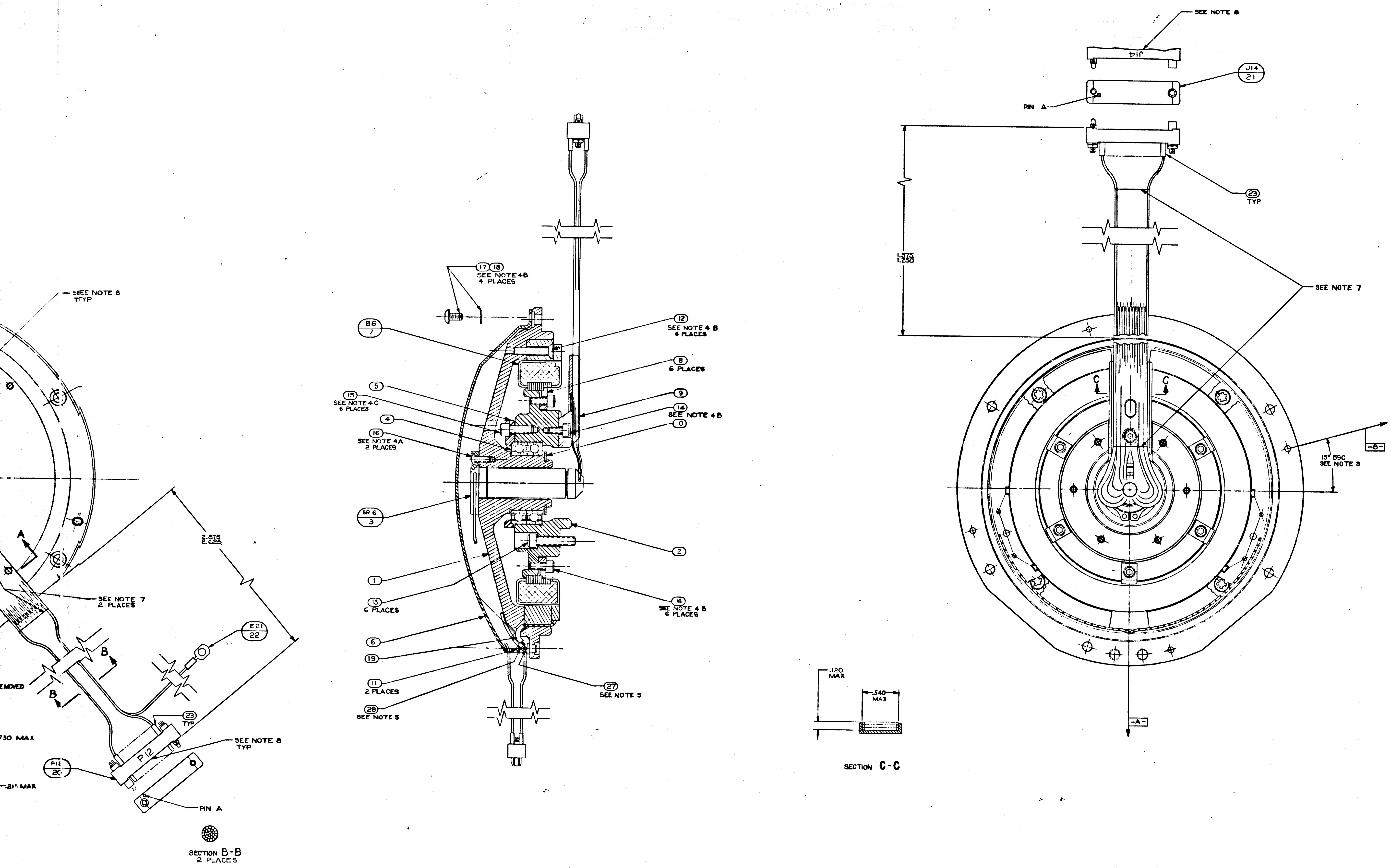
CODE IDENT NO. | SIZE J | NASA DRAWING NO. 2018611
SCALE 2/1 | WT | SHEET 1 OF 7

2018611 B

2018611 | REV B | SHEET 1

E3

SYM	DESCRIPTION
A	REVISED TDRR 17687
B	REVISED TDRR 19268



5
4
3
2
SEE NOTE 8
J14
J14
21
PIN A
1.375
1.250
23
TYP
SEE NOTE 7
C
C
15° BSC
SEE NOTE 3
-B-
-A-
.120
MAX
.540
MAX
SECTION C-C
17 18
SEE NOTE 4 B
4 PLACES
B6
7
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
5
9
15
SEE NOTE 4 C
6 PLACES
14
SEE NOTE 4 B
4
10
16
SEE NOTE 4 A
2 PLACES
SR 6
3
2
1
13
6 PLACES
14
SEE NOTE 4 B
6 PLACES
6
19
11
2 PLACES
27
SEE NOTE 5
28
SEE NOTE 5
SEE NOTE 8
TYP
A
2.875
2.625
SEE NOTE 7
2 PLACES
E21
22
B
B
REMOVED
23
TYP
730 MAX
SEE NOTE 8
TYP
P12
P12
20
.21 MAX
PIN A
SECTION B-B
2 PLACES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED
A/R	QQ-S-571 SN60	SOLDER
A/R	QQ-S-571 SN10	SOLDER
A/R	1010870	GREASE, LUBRICATING
1	1010416-1	WIRE, AWG 28E BLACK
1	1010416-10	WIRE, AWG 28E WHITE
82	1006776-18	INSULATION SLEEVING E
3	1000020-4	SHIELD AND GROUND ASSY
1	1010813-1	CONN ELEC RECEPT 44 PIN
2	1000123	CONN ELEC PLUG 26 PIN
1	1010490-054	INSULATION SLEEVING ELEC
4	MS15795-703	WASHER, FLAT, METAL, ROUND
4	1010891-12	SCREW BUTTON HD SELF LKG
2	1010891-2	SCREW BUTTON HD SELF LKG
6	1001488-18	SCREW HEX SOC HD SELF-LOC
7	1001488-2	SCREW HEX SOC HD SELF-LOC
6	1001489-22	SCREW HEX SOC HD
4	1010867-17	SCREW FLAT HD SELF LOCK
2	[illegible]	TERMINAL INSULATED
1	MS16624-4075	RING RETAINING EXTERNAL
1	2018715	RETAINER WIRE INNER AX
6	2018745	CLIP RETAINER TORQUE MOTOR
1	2018623	MOTOR TORQUE DC FRAME
1	2018781	WIRE GUIDE BRG HSG
1	2018747	PLATE BEARING RETAINER
1	2018601	BALL BEARING DUPLEX
1	2018634	SLIP RING ASSY ELEC 40 CO
1	2018743	SHAFT STUB TORQUE MOTOR
1	2018746	HOUSING BEARING TORQUE
011	LIST OF MATERIALS	

MASTER

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN L Morse DATE 6-8-64
CHECKED [illegible] 2-[illegible]-65
APPROVAL
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT C
HOUSTON, TEXAS

INTER-GIMBAL
TORQUE M
INNER A

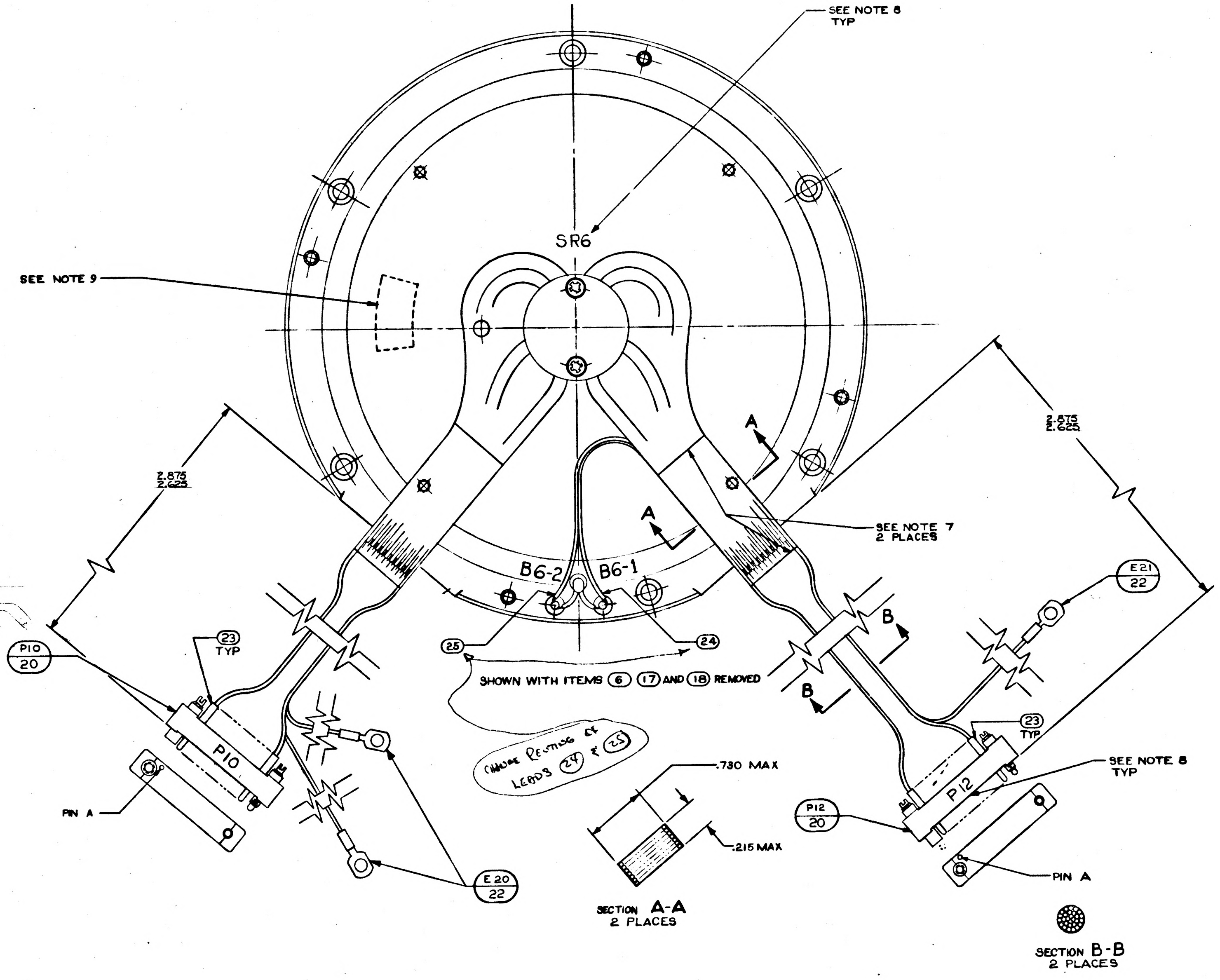
CODE IDENT
SIZE J
SCALE 2/
WT

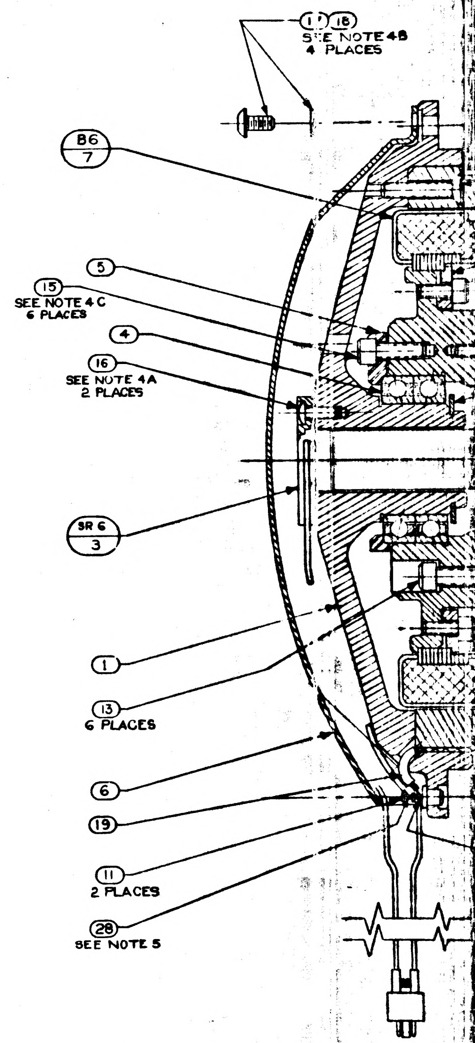
2018611 REV B SHEET 1

E-2

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018611
3. ECCENTRICITY MARKS ON THE OUTER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ② IS IN THE POSITION SHOWN
   THE ECCENTRICITY MARKS ON THE INNER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF -B- AND IN THE DIRECTION OF THE ARROW WHEN ① IS IN THE POSITION SHOWN
   APPLY A THIN COAT OF ㉖ TO INSIDE DIAMETER OF ④ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   A. 3.5 IN LB
   B. 5.0 IN LB
   C. 10.0 IN LB
5. SOLDER LEADS FROM ⑦ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉗ SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑳ AND ㉑ PER ND1002071 USING ㉘
   WIRE INSULATION SHALL BE WITHIN .06 OF SOLDERED CONNECTION
6. HEAT SHRINK SLEEVING ON ㉒ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ⑦ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ⑦
12. "Y" OR "N" IN TINNED COLUMN OF SHEETS 2 THRU INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NO. SHALL BE TWISTED TOGETHER PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3) & (15-1, 15-2, 15-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"


SEE NOTE 8
TYP
SR6
SEE NOTE 9
2.875
2.625
A
A
B6-2
B6-1
SEE NOTE 7
2 PLACES
E21
22
P10
20
23
TYP
25
24
SHOWN WITH ITEMS ⑥ ⑰ AND ⑱ REMOVED
B
B
CHANGE ROUTING OF LEADS ㉔ & ㉕
.730 MAX
.215 MAX
P10
PIN A
E20
22
SECTION A-A
2 PLACES
P12
20
23
TYP
P12
SEE NOTE 8
TYP
PIN A
SECTION B-B
2 PLACES


⑰ ⑱
SEE NOTE 4B
4 PLACES
B6
7
⑤
⑮
SEE NOTE 4C
6 PLACES
④
⑯
SEE NOTE 4A
2 PLACES
SR 6
3
①
⑬
6 PLACES
⑥
⑲
⑪
2 PLACES
㉘
SEE NOTE 5

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REVISION

NASA DRAWING NO.
2018611
SHEET 2 of 7

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.
1					22						
1-A		SHLD-1					E20				
1-1		P10-A	13	Y	23		SR6-1				
1-2		P10-B	13	Y	23		SR6-2				
1-3		P10-C	13	Y	23		SR6-3				
2		P10-D	13	Y	23		SR6-4				
3		P10-E	13	Y	23		SR6-5				
4-1		P10-F	13	Y	23		SR6-6				
4-2		P10-H	13	Y	23		SR6-7				
5-1		P10-J	13	Y	23		SR6-8				
5-2		P10-K	13	Y	23		SR6-9				
6-1		P10-L	13	Y	23		SR6-10				
6-2		P10-M	13	Y	23		SR6-11				
7					22						
7-A		SHLD-7					E20				
7-1		P10-N	13	Y	23		SR6-12				
7-2		P10-P	13	Y	23		SR6-13				
7-3		P10-R	13	Y	23		SR6-14				

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NASA DRAWING NO.
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SHEET 3 of 7

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.
8		P10-S	13	Y	23		SR6-15				
9		P10-T	13	Y	23		SR6-16				
10-1		P10-U	13	Y	23		SR6-17				
10-2		P10-V	13	Y	23		SR6-18				
11-1		P10-W	13	Y	23		SR6-19				
11-2		P10-X	13	Y	23		SR6-20				
12		P12-A	13	Y	23		SR6-26				
13		P12-B	13	Y	23		SR6-27				
14		P12-C	13	Y	23		SR6-28				
15					23						
15-A		SHLD-15			23		E21				
15-1		P12-D	13	Y	23		SR6-29				
15-2		P12-E	13	Y	23		SR6-30				
15-3		P12-F	13	Y	23		SR6-31				
16		P12-H	13	Y	23		SR6-32				
17		P12-J	13	Y	23		SR6-33				
18		P12-K	13	Y	23		SR6-34				

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SHEET 4 of 7

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.
19-1		P12-L	13	Y	23		SR6-35				
19-2		P12-M	13	Y	23		SR6-36				
20-1		P12-N	13	Y	23		SR6-37				
20-2		P12-P	13	Y	23		SR6-38				
21	25	P12-R	13	Y	23		B6-1	19	Y		
22	24	P12-S	13	Y	23		B6-2	19	Y		
23		B6-BLK					B6-1	19	Y		
24		B6-WHT					B6-2	19	Y		
25		P12-T	13	Y	23		SR6-39				
26		P12-U	13	Y	23		SR6-40				
27-1		p12-Y	13	Y	23		SR6-21				
27-2		P12-Z	13	Y	23		SR6-22				
27-3		P12-a	13	Y	23		SR6-23				
27-4		P12-b	13	Y	23		SR6-24				
27-5		P12-c	13	Y	23		SR6-25				

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NASA DRAWING NO.
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SHEET 5 of 7

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.
28		J14-A	13	Y	23		SR6-1				
29		J14-B	13	Y	23		SR6-2				
30		J13-C	13	Y	23		SR6-3				
31		J14-D	13	Y	23		SR6-4				
32		J14-E	13	Y	23		SR6-5				
33-1		J14-F	13	Y	23		SR6-6				
33-2		J14-H	13	Y	23		SR6-7				
34-1		J14-J	13	Y	23		SR6-8				
34-2		J14-K	13	Y	23		SR6-9				
35-1		J14-L	13	Y	23		SR6-10				
35-2		J14-M	13	Y	23		SR6-11				
36		J14-N	13	Y	23		SR6-12				
37		J14-P	13	Y	23		SR6-13				
38		J14-R	13	Y	23		SR6-14				

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NASA DRAWING NO.
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SHEET 6 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	TO TERMINATION SPEC FIND NO.	NO.
39			J14-S	13	Y	23		SR6-15			
40			J14-T	13	Y	23		SR6-16			
41-1			J14-U	13	Y	23		SR6-17			
41-2			J14-V	13	Y	23		SR6-18			
42-1			J14-W	13	Y	23		SR6-19			
42-2			J14-X	13	Y	23		SR6-20			
43-1			J14-Y	13	Y	23		SR6-21			
43-2			J14-Z	13	Y	23		SR6-22			
43-3			J14-AA	13	Y	23		SR6-23			
43-4			J14-BB	13	Y	23		SR6-24			
43-5			J14-CC	13	Y	23		SR6-25			
44			J14-DD	13	Y	23		SR6-26			
45			J14-EE	13	Y	23		SR6-27			
46			J14-FF	13	Y	23		SR6-28			

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NASA DRAWING NO.
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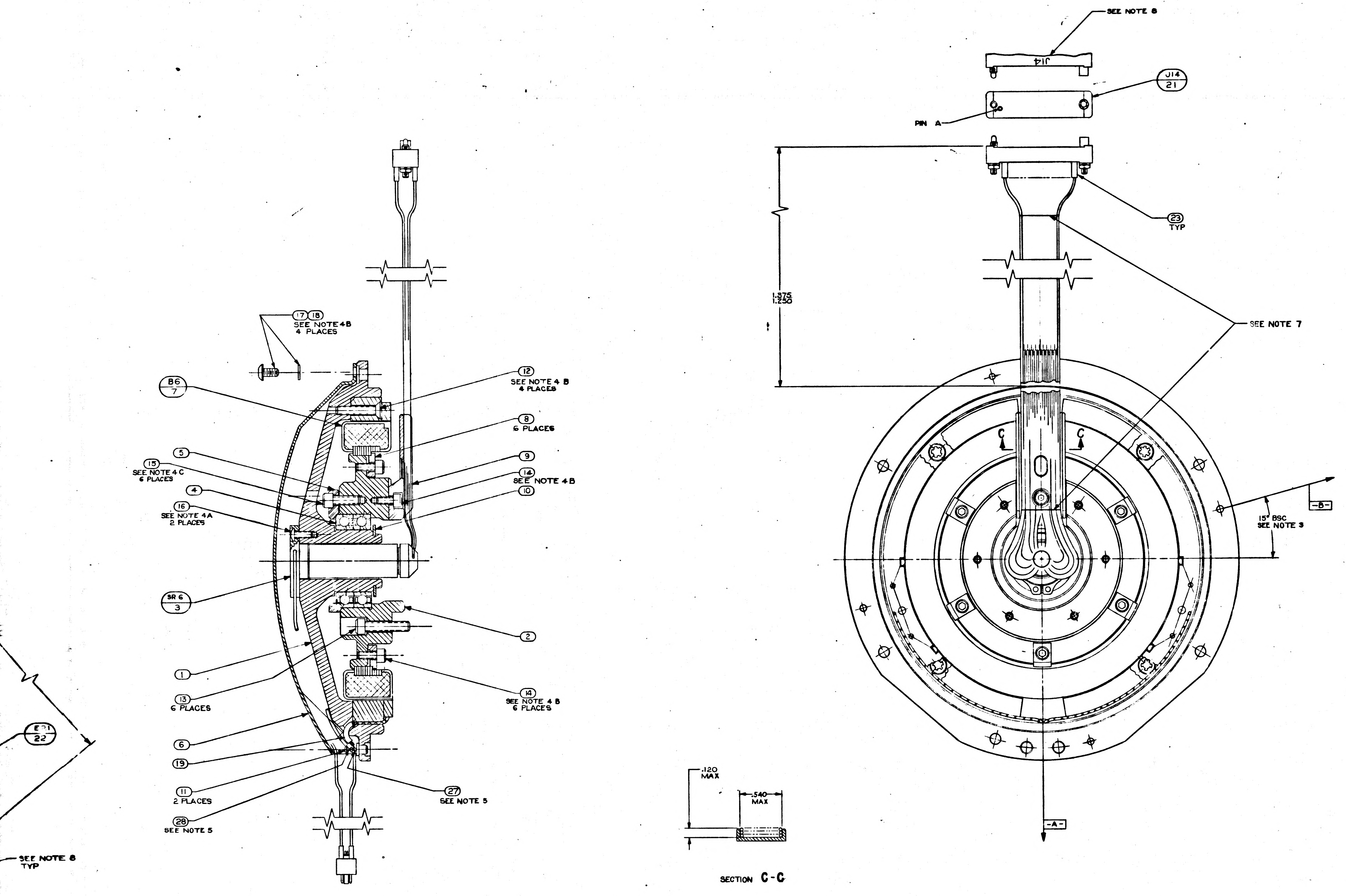
SHEET 7 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	TO TERMINATION SPEC FIND NO.	NO.
47			J14-HH	13	Y	23		SR6-29			
48			J14-JJ	13	Y	23		SR6-30			
49			J14-KK	13	Y	23		SR6-31			
50			J14-LL	13	Y	23		SR6-32			
51			J14-MM	13	Y	23		SR6-33			
52			J14-NN	13	Y	23		SR6-34			
53-1			J14-PP	13	Y	23		SR6-35			
53-2			J14-RR	13	Y	23		SR6-36			
54-1			J14-SS	13	Y	23		SR6-37			
54-2			J14-TT	13	Y	23		SR6-38			
55			J14-UU	13	Y	23		SR6-39			
56			J14-VV	13	Y	23		SR6-40			

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 16813			
A	REVISED TDRR 17687	[illegible]	[illegible]	[illegible]
B	REVISED TDRR 19268	2 Jun 65	[illegible]	[illegible]
C	REVISED TDRR 21675	31 Aug 65	[illegible]	[illegible]



SEE NOTE 8
J14
J14
21
PIN A
23
TYP
1.375
1.250
SEE NOTE 7
C
C
15° BSC
SEE NOTE 3
-B-
-A-
17
18
SEE NOTE 4B
4 PLACES
B6
7
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
9
14
SEE NOTE 4B
10
5
15
SEE NOTE 4 C
6 PLACES
4
16
SEE NOTE 4A
2 PLACES
BR 6
3
2
1
13
6 PLACES
14
SEE NOTE 4 B
6 PLACES
6
19
11
2 PLACES
27
SEE NOTE 5
28
SEE NOTE 5
E21
22
SEE NOTE 8
TYP
B-B
.120
MAX
.540
MAX

SECTION C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	29
A/R	QQ-S-571 SN60	SOLDER	28
A/R	QQ-S-571 SN10	SOLDER	27
A/R	1010870	GREASE, LUBRICATING	26
1	1010416-1	WIRE, AWG 28E BLACK 8" LONG	25
1	1010416-10	WIRE, AWG 28E WHITE 8" LONG	24
82	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	23
3	1000020-4	SHIELD AND GROUND ASSY	22
1	1010917-109	CONN ELEC RECEPT 44 PIN	21
2	1010917-906	CONN ELEC PLUG 26 PIN	20
1	1010490-054	INSULATION SLEEVING, ELEC HEAT SHRINK	19
4	MS15795-703	WASHER, FLAT, METAL, ROUND	18
4	1010891-12	SCREW BUTTON HD SELF LKG SOC SPLINE	17
2	1010891-2	SCREW BUTTON HD SELF LKG SOC SPLINE	16
6	1001488-18	SCREW HEX SOC HD SELF-LOCKING	15
7	1001488-2	SCREW HEX SOC HD SELF-LOCKING	14
6	1001489-22	SCREW HEX SOC HD	13
4	1010867-17	SCREW FLAT HD SELF LOCKING SOC SPLINE	12
2	1000100-1	TERMINAL INSULATED	11
1	MS-16624-4075	RING RETAINING EXTERNAL BASIC	10
1	2018715	RETAINER WIRE INNER AXIS	9
6	2018745	CLIP RETAINER TORQUE MOTOR INNER AXIS	8
1	2018623	MOTOR TORQUE DC FRAMELESS	7
1	2018781	WIRE GUIDE BRG HSG T.M. I.A.	6
1	2018747	PLATE BEARING RETAINER T.M. I.A.	5
1	2018621	BALL BEARING DUPLEX	4
1	2018634	SLIP RING ASS'Y ELEC 40 CONTACT	3
1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS	2
1	2018746	HOUSING BEARING TORQUE MOTOR I.A.	1
011	LIST OF MATERIALS		

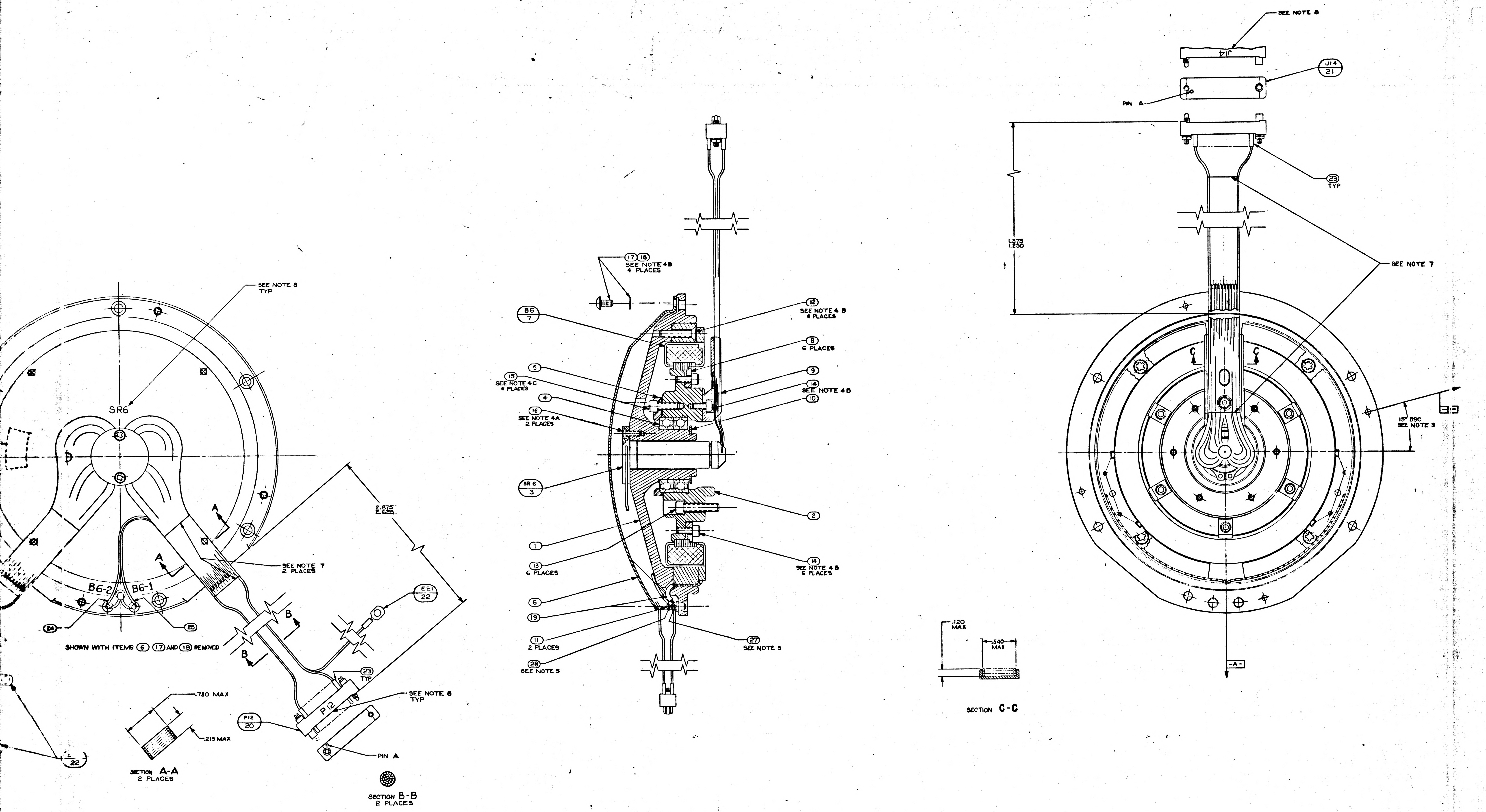
MASTER

2018604	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB Cambridge, Mass	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	MATERIAL	DRAWN L. Morse DATE 6-8-64 CHECKED G. QUINN 2-17-65 APPROVAL APPROVAL	INTER-GIMBAL SUB-ASSEMBLY TORQUE MOTOR INNER AXIS
APPLICATION		HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO. 80230 — SIZE J — NASA DRAWING NO. 2018611
		FINAL FINISH	MIT APPROVAL	SCALE 2/1 — WT — SHEET 1 OF 7

2018611 C

2018611 REV C SHEET 1

F3


SEE NOTE 8 TYP
SR6
B6-2
B6-1
A
A
SEE NOTE 7 2 PLACES
2.575 2.625
E21 22
B
B
23 TYP
SEE NOTE 8 TYP
P12
P12 20
PIN A
24
25
E 22
SHOWN WITH ITEMS 6 17 AND 18 REMOVED
.730 MAX
.215 MAX
SECTION A-A 2 PLACES
SECTION B-B 2 PLACES
17 18 SEE NOTE 4B 4 PLACES
B6 7
5
15 SEE NOTE 4C 6 PLACES
4
16 SEE NOTE 4A 2 PLACES
SR 6 3
1
13 6 PLACES
6
19
11 2 PLACES
28 SEE NOTE 5
12 SEE NOTE 4 B 4 PLACES
8 6 PLACES
9
14 SEE NOTE 4B
10
2
14 SEE NOTE 4 B 6 PLACES
27 SEE NOTE 5
SEE NOTE 8
J14
J14 21
PIN A
23 TYP
1.375 1.250
SEE NOTE 7
C
C
15° BSC SEE NOTE 3
-A-
.120 MAX
.540 MAX
SECTION C-C

MASTER

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

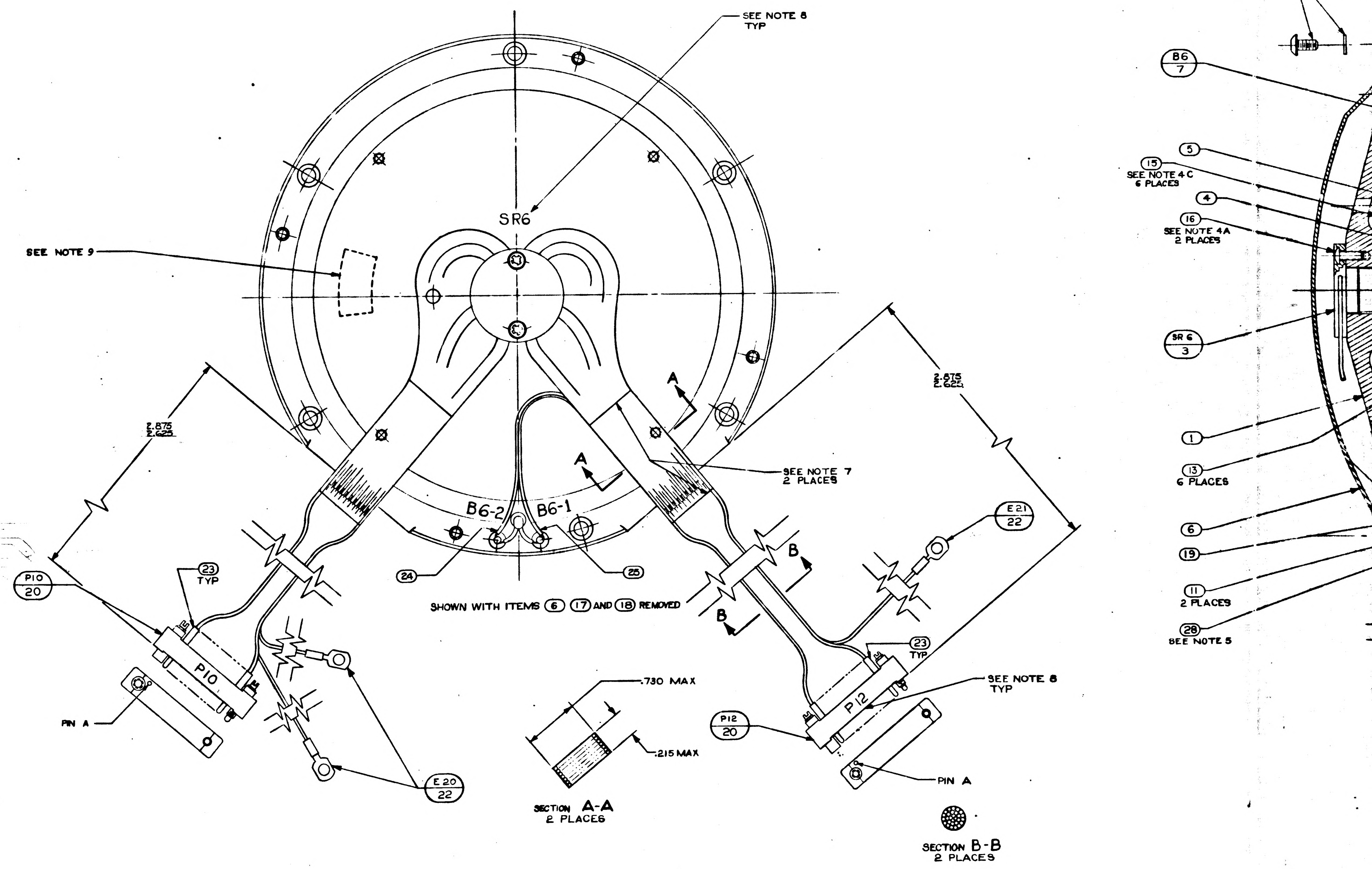
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS
± ±
DO NOT SCALE THIS DRAWING
MATERIAL
NEXT TREATMENT
FINAL FINISH

2018611 REV C SHEET 1

F-2

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018611
3. ECCENTRICITY MARKS ON THE OUTER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ② IS IN THE POSITION SHOWN
   THE ECCENTRICITY MARKS ON THE INNER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-B-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① IS IN THE POSITION SHOWN
   APPLY A THIN COAT OF ㉖ TO INSIDE DIAMETER OF ④ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ⑦ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉗ SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑳ AND ㉑ PER ND1002071 USING ㉘ WIRE INSULATION SHALL BE WITHIN .06 OF SOLDERED CONNECTION
6. HEAT SHRINK SLEEVING ON ㉒ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ⑦ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ⑦
12. "Y" OR "N" IN TINNED COLUMN OF SHEETS 2 THRU INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NO. SHALL BE TWISTED TOGETHER PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3) & (15-1, 15-2, 15-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"


SEE NOTE 8
TYP
SR6
SEE NOTE 9
2.875
2.625
A
A
B6-2
B6-1
SEE NOTE 7
2 PLACES
E21
22
B
B
P10
20
23
TYP
P10
PIN A
24
25
SHOWN WITH ITEMS ⑥ ⑰ AND ⑱ REMOVED
E20
22
.730 MAX
.215 MAX
SECTION A-A
2 PLACES
P12
20
P12
23
TYP
SEE NOTE 8
TYP
PIN A
SECTION B-B
2 PLACES
17 18
SEE N
4 PLA
B6
7
5
15
SEE NOTE 4C
6 PLACES
4
16
SEE NOTE 4A
2 PLACES
SR 6
3
1
13
6 PLACES
6
19
11
2 PLACES
28
SEE NOTE 5

8 7 6 5

D C B A

F-1

2018611 REV C SHEET 1

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NASA DRAWING NO.
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SHEET 2 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN	TO TERMINATION SPEC FIND NO.	TO NO.
1						22						
1-A			SHLD-1					E20				
1-1			P10-A	13	Y	23		SR6-1				
1-2			P10-B	13	Y	23		SR6-2				
1-3			P10-C	13	Y	23		SR6-3				
2			P10-D	13	Y	23		SR6-4				
3			P10-E	13	Y	23		SR6-5				
4-1			P10-F	13	Y	23		SR6-6				
4-2			P10-H	13	Y	23		SR6-7				
5-1			P10-J	13	Y	23		SR6-8				
5-2			P10-K	13	Y	23		SR6-9				
6-1			P10-L	13	Y	23		SR6-10				
6-2			P10-M	13	Y	23		SR6-11				
7						22						
7-A			SHLD-7					E20				
7-1			P10-N	13	Y	23		SR6-12				
7-2			P10-P	13	Y	23		SR6-13				
7-3			P10-R	13	Y	23		SR6-14				

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NASA DRAWING NO.
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SHEET 3 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN	TO TERMINATION SPEC FIND NO.	TO NO.
8			P10-S	13	y	23		SR6-15				
9			P10-T	13	y	23		SR6-16				
10-1			P10-U	13	y	23		SR6-17				
10-2			P10-V	13	Y	23		SR6-18				
11-1			P10-W	13	Y	23		SR6-19				
11-2			P10-X	13	Y	23		SR6-20				
12			P12-A	13	Y	23		SR6-26				
13			P12-B	13	Y	23		SR6-27				
14			P12-C	13	Y	23		SR6-28				
15						23						
15-A			SHLD-15			23		E21				
15-1			P12-D	13	Y	23		SR6-29				
15-2			P12-E	13	Y	23		SR6-30				
15-3			P12-F	13	Y	23		SR6-31				
16			P12-H	13	Y	23		SR6-32				
17			P12-J	13	Y	23		SR6-33				
18			P12-K	13	y	23		SR6-34				

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SHEET 4 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN	TO TERMINATION SPEC FIND NO.	TO NO.
19-1			P12-L	13	Y	23		SR6-35				
19-2			P12-M	13	Y	23		SR6-36				
20-1			P12-N	13	Y	23		SR6-37				
20-2			P12-P	13	Y	23		SR6-38				
21	25		P12-R	13	Y	23		B6-1	19	Y		
22	24		P12-S	13	Y	23		B6-2	19	Y		
23			B6-BLK					B6-1	19	Y		
24			B6-WHT					B6-2	19	Y		
25			P12-T	13	Y	23		SR6-39				
26			P12-U	13	Y	23		SR6-40				
27-1			P12-Y	13	Y	23		SR6-21				
27-2			P12-Z	13	Y	23		SR6-22				
27-3			P12-a	13	Y	23		SR6-23				
27-4			P12-b	13	Y	23		SR6-24				
27-5			P12-c	13	Y	23		SR6-25				

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SHEET 5 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN	TO TERMINATION SPEC FIND NO.	TO NO.
28			J14-A	13	Y	23		SR6-1				
29			J14-B	13	Y	23		SR6-2				
30			J13-C	13	Y	23		SR6-3				
31			J14-D	13	Y	23		SR6-4				
32			J14-E	13	Y	23		SR6-5				
33-1			J14-F	13	Y	23		SR6-6				
33-2			J14-H	13	Y	23		SR6-7				
34-1			J14-J	13	Y	23		SR6-8				
34-2			J14-K	13	Y	23		SR6-9				
35-1			J14-L	13	y	23		SR6-10				
35-2			J14-M	13	Y	23		SR6-11				
36			J14-N	13	y	23		SR6-12				
37			J14-P	13	y	23		SR6-13				
38			J14-R	13	Y	23		SR6-14				

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NASA DRAWING NO.
2018611
SHEET 6 of 7

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
39			J14-S	13	Y	23		SR6-15				
40			J14-T	13	Y	23		SR6-16				
41-1			J14-U	13	Y	23		SR6-17				
41-2			J14-V	13	Y	23		SR6-18				
42-1			J14-W	13	Y	23		SR6-19				
42-2			J14-X	13	Y	23		SR6-20				
43-1			J14-Y	13	Y	23		SR6-21				
43-2			J14-Z	13	Y	23		SR6-22				
43-3			J14-AA	13	Y	23		SR6-23				
43-4			J14-BB	13	Y	23		SR6-24				
43-5			J14-CC	13	Y	23		SR6-25				
44			J14-DD	13	Y	23		SR6-26				
45			J14-EE	13	Y	23		SR6-27				
46			J14-FF	13	Y	23		SR6-28				

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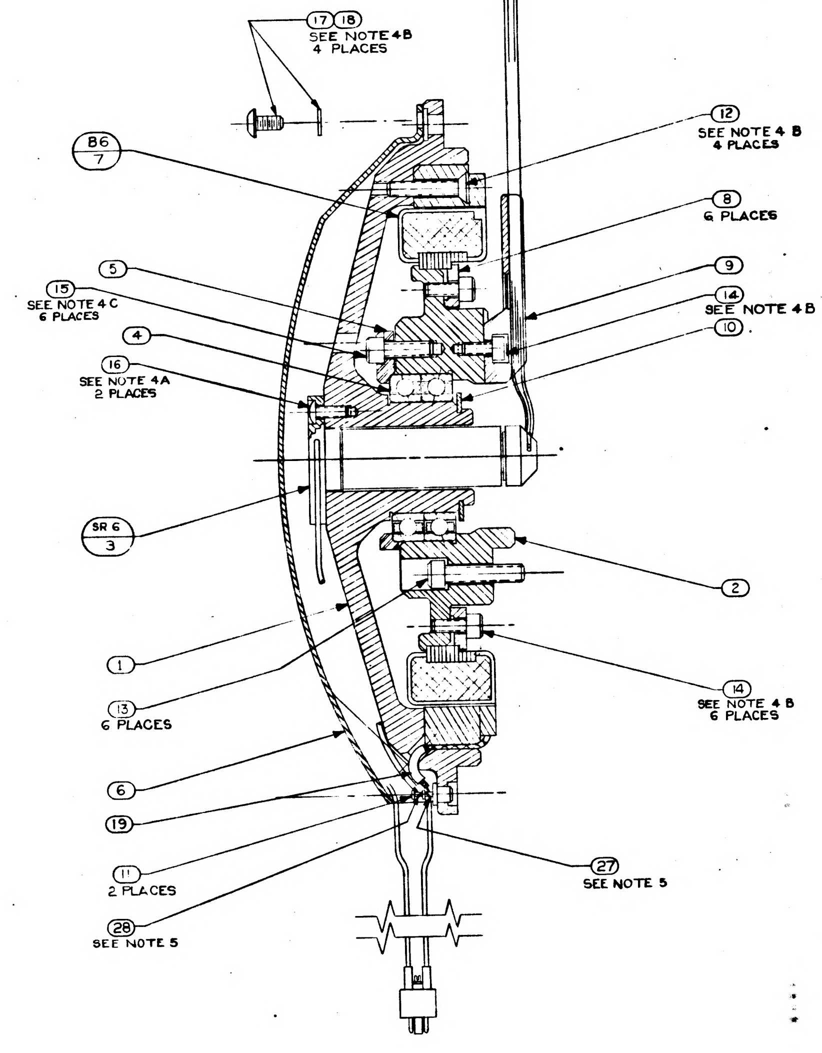
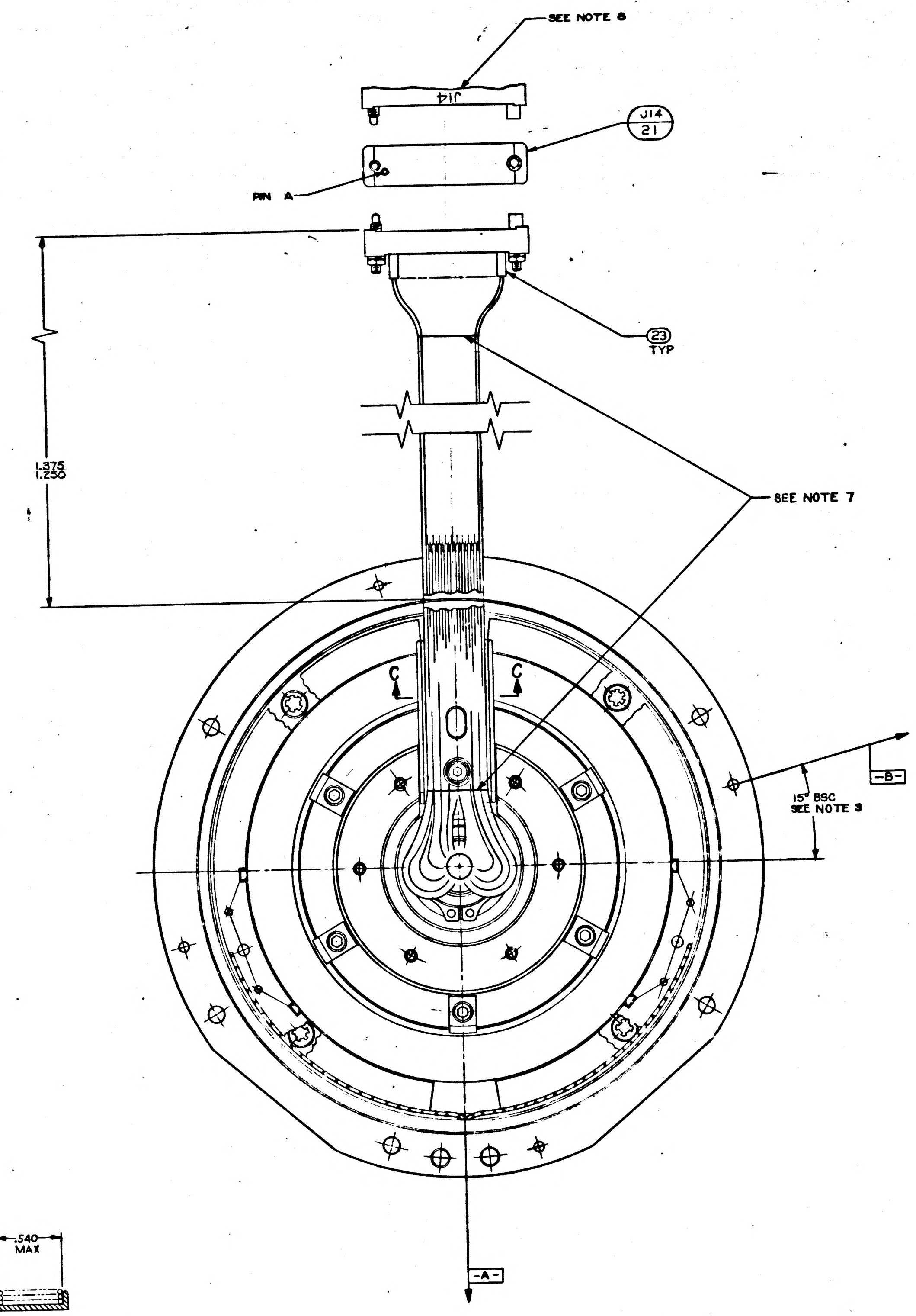
NASA DRAWING NO.
2018611
SHEET 7 of 7

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
47			J14-HH	13	Y	23		SR6-29				
48			J14-JJ	13	Y	23		SR6-30				
49			J14-KK	13	Y	23		SR6-31				
50			J14-LL	13	Y	23		SR6-32				
51			J14-MM	13	Y	23		SR6-33				
52			J14-NN	13	Y	23		SR6-34				
53-1			J14-PP	13	Y	23		SR6-35				
53-2			J14-RR	13	Y	23		SR6-36				
54-1			J14-SS	13	Y	23		SR6-37				
54-2			J14-TT	13	Y	23		SR6-38				
55			J14-UU	13	Y	23		SR6-39				
56			J14-VV	13	Y	23		SR6-40				

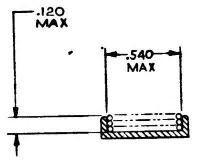
SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 16813			
A	REVISED TDRR 17687			
B	REVISED TDRR 19268	2 Jun 65		
C	REVISED TDRR 21675	31 Aug 65		
D	REVISED TDRR 22331	21 Sep 65		



17 18 SEE NOTE 4B 4 PLACES
B6 7
12 SEE NOTE 4 B 4 PLACES
8 6 PLACES
5
9
15 SEE NOTE 4 C 6 PLACES
14 SEE NOTE 4 B
10
4
16 SEE NOTE 4A 2 PLACES
SR 6 3
2
1
13 6 PLACES
14 SEE NOTE 4 B 6 PLACES
6
19
11 2 PLACES
27 SEE NOTE 5
28 SEE NOTE 5

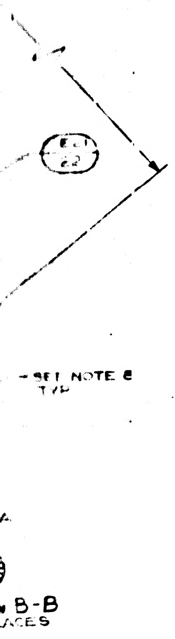


SEE NOTE 8
J14
J14 21
PIN A
23 TYP
1.375 1.250
SEE NOTE 7
C
C
-B-
15° BSC SEE NOTE 3
-A-



.120 MAX
.540 MAX

SECTION C-C



SEE NOTE 6 TYP
B-B
PLACES

A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	29
A/R	QQ-S-571 SN60	SOLDER	28
A/R	QQ-S-571 SN10	SOLDER	27
A/R	1010870	GREASE, LUBRICATING	26
1	1010416-1	WIRE, AWG 28E BLACK 8" LONG	25
1	1010416-10	WIRE, AWG 28E WHITE 8" LONG	24
82	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	23
3	1000020-4	SHIELD AND GROUND ASSY	22
1	1010917-109	CONN ELEC RECEPT 44 PIN	21
2	1010917-806	CONN ELEC PLUG 26 PIN	20
1	1010490-054	INSULATION SLEEVING, ELEC HEAT SHRINK	19
4	MS15795-703	WASHER, FLAT, METAL, ROUND	18
4	1010891-12	SCREW BUTTON HD SELF LKG SOC SPLINE	17
2	1010891-2	SCREW BUTTON HD SELF LKG SOC SPLINE	16
6	1001488-18	SCREW HEX SOC HD SELF-LOCKING	15
7	1001488-2	SCREW HEX SOC HD SELF-LOCKING	14
6	1001489-22	SCREW HEX SOC HD	13
4	1010867-17	SCREW FLAT HD SELF LOCKING SOC SPLINE	12
2	[illegible]	TERMINAL INSULATED	11
1	MS16624-4075	RING RETAINING EXTERNAL BASIC	10
1	2018822	RETAINER WIRE INNER AXIS	9
6	2018745	CLIP RETAINER TORQUE MOTOR INNER AXIS	8
1	2018623	MOTOR TORQUE DC FRAMELESS	7
1	2018781	WIRE GUIDE BRG HSG T.M. I.A.	6
1	2018747	PLATE BEARING RETAINER T.M. I.A.	5
1	2018621	BALL BEARING DUPLEX	4
1	2018634	SLIP RING ASSY ELEC 40 CONTACT	3
1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS	2
1	2018746	HOUSING BEARING TORQUE MOTOR I.A.	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
011	LIST OF MATERIALS		

D
2018611

MASTER

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN L. Morse DATE 6-8-64
CHECKED G. QUINN 2-17-65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

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HOUSTON, TEXAS

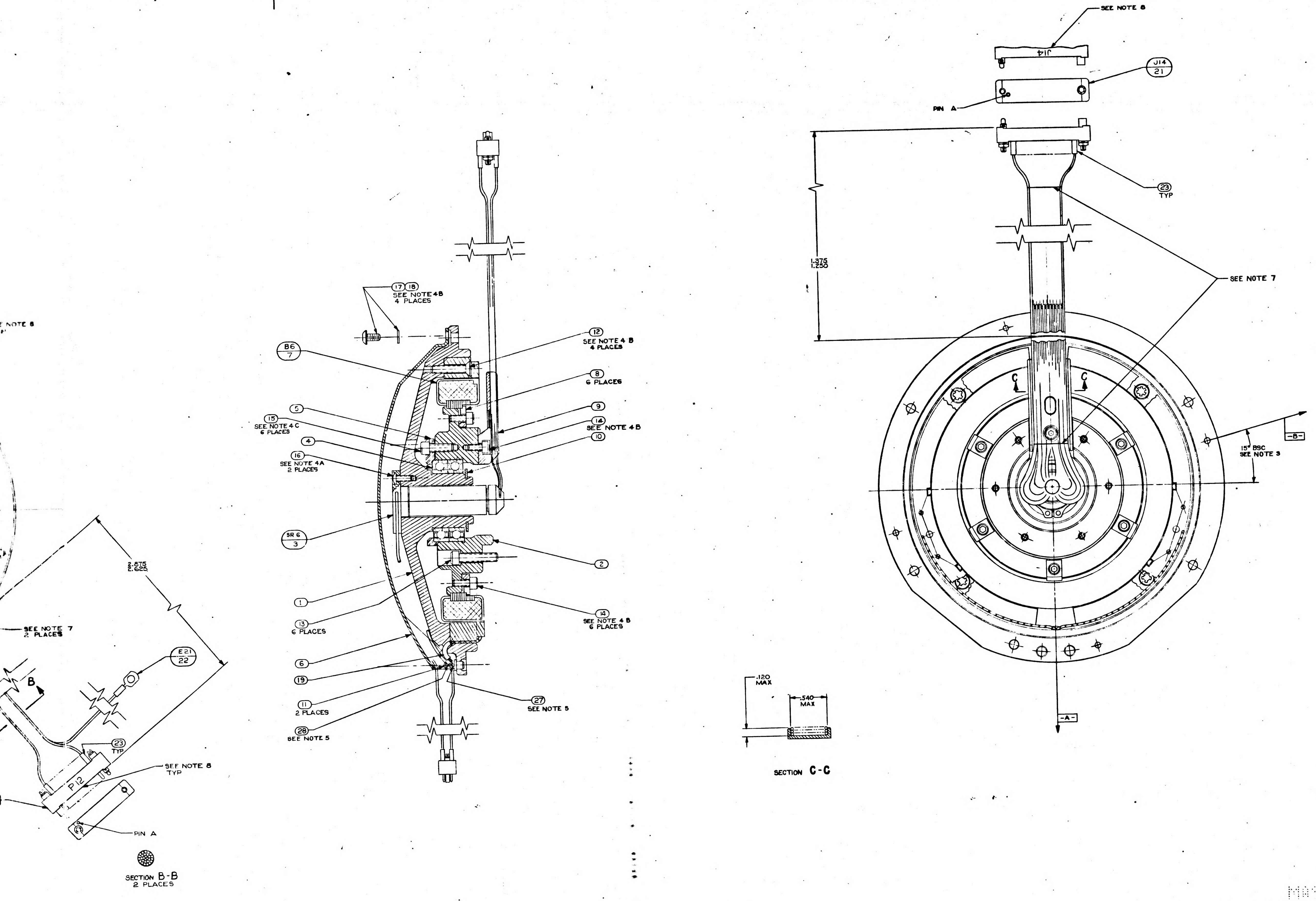
INTER-GIMBAL SUB-ASSEMBLY
TORQUE MOTOR
INNER AXIS

CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018611
SCALE 2/1 WT SHEET 1 OF 7

2018611 REV D SHEET 1

E3

SYM	DESCRIPTION				
A	REVISED TDRR 17687	[illegible]	65	[illegible]	[illegible]
B	REVISED TDRR 19268	2 Jan	65	[illegible]	[illegible]
C	REVISED TDRR 21675	30 Ap	65	[illegible]	[illegible]
D	REVISED TDRR 22331	21 Sep	65	[illegible]	[illegible]


SEE NOTE 8
J14
J14
21
PIN A
23
TYP
1.375
1.250
SEE NOTE 7
C
C
15° BSC
SEE NOTE 3
-B-
-A-
.120
MAX
.540
MAX
SECTION C-C
17 18
SEE NOTE 4B
4 PLACES
B6
7
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
9
14
SEE NOTE 4 B
10
5
15
SEE NOTE 4 C
6 PLACES
4
16
SEE NOTE 4A
2 PLACES
SR 6
3
2
1
13
6 PLACES
14
SEE NOTE 4 B
6 PLACES
6
19
11
2 PLACES
27
SEE NOTE 5
28
SEE NOTE 5
SEE NOTE 8
2.675
2.625
SEE NOTE 7
2 PLACES
E 21
22
B
23
TYP
SEE NOTE 8
TYP
P12
PIN A
SECTION B-B
2 PLACES
MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	[illegible]
A/R	QQ-S-571 SN60	SOLDER	[illegible]
A/R	QQ-S-571 SN10	SOLDER	[illegible]
A/R	1010870	GREASE, LUBRICATING	[illegible]
1	1010416-1	WIRE, AWG 28E BLACK 8" LONG	[illegible]
1	1010416-10	WIRE, AWG 28E WHITE 8" LONG	[illegible]
82	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	[illegible]
3	1000020-4	SHIELD AND GROUND ASSY	[illegible]
1	1010917-109	CONN ELEC RECEPT 44 PIN	[illegible]
2	1010917-806	CONN ELEC PLUG 26 PIN	[illegible]
1	1010490-054	INSULATION SLEEVING, ELEC HEAT SHRINK	[illegible]
4	MS15795-703	WASHER, FLAT, METAL, ROUND	[illegible]
4	1010891-12	SCREW BUTTON HD SELF LOCKING SOC SPLINE	[illegible]
2	1010891-2	SCREW BUTTON HD SELF LOCKING SOC SPLINE	[illegible]
6	1001488-18	SCREW HEX SOC HD SELF-LOCKING	[illegible]
7	10014[illegible]	SCREW HEX SOC HD SELF-LOCKING	[illegible]
6	1001489-22	SCREW HEX SOC HD	[illegible]
4	1010867-17	SCREW FLAT HD SELF LOCKING SOC SPLINE	[illegible]
2	[illegible]	TERMINAL INSULATED	[illegible]
1	[illegible]624-4075	RING RETAINING EXTERNAL BASIC	[illegible]
1	2018822	RETAINER WIRE INNER AXIS	[illegible]
6	2018745	CLIP RETAINER TORQUE MOTOR INNER AXIS	[illegible]
1	2018623	MOTOR TORQUE DC FRAMELESS	[illegible]
1	2018781	WIRE GUIDE BRG HSG T.M. I.A.	[illegible]
1	2018747	PLATE BEARING RETAINER T.M. I.A.	[illegible]
1	2018621	BALL BEARING DUPLEX	[illegible]
1	2018634	SLIP RING ASSY ELEC 40 CONTACT	[illegible]
1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS	[illegible]
1	2018746	HOUSING BEARING TORQUE MOTOR I.A.	[illegible]

011 LIST OF MATERIALS

NEXT ASSY	USED ON
2018604	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL C Hafelsteiner

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INTER-GIMBAL SUB-ASSEMBLY
TORQUE MOTOR
INNER AXIS

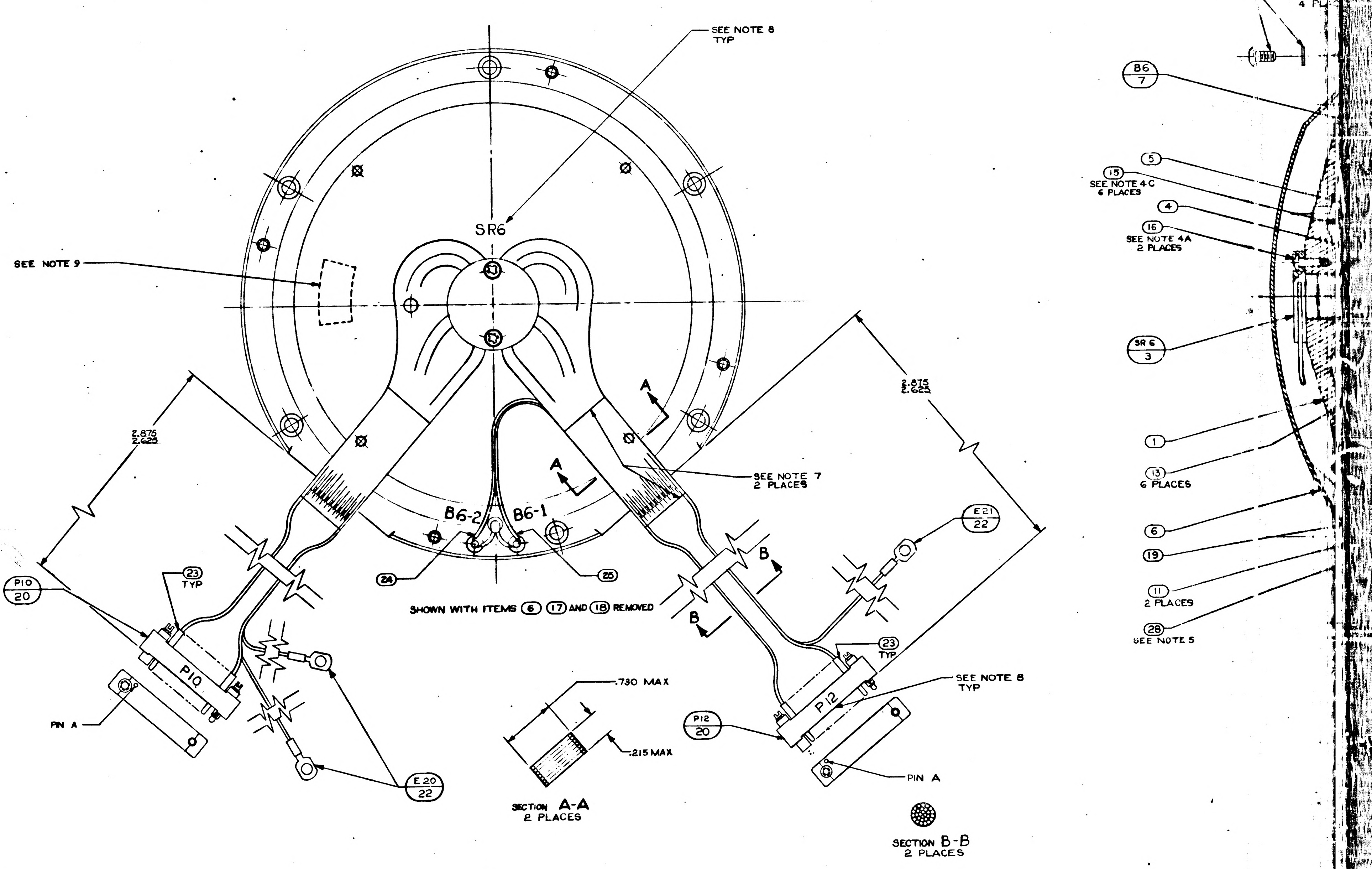
CODE IDENT NO. 80230 SIZE V NASA DRAWING NO. 2018611
SCALE 2/1 WT SHEET 1 OF

2018611	REV D	SHEET 1

E2

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS 2018611
3. ECCENTRICITY MARKS ON THE OUTER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ② IS IN THE POSITION SHOWN
   THE ECCENTRICITY MARKS ON THE INNER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-B-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① IS IN THE POSITION SHOWN
   APPLY A THIN COAT OF ㉖ TO INSIDE DIAMETER OF ④ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   A. 3.5 IN LB
   B. 5.0 IN LB
   C. 10.0 IN LB
5. SOLDER LEADS FROM ⑦ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉗ SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑳ AND ㉑ PER ND 1002071 USING ㉘ WIRE INSULATION SHALL BE WITHIN .06 OF SOLDERED CONNECTION
6. HEAT SHRINK SLEEVING ON ㉒ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ⑦ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ⑦
12. "Y" OR "N" IN TINNED COLUMN OF SHEETS 2 THRU INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NO. SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3) & (15-1, 15-2, 15-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"


SEE NOTE 8
TYP
SR6
SEE NOTE 9
2.875
2.625
2.875
2.625
A
A
B
B
B6-2
B6-1
24
25
SEE NOTE 7
2 PLACES
E21
22
P10
20
23
TYP
P10
PIN A
E20
22
SHOWN WITH ITEMS 6 17 AND 18 REMOVED
.730 MAX
.215 MAX
SECTION A-A
2 PLACES
P12
20
P12
23
TYP
SEE NOTE 8
TYP
PIN A
SECTION B-B
2 PLACES
17
B6
7
5
15
SEE NOTE 4 C
6 PLACES
4
16
SEE NOTE 4A
2 PLACES
SR 6
3
1
13
6 PLACES
6
19
11
2 PLACES
28
SEE NOTE 5

2018611 REV D SHEET 1

TDRR 16813

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REVISION D

NASA DRAWING NO. 2018611
SHEET 2 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
1					22						
1-A		SHLD-1					E20				
1-1		P10-A	13	Y	23		SR6-1				
1-2		P10-B	13	Y	23		SR6-2				
1-3		P10-C	13	Y	23		SR6-3				
2		P10-D	13	Y	23		SR6-4				
3		P10-E	13	Y	23		SR6-5				
4-1		P10-F	13	Y	23		SR6-6				
4-2		P10-H	13	Y	23		SR6-7				
5-1		P10-J	13	Y	23		SR6-8				
5-2		P10-K	13	Y	23		SR6-9				
6-1		P10-L	13	Y	23		SR6-10				
6-2		P10-M	13	Y	23		SR6-11				
7					22						
7-A		SHLD-7					E20				
7-1		P10-N	13	Y	23		SR6-12				
7-2		P10-P	13	Y	23		SR6-13				
7-3		P10-R	13	Y	23		SR6-14				

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NASA DRAWING NO. 2018611
SHEET 3 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
8		P10-S	13	Y	23		SR6-15				
9		P10-T	13	Y	23		SR6-16				
10-1		P10-U	13	Y	23		SR6-17				
10-2		P10-V	13	Y	23		SR6-18				
11-1		P10-W	13	Y	23		SR6-19				
11-2		P10-X	13	Y	23		SR6-20				
12		P12-A	13	Y	23		SR6-26				
13		P12-B	13	Y	23		SR6-27				
14		P12-C	13	Y	23		SR6-28				
15					23						
15-A		SHLD-15			23		E21				
15-1		P12-D	13	Y	23		SR6-29				
15-2		P12-E	13	Y	23		SR6-30				
15-3		P12-F	13	Y	23		SR6-31				
16		P12-H	13	Y	23		SR6-32				
17		P12-J	13	Y	23		SR6-33				
18		P12-K	13	Y	23		SR6-34				

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REVISION D

NASA DRAWING NO. 2018611
SHEET 4 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
19-1		P12-L	13	Y	23		SR6-35				
19-2		P12-M	13	Y	23		SR6-36				
20-1		P12-N	13	Y	23		SR6-37				
20-2		P12-P	13	Y	23		SR6-38				
21	25	P12-R	13	Y	23		B6-1	19	Y		
22	24	P12-S	13	Y	23		B6-2	19	Y		
23		B6-BLK					B6-1	19	Y		
24		B6-WHT					B6-2	19	Y		
25		P12-T	13	Y	23		SR6-39				
26		P12-U	13	Y	23		SR6-40				
27-1		P12-Y	13	Y	23		SR6-21				
27-2		P12-Z	13	Y	23		SR6-22				
27-3		P12-a	13	Y	23		SR6-23				
27-4		P12-b	13	Y	23		SR6-24				
27-5		P12-c	13	Y	23		SR6-25				

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NASA DRAWING NO. 2018611
SHEET 5 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
28		J14-A	13	Y	23		SR6-1				
29		J14-B	13	Y	23		SR6-2				
30		J13-C	13	Y	23		SR6-3				
31		J14-D	13	Y	23		SR6-4				
32		J14-E	13	Y	23		SR6-5				
33-1		J14-F	13	Y	23		SR6-6				
33-2		J14-H	13	Y	23		SR6-7				
34-1		J14-J	13	Y	23		SR6-8				
34-2		J14-K	13	Y	23		SR6-9				
35-1		J14-L	13	Y	23		SR6-10				
35-2		J14-M	13	Y	23		SR6-11				
36		J14-N	13	Y	23		SR6-12				
37		J14-P	13	Y	23		SR6-13				
38		J14-R	13	Y	23		SR6-14				

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REVISION D

NASA DRAWING NO. 2018611
SHEET 6 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.
39			J14-S	13	Y	23		SR6-15			
40			J14-T	13	Y	23		SR6-16			
41-1			J14-U	13	Y	23		SR6-17			
41-2			J14-V	13	Y	23		SR6-18			
42-1			J14-W	13	Y	23		SR6-19			
42-2			J14-X	13	Y	23		SR6-20			
43-1			J14-Y	13	Y	23		SR6-21			
43-2			J14-Z	13	Y	23		SR6-22			
43-3			J14-AA	13	Y	23		SR6-23			
43-4			J14-BB	13	Y	23		SR6-24			
43-5			J14-CC	13	Y	23		SR6-25			
44			J14-DD	13	Y	23		SR6-26			
45			J14-EE	13	Y	23		SR6-27			
46			J14-FF	13	Y	23		SR6-28			

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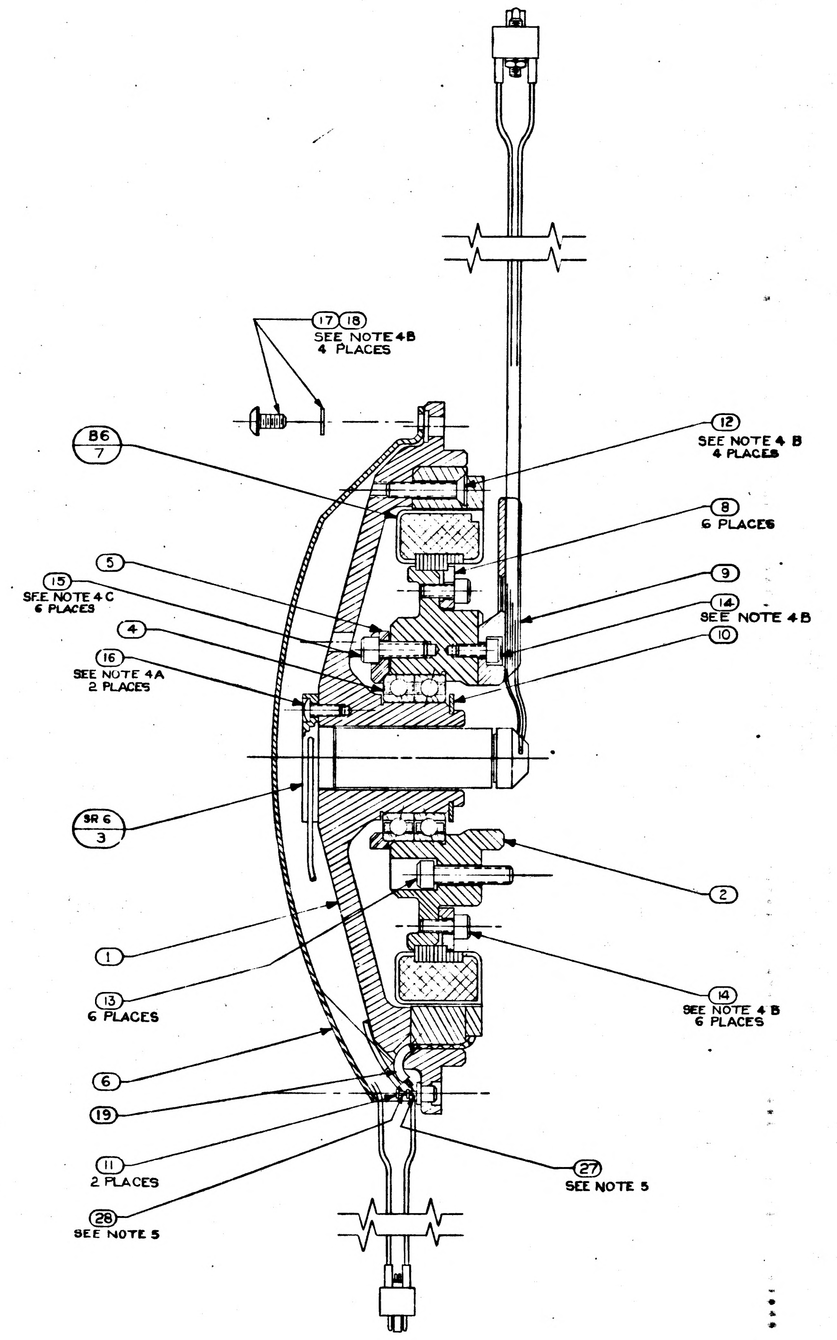
REVISION D

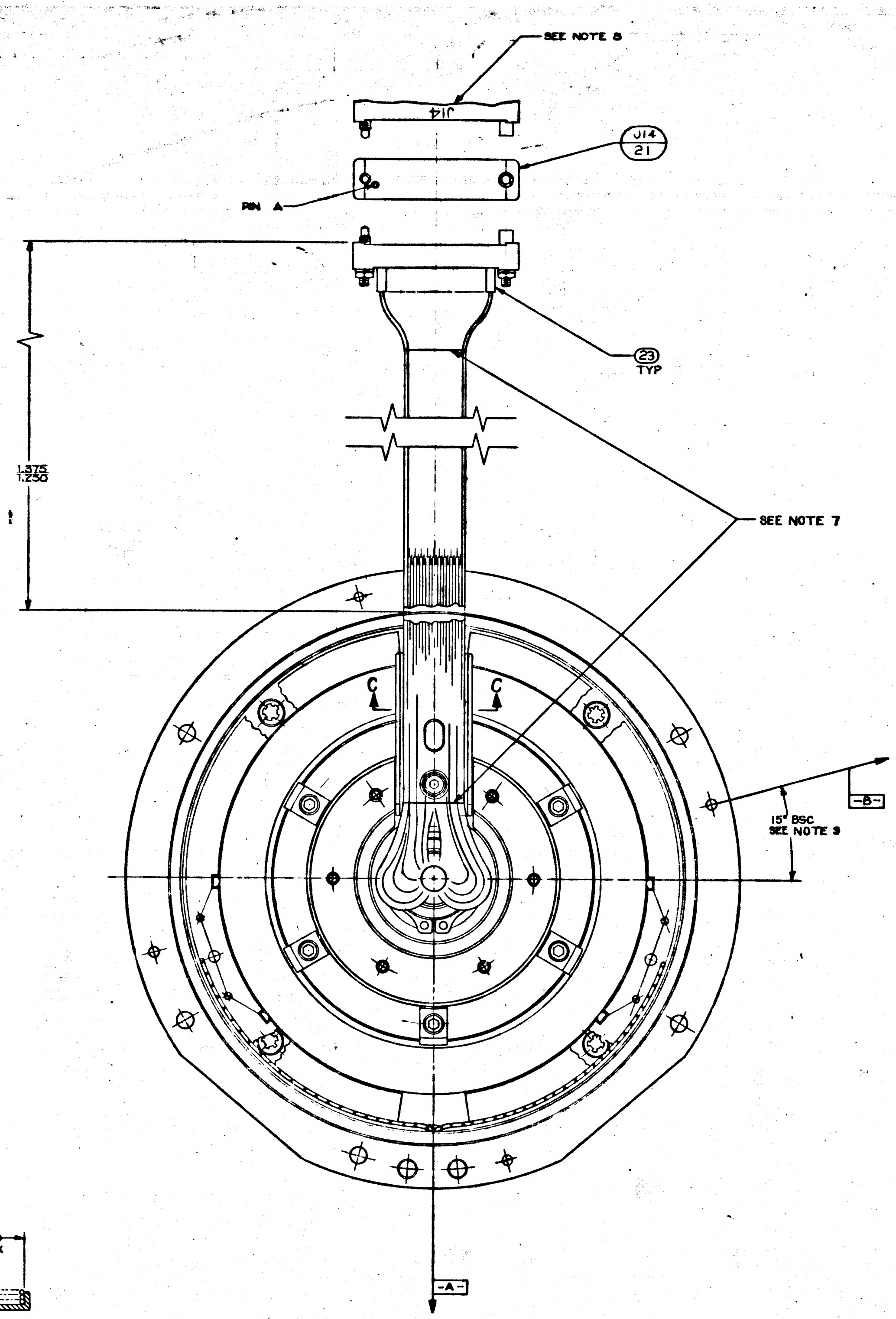
NASA DRAWING NO. 2018611
SHEET 7 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.
47			J14-HH	13	Y	23		SR6-29			
48			J14-JJ	13	Y	23		SR6-30			
49			J14-KK	13	Y	23		SR6-31			
50			J14-LL	13	Y	23		SR6-32			
51			J14-MM	13	Y	23		SR6-33			
52			J14-NN	13	Y	23		SR6-34			
53-1			J14-PP	13	Y	23		SR6-35			
53-2			J14-RR	13	Y	23		SR6-36			
54-1			J14-SS	13	Y	23		SR6-37			
54-2			J14-TT	13	Y	23		SR6-38			
55			J14-UU	13	Y	23		SR6-39			
56			J14-VV	13	Y	23		SR6-40			

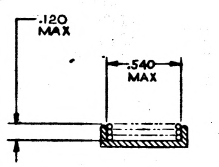
SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 16813		
A	REVISED TDRR 17687		WR
B	REVISED TDRR 19268	2 Jun 65	WR
C	REVISED TDRR 21675	31 Aug 65	WR
D	REVISED TDRR 22331	21 Sep 65	WR
E	REVISED TDRR 26250	2-1-66	WR
F	REVISED PER TDRR 26587		WR



17 18
SEE NOTE 4B
4 PLACES
86
7
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
5
9
15
SEE NOTE 4 C
6 PLACES
14
SEE NOTE 4 B
10
4
16
SEE NOTE 4A
2 PLACES
SR 6
3
2
1
13
6 PLACES
14
SEE NOTE 4 B
6 PLACES
6
19
11
2 PLACES
27
SEE NOTE 5
28
SEE NOTE 5



SEE NOTE 8
J14
J14
21
PIN A
23
TYP
1.375
1.250
SEE NOTE 7
C
C
15° BSC
SEE NOTE 9
-B-
-A-



.120
MAX
.540
MAX

SECTION C-C

A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	29
A/R	A/R	QQ-S-571 SN60	SOLDER	28
A/R	A/R	QQ-S-571 SN10	SOLDER	27
A/R	A/R	1010870	GREASE, LUBRICATING	26
1	1	1010416-1	WIRE, AWG 28E BLACK 8" LONG	25
1	1	1010416-10	WIRE, AWG 28E WHITE 8" LONG	24
82	82	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	23
3	3	1000020-4	SHIELD AND GROUND ASSY	22
1	1	1010917-109	CONN ELEC RECEPT 44 PIN	21
2	2	1010917-806	CONN ELEC PLUG 26 PIN	20
1	1	1010490-054	INSULATION SLEEVING, ELEC HEAT SHRINK	19
4	4	MS15795-703	WASHER, FLAT, METAL, ROUND	18
4	4	1010891-12	SCREW BUTTON HD SELF LKG SOC SPLINE	17
2	2	1010891-2	SCREW BUTTON HD SELF LKG SOC SPLINE	16
6	6	1001488-18	SCREW HEX SOC HD SELF-LOCKING	15
7	7	1001488-2	SCREW HEX SOC HD SELF-LOCKING	14
6	6	1001489-22	SCREW HEX SOC HD	13
4	4	1010867-17	SCREW FLAT HD SELF LOCKING SOC SPLINE	12
2	2	1000100-1	TERMINAL INSULATED	11
1	1	MS-16624-4075	RING RETAINING EXTERNAL BASIC	10
1	1	2018822	RETAINER WIRE INNER AXIS	9
6	6	2018745	CLIP RETAINER TORQUE MOTOR INNER AXIS	8
1	1	2018623	MOTOR TORQUE DC FRAMELESS	7
1	1	2018781	WIRE GUIDE BRG HSG T.M. I.A.	6
1	1	2018747	PLATE BEARING RETAINER T.M. I.A.	5
1	1	2018621	BALL BEARING DUPLEX	4
1	1	2018634	SLIP RING ASSY ELEC 40 CONTACT	3
1	1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS	2
1	1	2018746	HOUSING BEARING TORQUE MOTOR I.A.	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

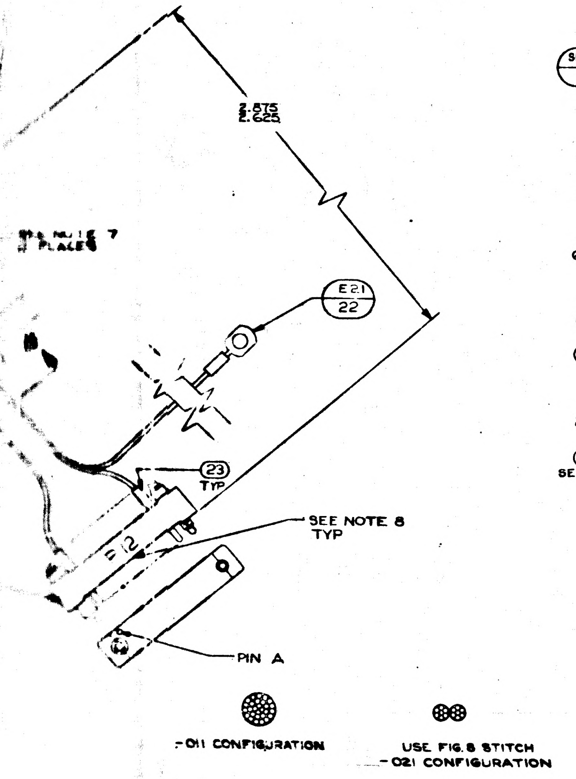
MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN L. Morse DATE 6-8-64 CHECKED G. QUINN 2-17-65 APPROVAL APPROVAL	INTER-GIMBAL SUB-ASSEMBLY TORQUE MOTOR INNER AXIS
2018604	DL2018601	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO. 80230 / SIZE J / NASA DRAWING NO. 2018611
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL	SCALE 2/1 / WT / SHEET 1 OF 13
APPLICATION				

2018611 F

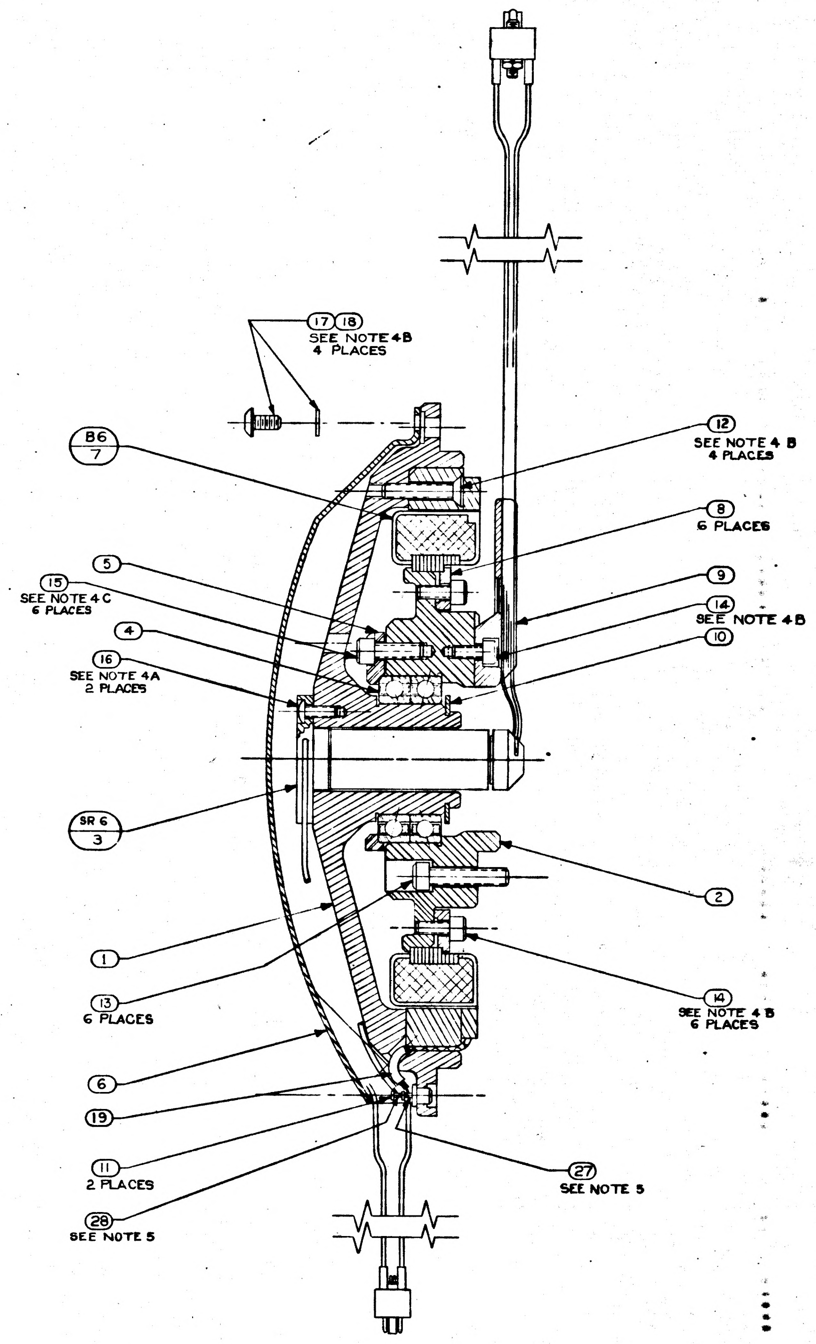
E3

SYM	DESCRIPTION	DATE	APP	
A	REVISED TDRR 17687	[illegible]	[illegible]	[illegible]
B	REVISED TDRR 19268	2 Jun 65	[illegible]	[illegible]
C	REVISED TDRR 21675	[illegible]	[illegible]	[illegible]
D	REVISED TDRR 22331	11 Sep 65	[illegible]	[illegible]
E	REVISED TDRR 36250	2-1-66	[illegible]	[illegible]
F	REVISED PER TDRR 26587	[illegible]	[illegible]	[illegible]

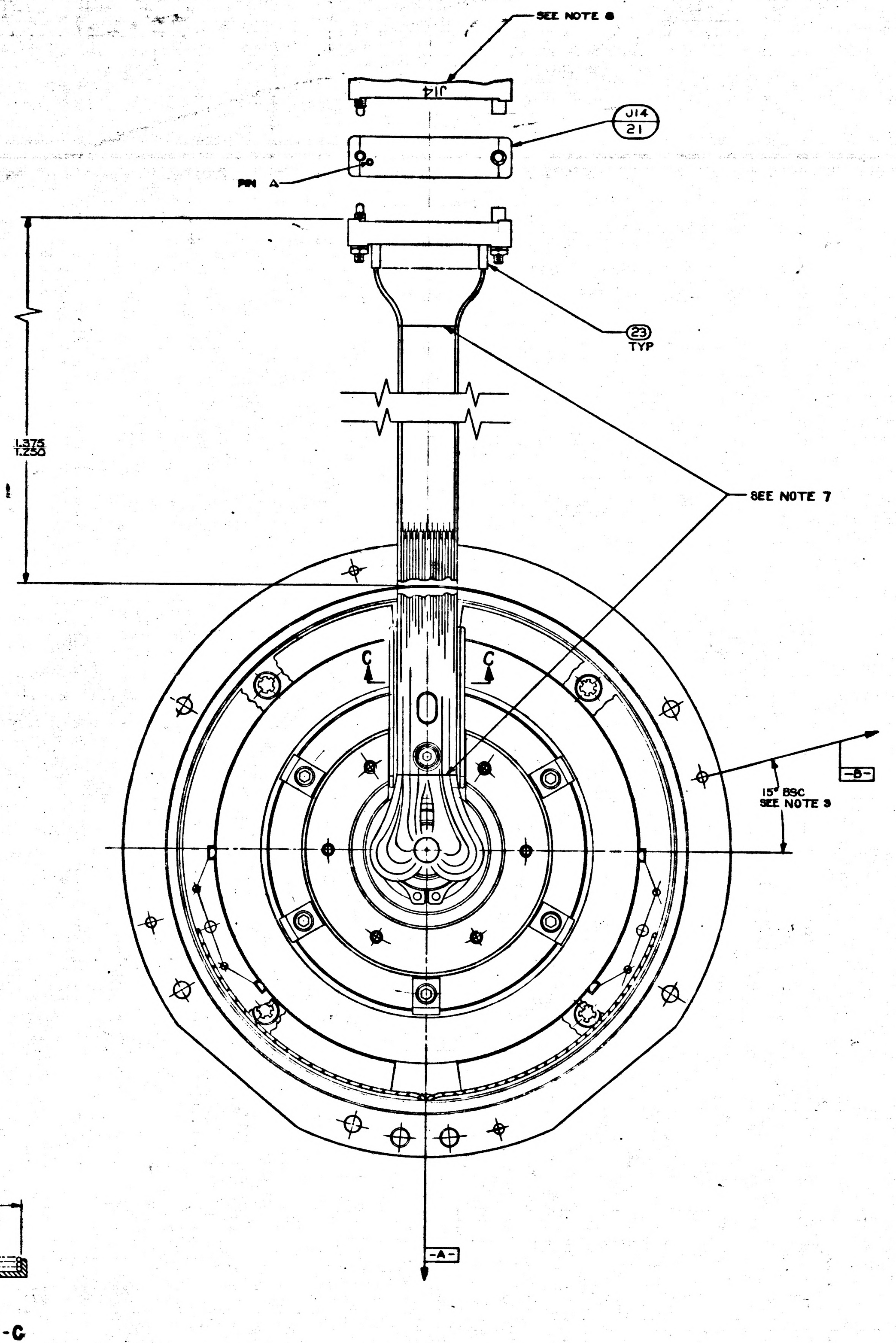


2.575
2.565
SEE NOTE 7
4 PLACES
E21
22
23
TYP
SEE NOTE 8
TYP
PIN A
F011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION

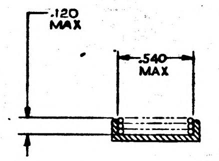
SECTION B-B



17 18
SEE NOTE 4B
4 PLACES
B6
7
5
15
SEE NOTE 4C
6 PLACES
4
16
SEE NOTE 4A
2 PLACES
SR6
3
1
13
6 PLACES
6
19
11
2 PLACES
28
SEE NOTE 5
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
9
14
SEE NOTE 4B
10
2
14
SEE NOTE 4 B
6 PLACES
27
SEE NOTE 5



SEE NOTE 8
J14
J14
21
PIN A
23
TYP
1.375
1.240
SEE NOTE 7
C
C
15° BSC
SEE NOTE 3
B
A



.120
MAX
.540
MAX

SECTION C-C

A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	29
A/R	A/R	QQ-S-571 SN60	SOLDER	28
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6	6	1001489-22	SCREW HEX SOC HD	13
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1	1	2018781	WIRE GUIDE BRG HSG T.M. I.A.	6
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1	1	2018621	BALL BEARING DUPLEX	4
1	1	2018634	SLIP RING ASSY ELEC 40 CONTACT	3
1	1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS	2
1	1	2018746	HOUSING BEARING TORQUE MOTOR	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
021	011	LIST OF MATERIALS		

MASTER

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN L. Morse DATE 6-8-64
CHECKED J. QUINN 2-7-65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTER-GIMBAL SUB-ASSEMBLY
TORQUE MOTOR
INNER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018611
SCALE 2/1
WT
SHEET

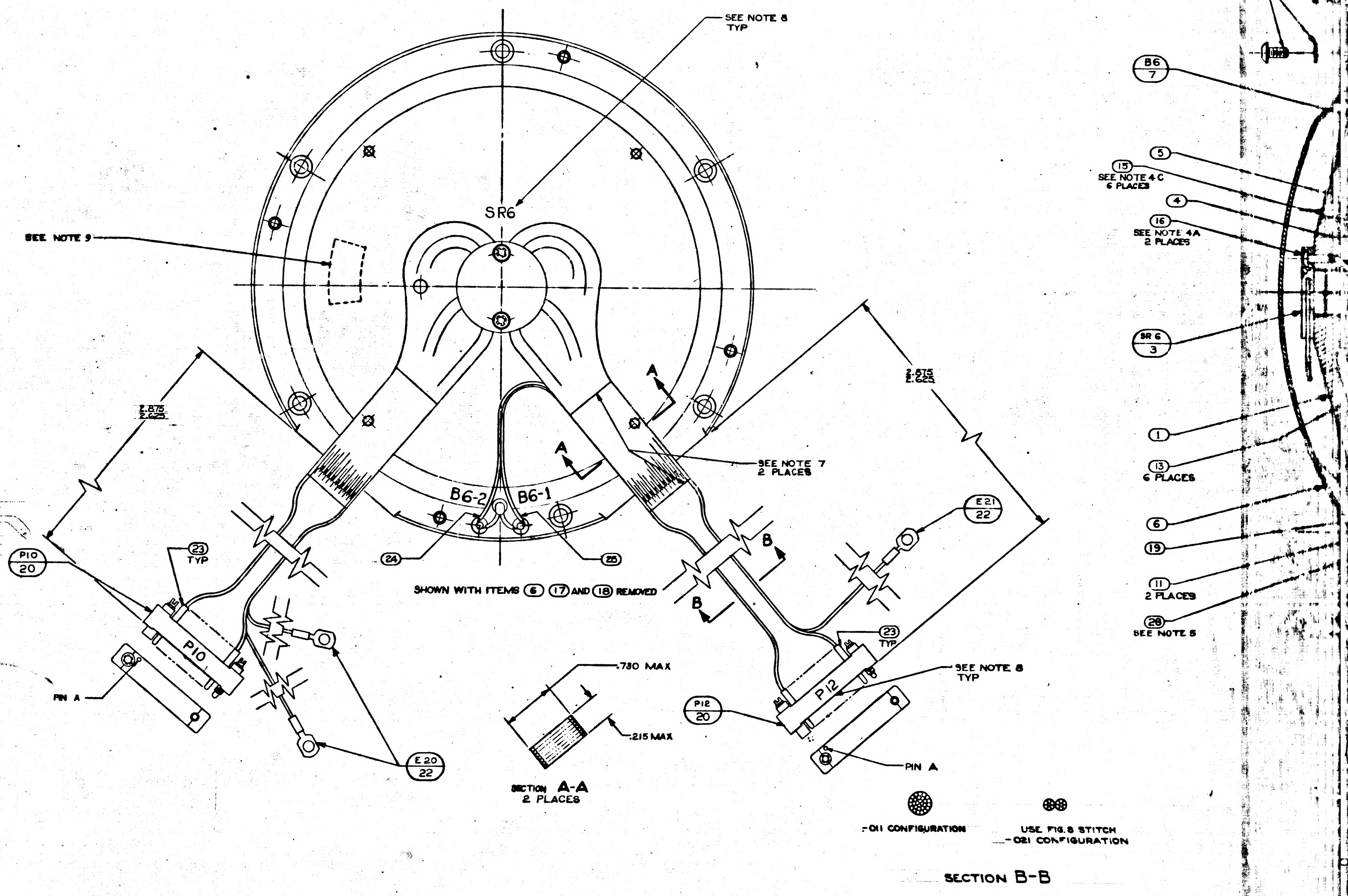
2018611 REV F SHEET 1

F-2

TABLE I	
ASSEMBLY NO.	PS. NUMBER
2018611-011	PS. 2018611
2018611-021	PS. 2016147

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS PER TABLE I
3. ECCENTRICITY MARKS ON THE OUTER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ② IS IN THE POSITION SHOWN
   THE ECCENTRICITY MARKS ON THE INNER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-B-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① IS IN THE POSITION SHOWN
   APPLY A THIN COAT OF ㉖ TO INSIDE DIAMETER OF ④ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   A. 3.5 IN LB
   B. 5.0 IN LB
   C. 10.0 IN LB
5. SOLDER LEADS FROM ⑦ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉗ SOLDER ALL OTHER. LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑳ AND ㉑ PER ND1002071 USING ㉘ WIRE INSULATION SHALL BE WITHIN .06 OF SOLDERED CONNECTION
6. HEAT SHRINK SLEEVING ON ㉒ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ⑦ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ⑦
12. "Y" OR "N" IN TINNED COLUMN OF SHEETS 2 THRU INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NO. SHALL BE TWISTED TOGETHER PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3) & (15-1, 15-2, 15-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"


SEE NOTE 8
TYP
SR6
SEE NOTE 9
A
A
B
B
2.875
2.625
SEE NOTE 7
2 PLACES
B6-2
B6-1
24
25
SHOWN WITH ITEMS 6 17 AND 18 REMOVED
E21
22
P10
20
23
TYP
P10
PIN A
E20
22
.730 MAX
.215 MAX
SECTION A-A
2 PLACES
P12
20
23
TYP
P12
SEE NOTE 8
TYP
PIN A
-011 CONFIGURATION
USE FIG.8 STITCH
-021 CONFIGURATION
SECTION B-B
B6
7
5
15
SEE NOTE 4C
6 PLACES
4
16
SEE NOTE 4A
2 PLACES
SR6
3
1
13
6 PLACES
6
19
11
2 PLACES
28
SEE NOTE 5

TDRR 16813

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REVISION E

NASA DRAWING NO. 2018611-011
SHEET 2 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	
1				22		
1-A		SHLD-1			E20	
1-1		P10-A	13Y	23	SR6-1	
1-2		P10-B	13Y	23	SR6-2	
1-3		P10-C	13Y	23	SR6-3	
2		P10-D	13Y	23	SR6-4	
3		P10-E	13Y	23	SR6-5	
4-1		P10-F	13Y	23	SR6-6	
4-2		P10-H	13Y	23	SR6-7	
5-1		P10-J	13Y	23	SR6-8	
5-2		P10-K	13Y	23	SR6-9	
6-1		P10-L	13Y	23	SR6-10	
6-2		P10-M	13Y	23	SR6-11	
7				22		
7-A		SHLD-7			E20	
7-1		P10-N	13Y	23	SR6-12	
7-2		P10-P	13Y	23	SR6-13	
7-3		P10-R	13Y	23	SR6-14	

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REVISION E

NASA DRAWING NO. 2018611-011
SHEET 3 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	
8		P10-S	13Y	23	SR6-15	
9		P10-T	13Y	23	SR6-16	
10-1		P10-U	13Y	23	SR6-17	
10-2		P10-V	13Y	23	SR6-18	
11-1		P10-W	13Y	23	SR6-19	
11-2		P10-X	13Y	23	SR6-20	
12		P12-A	13Y	23	SR6-26	
13		P12-B	13Y	23	SR6-27	
14		P12-C	13Y	23	SR6-28	
15				23		
15-A		SHLD-15		23	E21	
15-1		P12-D	13Y	23	SR6-29	
15-2		P12-E	13Y	23	SR6-30	
15-3		P12-F	13Y	23	SR6-31	
16		P12-H	13Y	23	SR6-32	
17		P12-J	13Y	23	SR6-33	
18		P12-K	13Y	23	SR6-34	

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NASA DRAWING NO. 2018611-011
SHEET 4 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	
19-1		P12-L	13Y	23	SR6-35	
19-2		P12-M	13Y	23	SR6-36	
20-1		P12-N	13Y	23	SR6-37	
20-2		P12-P	13Y	23	SR6-38	
21	25	P12-R	13Y	23	B6-1	19Y
22	24	P12-S	13Y	23	B6-2	19Y
23		B6-BLK			B6-1	19Y
24		B6-WHT			B6-2	19Y
25		P12-T	13Y	23	SR6-39	
26		P12-U	13Y	23	SR6-40	
27-1		P12-Y	13Y	23	SR6-21	
27-2		P12-Z	13Y	23	SR6-22	
27-3		P12-a	13Y	23	SR6-23	
27-4		P12-b	13Y	23	SR6-24	
27-5		P12-c	13Y	23	SR6-25	

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REVISION E

NASA DRAWING NO. 2018611-011
SHEET 5 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	
28		J14-A	13Y	23	SR6-1	
29		J14-B	13Y	23	SR6-2	
30		J13-C	13Y	23	SR6-3	
31		J14-D	13Y	23	SR6-4	
32		J14-E	13Y	23	SR6-5	
33-1		J14-F	13Y	23	SR6-6	
33-2		J14-H	13Y	23	SR6-7	
34-1		J14-J	13Y	23	SR6-8	
34-2		J14-K	13Y	23	SR6-9	
35-1		J14-L	13Y	23	SR6-10	
35-2		J14-M	13Y	23	SR6-11	
36		J14-N	13Y	23	SR6-12	
37		J14-P	13Y	23	SR6-13	
38		J14-R	13Y	23	SR6-14	

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NASA DRAWING NO.
2018611-011
SHEET 6 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	T/N	TO TERMINATION SPEC FIND NO.	NO.
39			J14-S	13	Y	23		SR6-15				
40			J14-T	13	Y	23		SR6-16				
41-1			J14-U	13	Y	23		SR6-17				
41-2			J14-V	13	Y	23		SR6-18				
42-1			J14-W	13	Y	23		SR6-19				
42-2			J14-X	13	Y	23		SR6-20				
43-1			J14-Y	13	Y	23		SR6-21				
43-2			J14-Z	13	Y	23		SR6-22				
43-3			J14-AA	13	Y	23		SR6-23				
43-4			J14-BB	13	Y	23		SR6-24				
43-5			J14-CC	13	Y	23		SR6-25				
44			J14-DD	13	Y	23		SR6-26				
45			J14-EE	13	Y	23		SR6-27				
46			J14-FF	13	Y	23		SR6-28				

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REVISION
E

NASA DRAWING NO.
2018611-011
SHEET 7 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	T/N	TO TERMINATION SPEC FIND NO.	NO.
47			J14-HH	13	Y	23		SR6-29				
48			J14-JJ	13	Y	23		SR6-30				
49			J14-KK	13	Y	23		SR6-31				
50			J14-LL	13	Y	23		SR6-32				
51			J14-MM	13	Y	23		SR6-33				
52			J14-NN	13	Y	23		SR6-34				
53-1			J14-PP	13	Y	23		SR6-35				
53-2			J14-RR	13	Y	23		SR6-36				
54-1			J14-SS	13	Y	23		SR6-37				
54-2			J14-TT	13	Y	23		SR6-38				
55			J14-UU	13	Y	23		SR6-39				
56			J14-VV	13	Y	23		SR6-40				

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REVISION
E

NASA DRAWING NO.
2018611-021
SHEET 8 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	T/N	TO TERMINATION SPEC FIND NO.	NO.
1						22						
1-A			SHLD-1					E20				
1-1			P10-A	13	Y	23		SR6-1				
1-2			P10-B	13	Y	23		SR6-2				
1-3			P10-C	13	Y	23		SR6-3				
2			P10-D	13	Y	23		SR6-4				
3			P10-E	13	Y	23		SR6-5				
4-1			P10-F	13	Y	23		SR6-6				
4-2			P10-H	13	Y	23		SR6-7				
5-1			P10-J	13	Y	23		SR6-8				
5-2			P10-K	13	Y	23		SR6-9				
6-1			P10-L	13	Y	23		SR6-10				
6-2			P10-M	13	Y	23		SR6-11				
7						22						
7-A			SHLD-7					E20				
7-1			P10-N	13	Y	23		SR6-12				
7-2			P10-P	13	Y	23		SR6-13				
7-3			P10-R	13	Y	23		SR6-14				

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NASA DRAWING NO.
2018611-021
SHEET 9 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	T/N	TO TERMINATION SPEC FIND NO.	NO.
8			P10-S	13	Y	23		SR6-15				
9			P10-T	13	Y	23		SR6-16				
10-1			P10-U	13	Y	23		SR6-17				
10-2			P10-V	13	Y	23		SR6-18				
11-1			P10-W	13	Y	23		SR6-19				
11-2			P10-X	13	Y	23		SR6-20				
12			P12-A	13	Y	23		SR6-26				
13			P12-B	13	Y	23		SR6-27				
14			P12-C	13	Y	23		sR6-28				
15						23						
15-A			SHLD-15			23		E21				
15-1			P12-D	13	Y	23		SR6-29				
15-2			P12-E	13	Y	23		SR6-30				
15-3			P12-F	13	Y	23		SR6-31				
16			P12-H	13	Y	23		SR6-32				
17			P12-J	13	Y	23		SR6-33				
18			P12-K	13	Y	23		SR6-34				

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NASA DRAWING NO.
2018611-021
SHEET 10 of 13

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.
19-1		P12-L	13Y	23		SR6-35			
19-2		P12-M	13Y	23		SR6-36			
20-1		P12-N	13Y	23		SR6-37			
20-2		P12-P	13Y	23		SR6-38			
21	25	P12-R	13Y	23		B6-1	19Y		
22	24	P12-S	13Y	23		B6-2	19Y		
23		B6-BLK				B6-1	19Y		
24		B6-WHT				B6-2	19Y		
25		P12-T	13Y	23		SR6-39			
26		P12-U	13Y	23		SR6-40			
27-1		P12-Y	13Y	23		SR6-21			
27-2		P12-Z	13Y	23		SR6-22			
27-3		P12-a	13Y	23		SR6-23			
27-4		P12-b	13Y	23		sR6-24			
27-5		P12-c	13Y	23		SR6-25			

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NASA DRAWING NO.
2018611-021
SHEET 11 of 13

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.
28		J14-A	13Y	23		SR6-1			
29		J14-B	13Y	23		SR6-2			
30		J14-C	13Y	23		SR6-3			
31		J14-D	13Y	23		SR6-4			
32		J14-E	13Y	23		SR6-5			
33-1		J14-J	13Y	23		SR6-6			
33-2		J14-K	13Y	23		SR6-7			
34-1		J14-F	13Y	23		SR6-8			
34-2		J14-H	13Y	23		SR6-9			
35-1		J14-M	13Y	23		SR6-10			
35-2		J14-L	13Y	23		SR6-11			
36		J14-N	13Y	23		SR6-12			
37		J14-P	13Y	23		SR6-13			
38		J14-R	13Y	23		SR6-14			

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NASA DRAWING NO.
2018611-021
SHEET 12 of 13

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.
39		J14-S	13Y	23		SR6-15			
40		J14-T	13Y	23		SR6-16			
41-1		J14-U	13Y	23		SR6-17			
41-2		J14-V	13Y	23		SR6-18			
42-1		J14-X	13Y	23		SR6-19			
42-2		J14-W	13Y	23		SR6-20			
43-1		J14-Y	13Y	23		SR6-21			
43-2		J14-Z	13Y	23		SR6-22			
43-3		J14-AA	13Y	23		SR6-23			
43-4		J14-BB	13Y	23		SR6-24			
43-5		J14-CC	13Y	23		SR6-25			
44		J14-DD	13Y	23		SR6-26			
45		J14-EE	13Y	23		SR6-27			
46		J14-FF	13Y	23		SR6-28			

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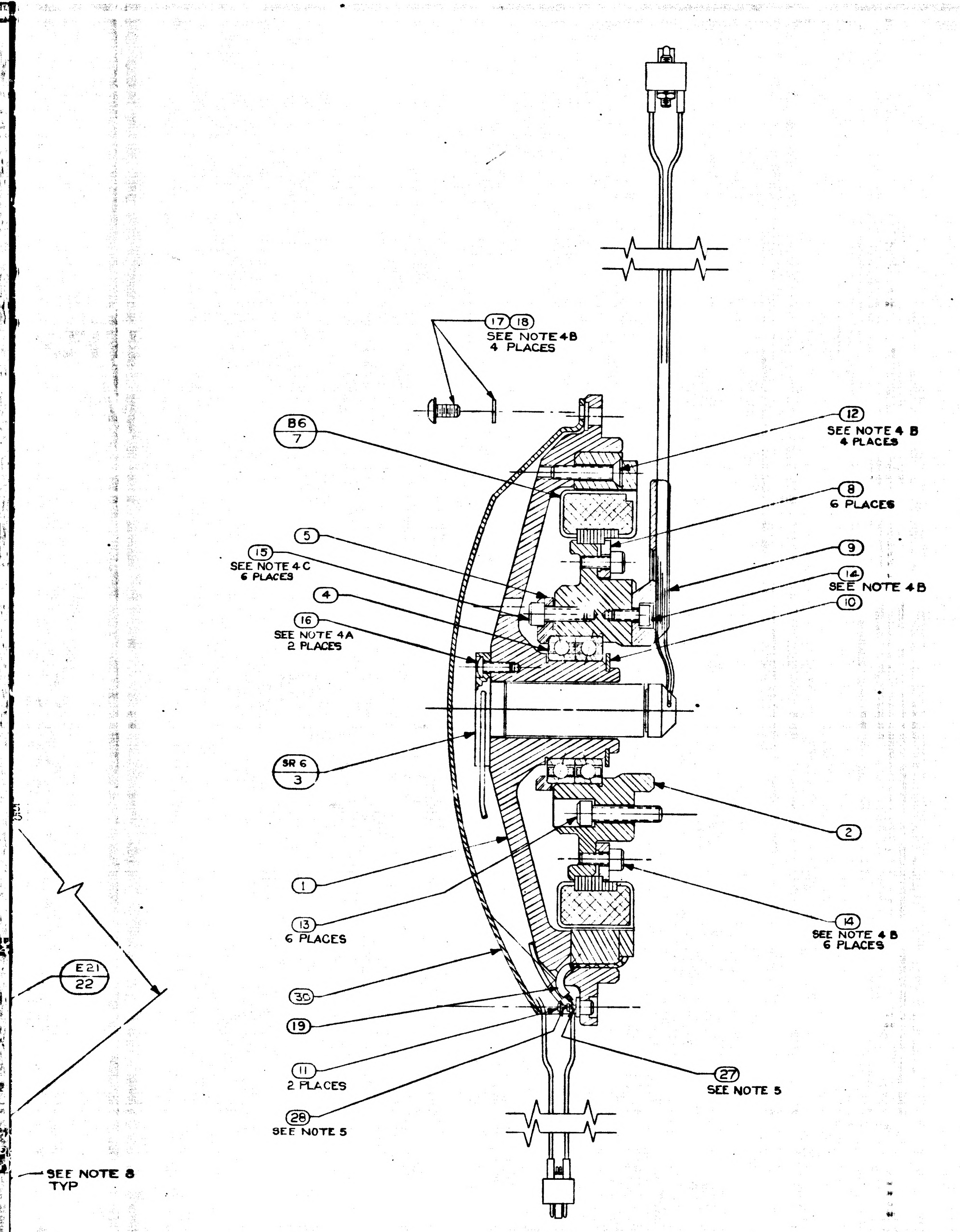
NASA DRAWING NO.
2018611-021
SHEET 13 of 13

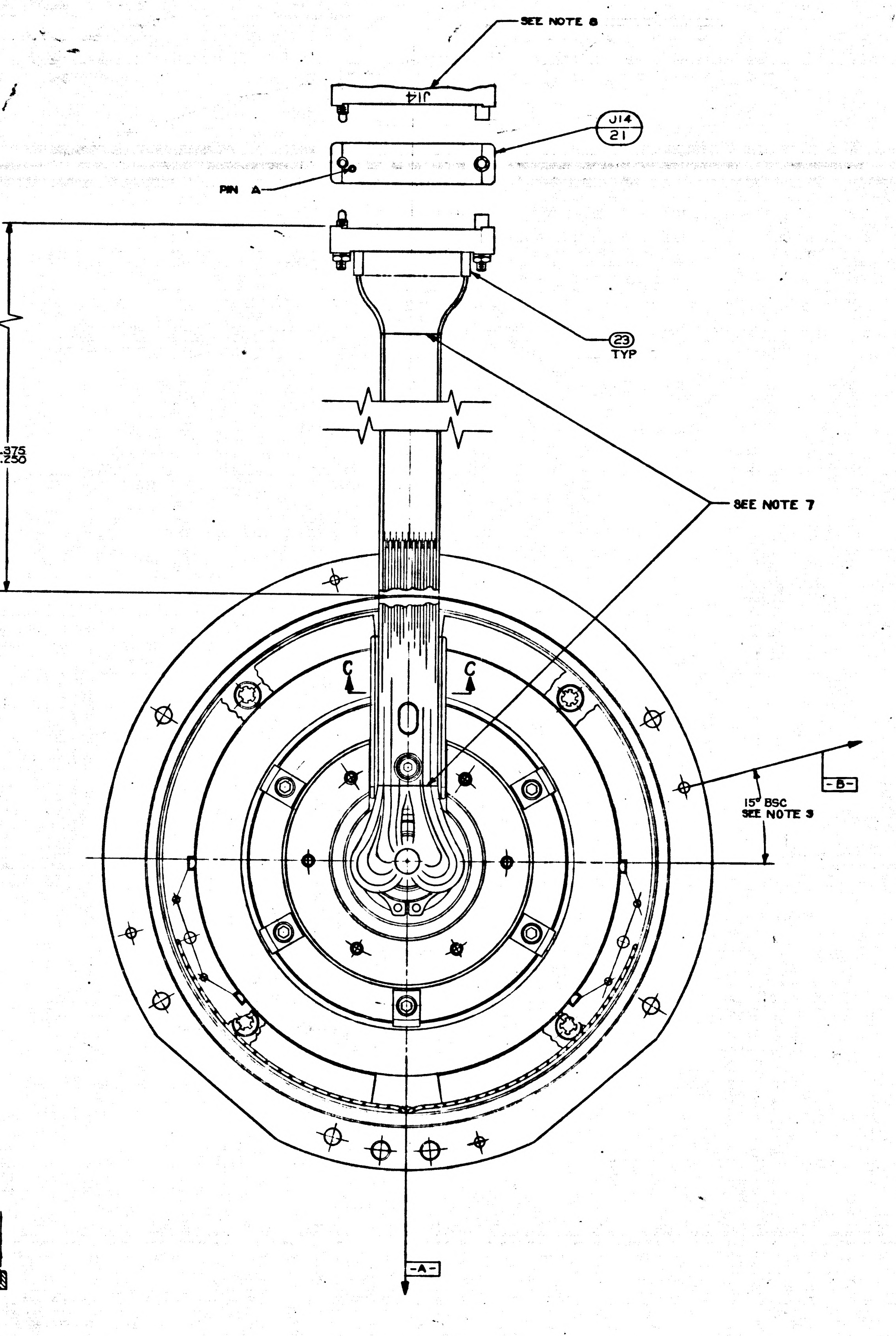
CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	NO.
47		J14-HH	13Y	23		SR6-29			
48		J14-JJ	13Y	23		SR6-30			
49		J14-KK	13Y	23		SR6-31			
50		J14-LL	13Y	23		SR6-32			
51		J14-MM	13Y	23		SR6-33			
52		J14-NN	13Y	23		SR6-34			
53-1		J14-PP	13Y	23		SR6-35			
53-2		J14-RR	13Y	23		SR6-36			
54-1		J14-SS	13Y	23		SR6-37			
54-2		J14-TT	13Y	23		SR6-38			
55		J14-UU	13Y	23		SR6-39			
56		J14-VV	13Y	23		SR6-40			

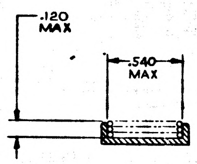
SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 16813		
A	REVISED TDRR 17687		
B	REVISED TDRR 19268	2 Jun 65	
C	REVISED TDRR 21675	31 Aug 65	
D	REVISED TDRR 22331	21 Sep 65	
E	REVISED TDRR 26250	2-1-66	
F	REVISED PER TDRR 26587	7 Mar 66	
G	REVISED TDRR 28288	2 May 66	


17
18
SEE NOTE 4B
4 PLACES
B6
7
5
15
SEE NOTE 4 C
6 PLACES
4
16
SEE NOTE 4A
2 PLACES
SR 6
3
1
13
6 PLACES
E21
22
30
19
11
2 PLACES
28
SEE NOTE 5
SEE NOTE 8
TYP
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
9
14
SEE NOTE 4B
10
2
14
SEE NOTE 4 B
6 PLACES
27
SEE NOTE 5

...ATION USE F.G.B SWITCH
...02 CONFIGURATION

SECTION B-B


SEE NOTE 8
J14
J14
21
PIN A
23
TYP
1.375
1.250
SEE NOTE 7
C
C
-B-
15° BSC
SEE NOTE 3
-A-


.120
MAX
.540
MAX

SECTION C-C

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1	2018845	WIRE GUIDE, BRG. HSG., T.M., I.A.	30
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	29
A/R	A/R	QQ-S-571 SN60	SOLDER	28
A/R	A/R	QQ-S-571 SN10	SOLDER	27
A/R	A/R	1010870	GREASE, LUBRICATING	26
1	1	1010416-1	WIRE, AWG 28E BLACK 8" LONG	25
1	1	1010416-10	WIRE, AWG 28E WHITE 8" LONG	24
82	82	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	23
3	3	1000020-4	SHIELD AND GROUND ASSY	22
1	1	1010917-109	CONN ELEC RECEPT 44 PIN	21
2	2	1010917-806	CONN ELEC PLUG 26 PIN	20
1	1	1010490-054	INSULATION SLEEVING, ELEC HEAT SHRINK	19
4	4	MS15795-703	WASHER, FLAT, METAL, ROUND	18
4	4	1010891-12	SCREW BUTTON HD SELF LKG SOC SPLINE	17
2	2	1010891-2	SCREW BUTTON HD SELF LKG SOC SPLINE	16
6	6	1001488-18	SCREW HEX SOC HD SELF-LOCKING	15
7	7	1001488-2	SCREW HEX SOC HD SELF-LOCKING	14
6	6	1001489-22	SCREW HEX SOC HD	13
4	4	1010867-17	SCREW FLAT HD SELF LOCKING SOC SPLINE	12
2	2	1000100-1	TERMINAL INSULATED	11
1	1	MS16624-4075	RING RETAINING EXTERNAL BASIC	10
1	1	2018822	RETAINER WIRE INNER AXIS	9
6	6	2018745	CLIP RETAINER TORQUE MOTOR INNER AXIS	8
1	1	2018623	MOTOR TORQUE DC FRAMELESS	7
~~1~~	~~1~~	~~2018781~~	~~WIRE GUIDE BRG HSG T.M. I.A.~~	~~6~~
1	1	2018747	PLATE BEARING RETAINER T.M. I.A.	5
1	1	2018621	BALL BEARING DUPLEX	4
1	1	2018634	SLIP RING ASS'Y ELEC 40 CONTACT	3
1	1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS	2
1	1	2018746	HOUSING BEARING TORQUE MOTOR I.A.	1
021	011	LIST OF MATERIALS		

2018611 G

MASTER

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN L. Morse DATE 6-8-64
CHECKED G. QUINN 2-17-65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL L Hazeltine

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HOUSTON, TEXAS

INTER-GIMBAL SUB-ASSEMBLY
TORQUE MOTOR
INNER AXIS

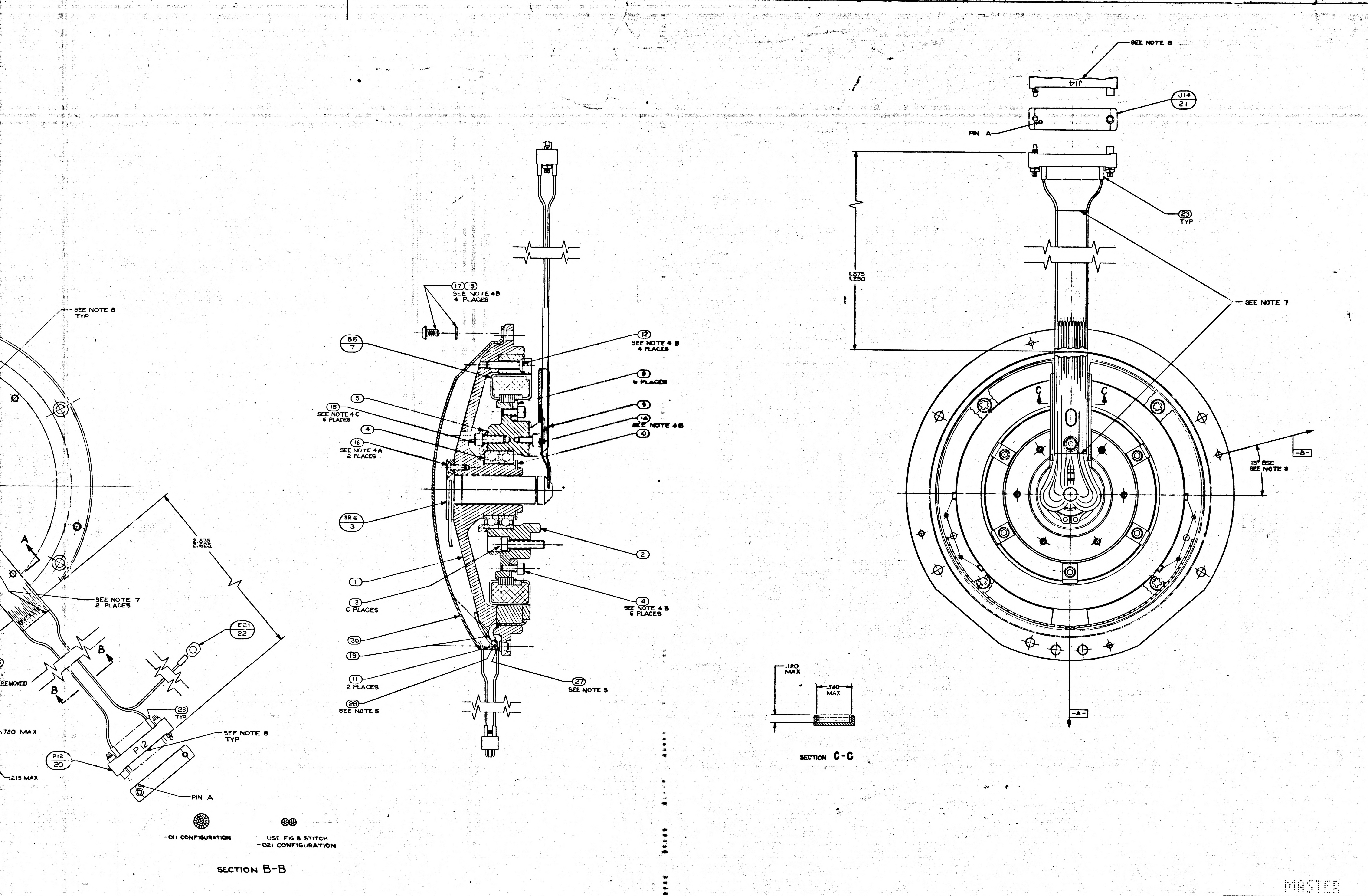
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018611
SCALE 2/1
WT
SHEET 1 OF 13

2018611 REV G SHEET 1

3H

E-3

SYM	DESCRIPTION
A	REVISED TDRR 17687
B	REVISED TDRR 19268
C	REVISED TDRR 21675
D	REVISED TDRR 22331
E	REVISED TDRR 26290
F	REVISED PER TDRR 26597
G	REVISED TDRR 28288


SEE NOTE 8
J14
J14
21
PIN A
1.375
1.250
23
TYP
SEE NOTE 7
C
C
15° BSC
SEE NOTE 3
-B-
-A-
17 18
SEE NOTE 4B
4 PLACES
B6
7
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
9
5
15
SEE NOTE 4 C
6 PLACES
14
SEE NOTE 4B
10
4
16
SEE NOTE 4A
2 PLACES
SR 6
3
2
1
13
6 PLACES
14
SEE NOTE 4 B
6 PLACES
30
19
11
2 PLACES
27
SEE NOTE 5
28
SEE NOTE 5
.120
MAX
.540
MAX
SECTION C-C
SEE NOTE 8
TYP
A
2.675
2.625
SEE NOTE 7
2 PLACES
E21
22
B
B
REMOVED
23
TYP
.730 MAX
SEE NOTE 8
TYP
P12
P12
20
.215 MAX
PIN A
-011 CONFIGURATION
USE FIG.8 STITCH
-021 CONFIGURATION
SECTION B-B
5
4
3
2

MASTER

021	011 QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
1	1	2018645	WIR GUIDE, BRG HSG., T.
A/R	A/R	MIL-T-713 TYPE P CLASS2	TAPE NYLON, WAXED
A/R	A/R	QQ-S-571 SN60	SOLD R
A/R	A/R	QQ-S-571 SN10	SOLD R
A/R	A/R	1010870	GREA E, LUBRICATING
1	1	1010416-1	WIRE WG 28E BLACK 8" LON
1	1	1010416-10	WIRE WG 28E WHITE 8" LON
82	82	1006776-18	INSUL TION SLEEVING ELEC
3	3	1000020-4	SHEL AND GROUND ASSY
1	1	1010917-109	CONN LEC RECEPT 44 PIN
2	2	1010917-806	CONN LEC PLUG 26 PIN
1	1	1010490-054	INSUL TON SLEEVING, ELEC HEA
4	4	MS15795-703	WASH , FLAT, METAL, ROUND
4	4	1010891-12	SCRE BUTTON HD SELF LKG
2	2	1010891-2	SCRE BUTTON HD SELF LKG
6	6	1001488-18	SCRE HEX SOC HD SELF-LOC
7	7	1001488-2	SCRE HEX SOC HD SELF-LOC
6	6	1001489-22	SCRE HEX SOC HD
4	4	1010867-17	SCRE FLAT HD SELF LOCKIN
2	2	1000100-1	TERM AL INSULATED
1	1	MS16624-4075	RING TAINING EXTERNAL BA
1	1	2018822	RETAIN R WIRE INNER AXIS
6	6	2018745	CLIP R TAINER TORQUE MOTOR
1	1	2018623	MOTOR TORQUE DC FRAMELES
~~1~~	~~1~~	~~2018781~~	~~WIRE GUIDE BRG HSG T.M.~~
1	1	2018747	PLAT BEARING RETAINER T.M.
1	1	2018621	BALL EARING DUPLEX
1	1	2018634	SLIP R G ASSY ELEC 40 CONT
1	1	2018743	SHAFT STUB TORQUE MOTOR IN
1	1	2018746	HOUSIN BEARING TORQUE MOT

LIST OF M TERIALS

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN L. Morse DATE 6-8-64
CHECKED J. QUINN 2-17-65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT C
HOUSTON, TEXAS

INTE GIMBAL SUB-AS
TORQUE MOTOR
INNER AXIS

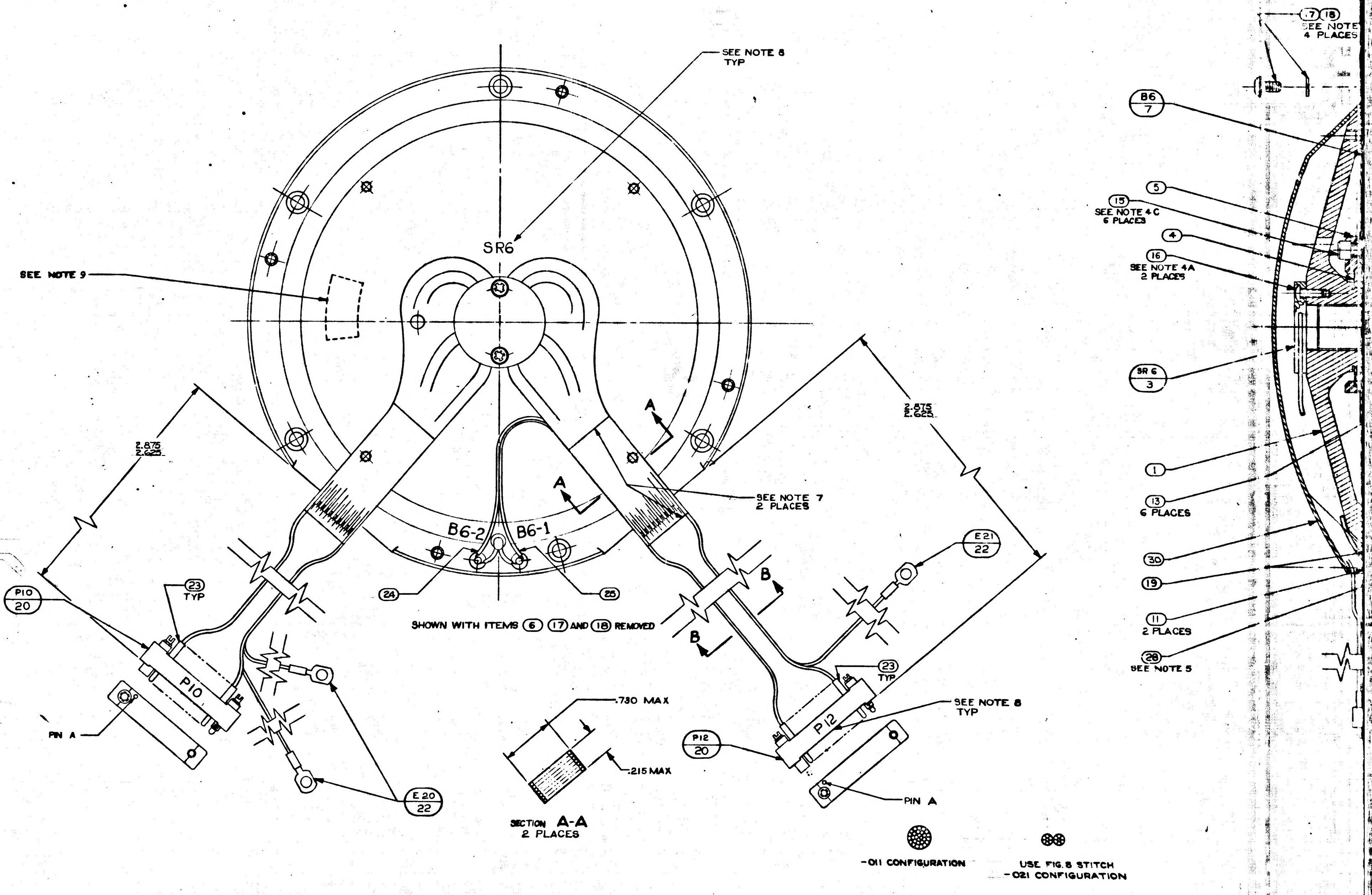
CODE IDENT NO. 80230
SIZE J
2018
SCALE 2/

2018611 REV G SHEET 1

TABLE I	
ASSEMBLY NO.	P.S. NUMBER
2018611-011	P.S. 2018611
2018611-021	P.S. 2016147

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS PER TABLE I
3. ECCENTRICITY MARKS ON THE OUTER RACE OF (4) TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN (2) IS IN THE POSITION SHOWN
   THE ECCENTRICITY MARKS ON THE INNER RACE OF (4) TO BE ALIGNED WITHIN ± 5° OF -B- AND IN THE DIRECTION OF THE ARROW WHEN (1) IS IN THE POSITION SHOWN
   APPLY A THIN COAT OF (26) TO INSIDE DIAMETER OF (4) AND TO FAYING SURFACE OF (1) BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   A. 3.5 IN LB
   B. 5.0 IN LB
   C. 10.0 IN LB
5. SOLDER LEADS FROM (7) TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING (27) SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR (20) AND (21) PER ND 1002071 USING (28) WIRE INSULATION SHALL BE WITHIN .06 OF SOLDERED CONNECTION
6. HEAT SHRINK SLEEVING ON (22) AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT (2) FROM HOUSING BEARING (1) OR REMOVE TORQUE MOTOR (7) WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR (7)
12. "Y" OR "N" IN TINNED COLUMN OF SHEETS 2 THRU INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NO. SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3) & (15-1, 15-2, 15-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"


SEE NOTE 8
TYP
SR6
SEE NOTE 9
2.875
2.625
A
A
SEE NOTE 7
2 PLACES
B6-2
B6-1
24
25
SHOWN WITH ITEMS (6) (17) AND (18) REMOVED
P10
20
23
TYP
P10
PIN A
E20
22
B
B
E21
22
23
TYP
SEE NOTE 8
TYP
P12
P12
20
PIN A
.730 MAX
.215 MAX
-011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION
7 18
SEE NOTE
4 PLACES
B6
7
5
15
SEE NOTE 4C
6 PLACES
4
16
SEE NOTE 4A
2 PLACES
SR6
3
1
13
6 PLACES
30
19
11
2 PLACES
28
SEE NOTE 5

SECTION A-A
2 PLACES

SECTION B-B

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NASA DRAWING NO. 201861I-011
SHEET 2 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
1					22						
1-A		SHLD-1					E20				
1-1		P10-A	13	Y	23		SR6-1				
1-2		P10-B	13	Y	23		SR6-2				
1-3		P10-C	13	Y	23		SR6-3				
2		P10-D	13	Y	23		SR6-4				
3		P10-E	13	Y	23		SR6-5				
4-1		P10-F	13	Y	23		SR6-6				
4-2		P10-H	13	Y	23		SR6-7				
5-1		P10-J	13	Y	23		SR6-8				
5-2		P10-K	13	Y	23		SR6-9				
6-1		P10-L	13	Y	23		SR6-10				
6-2		P10-M	13	Y	23		SR6-11				
7					22						
7-A		SHLD-7					E20				
7-1		P10-N	13	Y	23		SR6-12				
7-2		P10-P	13	Y	23		SR6-13				
7-3		P10-R	13	Y	23		SR6-14				

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NASA DRAWING NO. 201861I-011
SHEET 3 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
8		P10-S	13	Y	23		SR6-15				
9		P10-T	13	Y	23		SR6-16				
10-1		P10-U	13	Y	23		SR6-17				
10-2		P10-V	13	Y	23		SR6-18				
11-1		P10-W	13	Y	23		SR6-19				
11-2		P10-X	13	Y	23		SR6-20				
12		P12-A	13	Y	23		SR6-26				
13		P12-B	13	Y	23		SR6-27				
14		P12-C	13	Y	23		SR6-28				
15					23						
15-A		SHLD-15			23		E21				
15-1		P12-D	13	Y	23		SR6-29				
15-2		P12-E	13	Y	23		SR6-30				
15-3		P12-F	13	Y	23		SR6-31				
16		P12-H	13	Y	23		SR6-32				
17		P12-J	13	Y	23		SR6-33				
18		P12-K	13	Y	23		SR6-34				

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SHEET 4 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
19-1		P12-L	13	Y	23		SR6-35				
19-2		P12-M	13	Y	23		SR6-36				
20-1		P12-N	13	Y	23		SR6-37				
20-2		P12-P	13	Y	23		SR6-38				
21	25	P12-R	13	Y	23		B6-1	19	Y		
22	24	P12-S	13	Y	23		B6-2	19	Y		
23		B6-BLK					B6-1	19	Y		
24		B6-WHT					B6-2	19	Y		
25		P12-T	13	Y	23		SR6-39				
26		P12-U	13	Y	23		SR6-40				
27-1		P12-Y	13	Y	23		SR6-21				
27-2		P12-Z	13	Y	23		SR6-22				
27-3		P12-a	13	Y	23		SR6-23				
27-4		P12-b	13	Y	23		SR6-24				
27-5		P12-c	13	Y	23		SR6-25				

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SHEET 5 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
28		J14-A	13	Y	23		SR6-1				
29		J14-B	13	Y	23		SR6-2				
30		J13-C	13	Y	23		SR6-3				
31		J14-D	13	Y	23		SR6-4				
32		J14-E	13	Y	23		SR6-5				
33-1		J14-F	13	Y	23		SR6-6				
33-2		J14-H	13	Y	23		SR6-7				
34-1		J14-J	13	Y	23		SR6-8				
34-2		J14-K	13	Y	23		SR6-9				
35-1		J14-L	13	Y	23		SR6-10				
35-2		J14-M	13	Y	23		SR6-11				
36		J14-N	13	Y	23		SR6-12				
37		J14-P	13	Y	23		SR6-13				
38		J14-R	13	Y	23		SR6-14				

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SHEET 6 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
39			J14-S	13	Y	23		SR6-15			
40			J14-T	13	Y	23		SR6-16			
41-1			J14-U	13	Y	23		SR6-17			
41-2			J14-V	13	Y	23		SR6-18			
42-1			J14-W	13	Y	23		SR6-19			
42-2			J14-X	13	Y	23		SR6-20			
43-1			J14-Y	13	Y	23		SR6-21			
43-2			J14-Z	13	Y	23		SR6-22			
43-3			J14-AA	13	Y	23		SR6-23			
43-4			J14-BB	13	Y	23		SR6-24			
43-5			J14-CC	13	Y	23		SR6-25			
44			J14-DD	13	Y	23		SR6-26			
45			J14-EE	13	Y	23		SR6-27			
46			J14-FF	13	Y	23		SR6-28			

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NASA DRAWING NO.
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SHEET 7 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
47			J14-HH	13	Y	23		SR6-29			
48			J14-JJ	13	Y	23		SR6-30			
49			J14-KK	13	Y	23		SR6-31			
50			J14-LL	13	Y	23		SR6-32			
51			J14-MM	13	Y	23		SR6-33			
52			J14-NN	13	Y	23		SR6-34			
53-1			J14-PP	13	Y	23		SR6-35			
53-2			J14-RR	13	Y	23		SR6-36			
54-1			J14-SS	13	Y	23		SR6-37			
54-2			J14-TT	13	Y	23		SR6-38			
55			J14-UU	13	Y	23		SR6-39			
56			J14-VV	13	Y	23		SR6-40			

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SHEET 8 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
1						22					
1-A			SHLD-1					E20			
1-1			P10-A	13	Y	23		SR6-1			
1-2			P10-B	13	Y	23		SR6-2			
1-3			P10-C	13	Y	23		SR6-3			
2			P10-D	13	Y	23		SR6-4			
3			P10-E	13	Y	23		SR6-5			
4-1			P10-F	13	Y	23		SR6-6			
4-2			P10-H	13	Y	23		SR6-7			
5-1			P10-J	13	Y	23		SR6-8			
5-2			P10-K	13	Y	23		SR6-9			
6-1			P10-L	13	Y	23		SR6-10			
6-2			P10-M	13	Y	23		SR6-11			
7						22					
7-A			SHLD-7					E20			
7-1			P10-N	13	Y	23		SR6-12			
7-2			P10-P	13	Y	23		SR6-13			
7-3			P10-R	13	Y	23		SR6-14			

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SHEET 9 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.	TO NO.
8			P10-S	13	Y	23		SR6-15			
9			P10-T	13	Y	23		SR6-16			
10-1			P10-U	13	Y	23		SR6-17			
10-2			P10-V	13	Y	23		SR6-18			
11-1			P10-W	13	Y	23		SR6-19			
11-2			P10-X	13	Y	23		SR6-20			
12			P12-A	13	Y	23		SR6-26			
13			P12-B	13	Y	23		SR6-27			
14			P12-C	13	Y	23		sR6-28			
15						23					
15-A			SHLD-15			23		E21			
15-1			P12-D	13	Y	23		SR6-29			
15-2			P12-E	13	Y	23		SR6-30			
15-3			P12-F	13	Y	23		SR6-31			
16			P12-H	13	Y	23		SR6-32			
17			P12-J	13	Y	23		SR6-33			
18			P12-K	13	Y	23		SR6-34			

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SHEET 10 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.
19-1		P12-L	13	Y	23		SR6-35				
19-2		P12-M	13	Y	23		SR6-36				
20-1		P12-N	13	Y	23		SR6-37				
20-2		P12-P	13	Y	23		SR6-38				
21	25	P12-R	13	Y	23		B6-1	19	Y		
22	24	P12-S	13	Y	23		B6-2	19	Y		
23		B6-BLK					B6-1	19	Y		
24		B6-WHT					B6-2	19	Y		
25		P12-T	13	Y	23		SR6-39				
26		P12-U	13	Y	23		SR6-40				
27-1		P12-Y	13	Y	23		SR6-21				
27-2		P12-Z	13	Y	23		SR6-22				
27-3		P12-a	13	Y	23		SR6-23				
27-4		P12-b	13	Y	23		sR6-24				
27-5		P12-c	13	Y	23		SR6-25				

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SHEET 11 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.
28		J14-A	13	Y	23		SR6-1				
29		J14-B	13	Y	23		SR6-2				
30		J14-C	13	Y	23		SR6-3				
31		J14-D	13	Y	23		SR6-4				
32		J14-E	13	Y	23		SR6-5				
33-1		J14-J	13	Y	23		SR6-6				
33-2		J14-K	13	Y	23		SR6-7				
34-1		J14-F	13	Y	23		SR6-8				
34-2		J14-H	13	Y	23		SR6-9				
35-1		J14-M	13	Y	23		SR6-10				
35-2		J14-L	13	Y	23		SR6-11				
36		J14-N	13	Y	23		SR6-12				
37		J14-P	13	Y	23		SR6-13				
38		J14-R	13	Y	23		SR6-14				

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NASA DRAWING NO.
2018611-021
SHEET 12 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.
39		J14-S	13	Y	23		SR6-15				
40		J14-T	13	Y	23		SR6-16				
41-1		J14-U	13	Y	23		SR6-17				
41-2		J14-V	13	Y	23		SR6-18				
42-1		J14-X	13	Y	23		SR6-19				
42-2		J14-W	13	Y	23		SR6-20				
43-1		J14-Y	13	Y	23		SR6-21				
43-2		J14-Z	13	Y	23		SR6-22				
43-3		J14-AA	13	Y	23		SR6-23				
43-4		J14-BB	13	Y	23		SR6-24				
43-5		J14-CC	13	Y	23		SR6-25				
44		J14-DD	13	Y	23		SR6-26				
45		J14-EE	13	Y	23		SR6-27				
46		J14-FF	13	Y	23		SR6-28				

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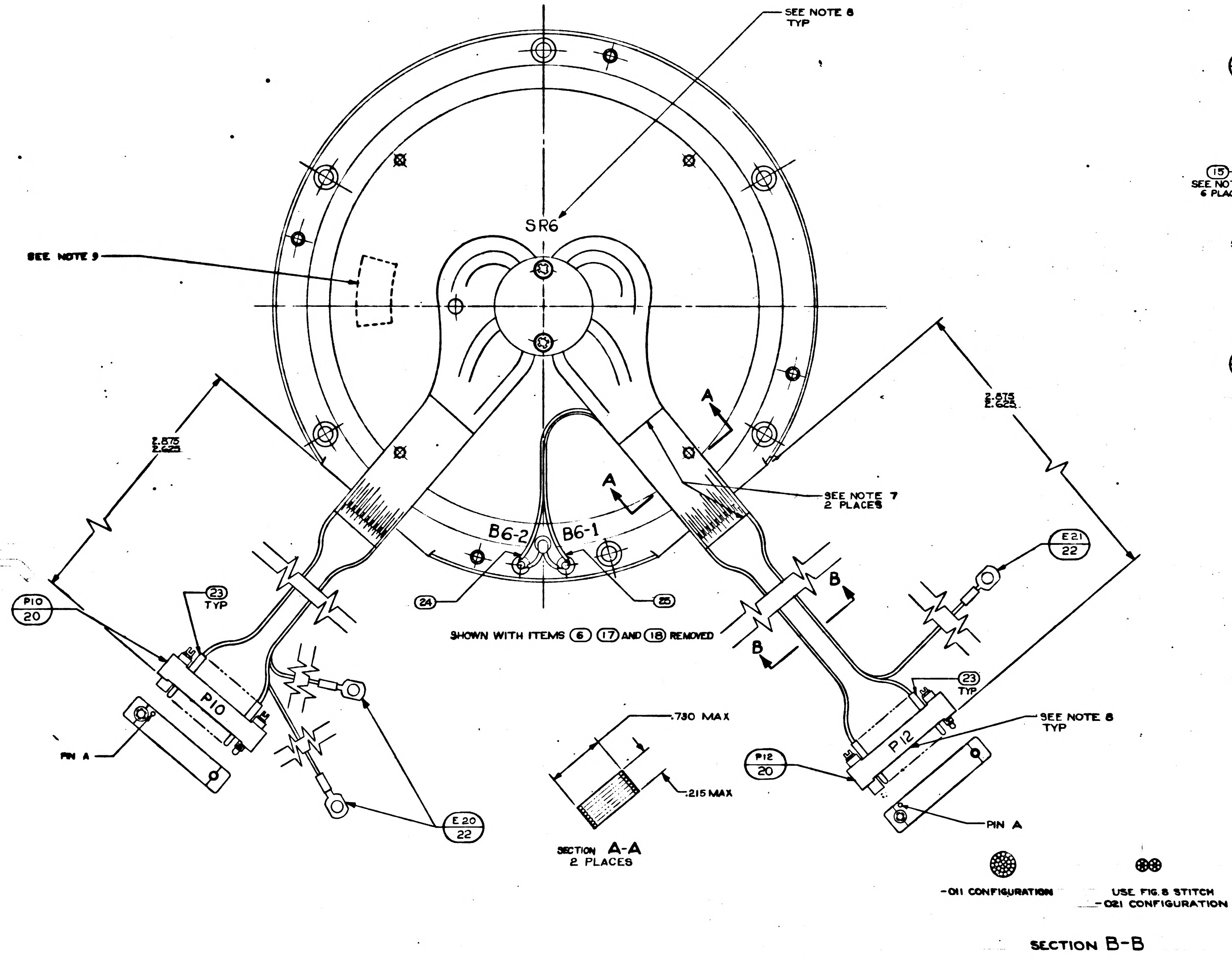
NASA DRAWING NO.
2018611-021
SHEET 13 of 13

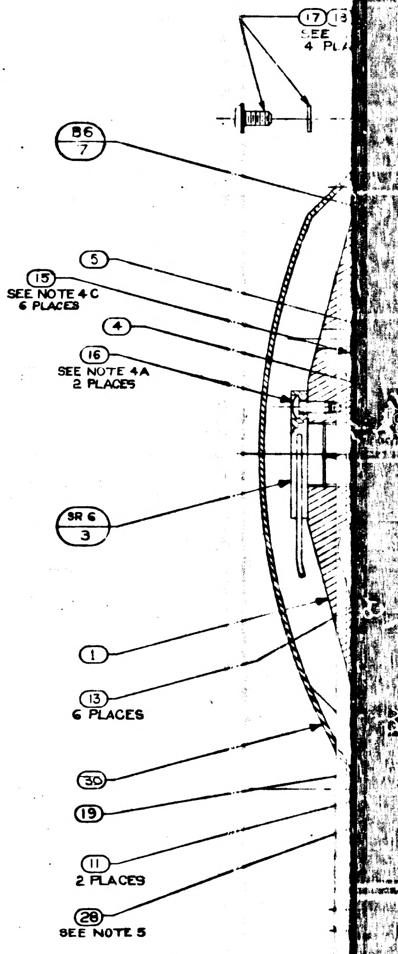
CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION SPEC FIND NO.	NO.
47		J14-HH	13	Y	23		SR6-29				
48		J14-JJ	13	Y	23		SR6-30				
49		J14-KK	13	Y	23		SR6-31				
50		J14-LL	13	Y	23		SR6-32				
51		J14-MM	13	Y	23		SR6-33				
52		J14-NN	13	Y	23		SR6-34				
53-1		J14-PP	13	Y	23		SR6-35				
53-2		J14-RR	13	Y	23		SR6-36				
54-1		J14-SS	13	Y	23		SR6-37				
54-2		J14-TT	13	Y	23		SR6-38				
55		J14-UU	13	Y	23		SR6-39				
56		J14-VV	13	Y	23		SR6-40				

TABLE I	
ASSEMBLY NO.	P.S. NUMBER
2018611-011	P.S. 2018611
2018611-021	P.S. 2016147

NOTES:

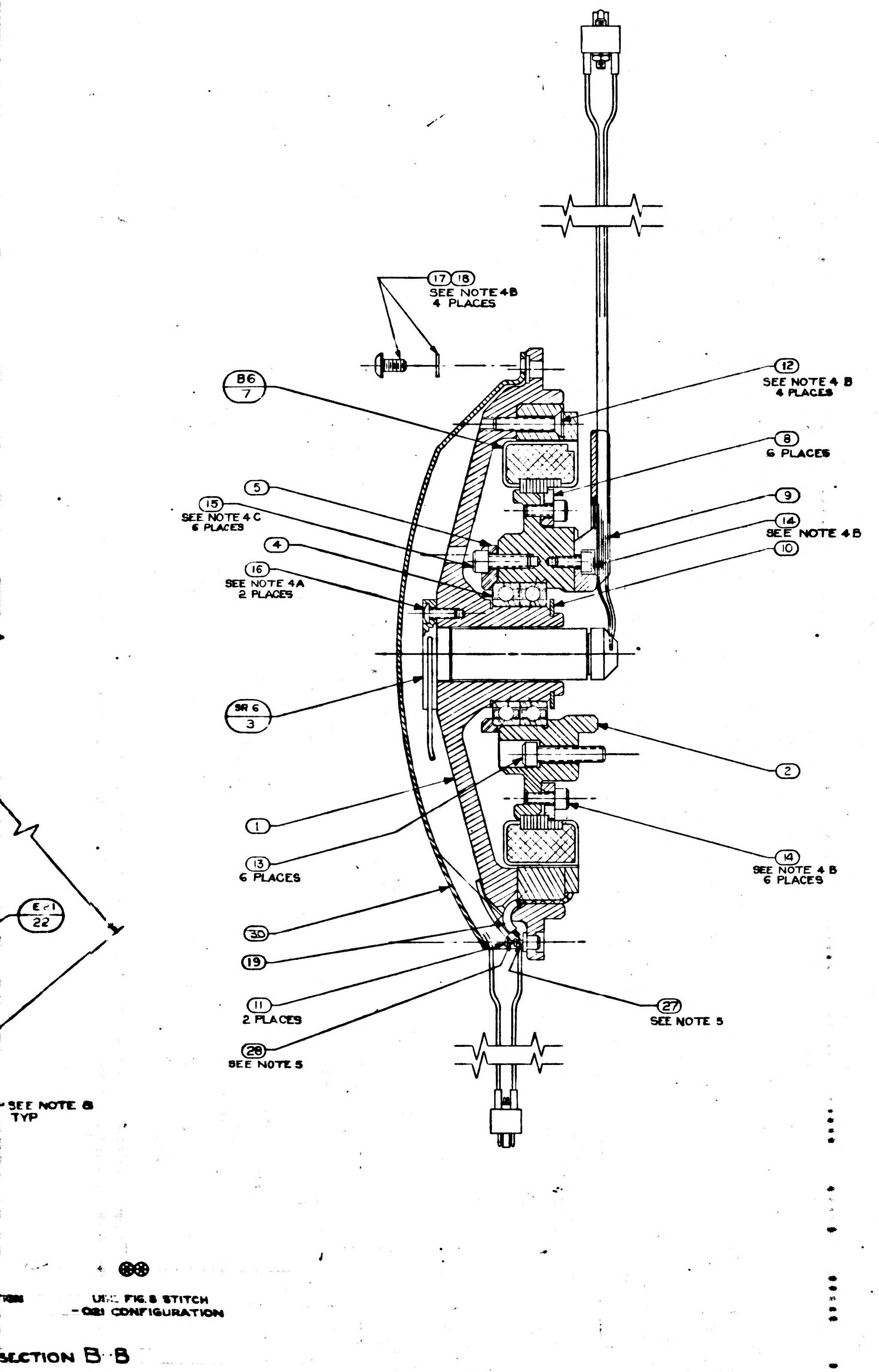
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET REQUIREMENTS OF PS PER TABLE I
3. ECCENTRICITY MARKS ON THE OUTER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ② IS IN THE POSITION SHOWN
   THE ECCENTRICITY MARKS ON THE INNER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF -B- AND IN THE DIRECTION OF THE ARROW WHEN ① IS IN THE POSITION SHOWN
   APPLY A THIN COAT OF ㉖ TO INSIDE DIAMETER OF ④ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   A. 3.5 IN LB
   B. 5.0 IN LB
   C. 10.0 IN LB
5. SOLDER LEADS FROM ⑦ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉗ SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑳ AND ㉑ PER ND1002071 USING ㉘ WIRE INSULATION SHALL BE WITHIN .06 OF SOLDERED CONNECTION
6. HEAT SHRINK SLEEVING ON ㉒ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ⑦ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ⑦
12. "Y" OR "N" IN TINNED COLUMN OF SHEETS 2 THRU INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NO. SHALL BE TWISTED TOGETHER PER ND1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3) & (15-1, 15-2, 15-3) WHICH ARE SHIELDED BUT NOT TWISTED
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"


SEE NOTE 8
TYP
SR6
SEE NOTE 9
B6-2
B6-1
A
A
B
B
2.675
2.625
SEE NOTE 7
2 PLACES
E21
22
23
TYP
P10
20
P10
PIN A
24
25
SHOWN WITH ITEMS 6 17 AND 18 REMOVED
E20
22
.730 MAX
.215 MAX
SECTION A-A
2 PLACES
P12
20
P12
23
TYP
SEE NOTE 8
TYP
PIN A
-011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION
SECTION B-B


17
SEE
4 PL
B6
7
5
15
SEE NOTE 4 C
6 PLACES
4
16
SEE NOTE 4 A
2 PLACES
SR 6
3
1
13
6 PLACES
30
19
11
2 PLACES
28
SEE NOTE 5

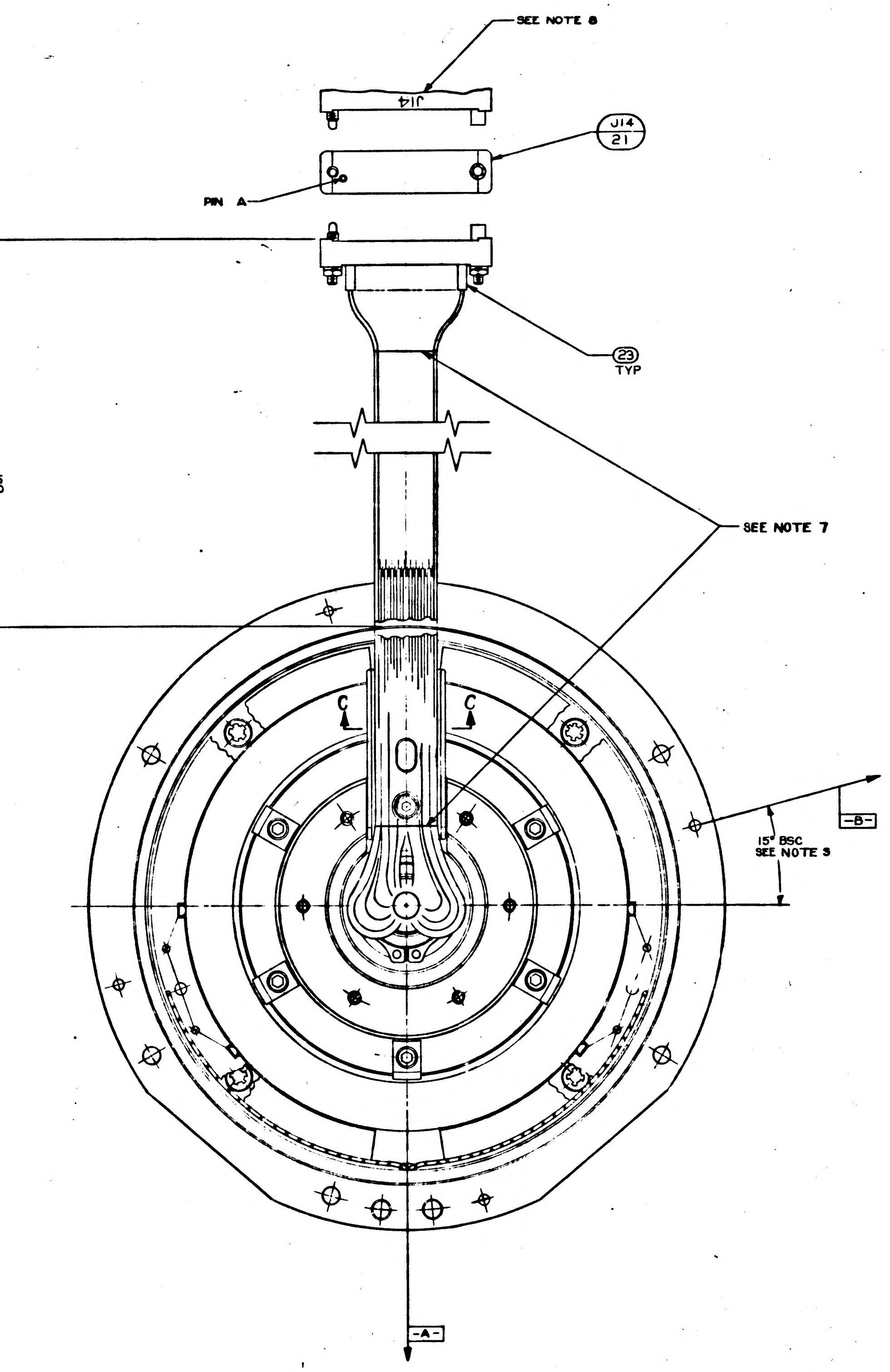
2018611	REV H	SHEET 1

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 16813			
A	REVISED TDRR 17687			
B	REVISED TDRR 19268	2 Jun 65		
C	REVISED TDRR 21675	31 Aug 65		
D	REVISED TDRR 22331	21 Sep 65		
E	REVISED TDRR 26250	2-1-66		
F	REVISED PER TDRR 26587	7 Mar 66		
G	REVISED TDRR 28288	29 May 66		
H	REVISED PER TDRR 32854	4 FEB 67	DR	IH

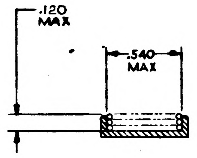


17 18
SEE NOTE 4B
4 PLACES
86
7
15
SEE NOTE 4 C
6 PLACES
5
4
16
SEE NOTE 4A
2 PLACES
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
9
14
SEE NOTE 4B
10
BR 6
3
2
1
13
6 PLACES
14
SEE NOTE 4 B
6 PLACES
E-1
22
30
19
11
2 PLACES
27
SEE NOTE 5
28
SEE NOTE 5
SEE NOTE 8
TYP
USE FIG. 8 STITCH
-021 CONFIGURATION

SECTION B-B



SEE NOTE 8
J14
J14
21
PIN A
23
TYP
1.375
1.250
SEE NOTE 7
C
C
15° BSC
SEE NOTE 3
-B-
-A-



.120
MAX
.540
MAX

SECTION C-C

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1	2018845	WIRE GUIDE, BRG. HSG., T.M., I.A.	30
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	29
A/R	A/R	QQ-S-571 SN60	SOLDER	28
A/R	A/R	QQ-S-571 SN10	SOLDER	27
A/R	A/R	1010870	GREASE, LUBRICATING	26
1	1	1010416-1	WIRE, AWG 28E BLACK 8" LONG	25
1	1	1010416-10	WIRE, AWG 28E WHITE 8" LONG	24
82	82	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	23
3	3	1000020-4	SHIELD AND GROUND ASSY	22
1	1	1010917-109	CONN ELEC RECEPT 44 PIN	21
2	2	1010917-806	CONN ELEC PLUG 26 PIN	20
1	1	1010490-054	INSULATION SLEEVING, ELEC HEAT SHRINK	19
4	4	MS15795-703	WASHER, FLAT, METAL, ROUND	18
4	4	1010891-12	SCREW BUTTON HD SELF LKG SOC SPLINE	17
2	2	1010891-2	SCREW BUTTON HD SELF LKG SOC SPLINE	16
6	6	1001488-18	SCREW HEX SOC HD SELF-LOCKING	15
7	7	1001488-2	SCREW HEX SOC HD SELF-LOCKING	14
6	6	1001489-22	SCREW HEX SOC HD	13
4	4	1010867-17	SCREW FLAT HD SELF LOCKING SOC SPLINE	12
2	2	1000100-1	TERMINAL INSULATED	11
1	1	MS-16624-4075	RING RETAINING EXTERNAL BASIC	10
1	1	2018822	RETAINER WIRE INNER AXIS	9
6	6	2018745	CLIP RETAINER TORQUE MOTOR INNER AXIS	8
1	1	2018623	MOTOR TORQUE DC FRAMELESS	7
~~1~~	~~1~~	~~2018781~~	~~WIRE GUIDE BRG HSG T.M. I.A.~~	~~6~~
1	1	2018747	PLATE BEARING RETAINER T.M. I.A.	5
1	1	2018621	BALL BEARING DUPLEX	4
1	1	2018634	SLIP RING ASS'Y ELEC 40 CONTACT	3
1	1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS	2
1	1	2018746	HOUSING, BEARING TORQUE MOTOR I.A.	1
021	011	LIST OF MATERIALS		

MASTER

NEXT ASSY	USED ON
2018604	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN L. Morse DATE 6-8-64
CHECKED G. QUINN 2-17-65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

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INTER-GIMBAL SUB-ASSEMBLY
TORQUE MOTOR
INNER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018611
SCALE 2/1
WT
SHEET 1 OF 13

2018611 REV H SHEET 1

3H

2/2018611

TDRR 16813

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH		CUT WIRE OR SHIELD			TERMINATION		CUT WIRE OR SHIELD			TERMINATION	
FIND NUMBER	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	SPEC FIND NO.	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	SPEC FIND NO.	NO.
1					22						
1-A		SHLD-1					E20				
1-1		P10-A	.17	Y	23		SR6-1				
1-2		P10-B	.17	Y	23		SR6-2				
1-3		P10-C	.17	Y	23		SR6-3				
2		P10-D	.17	Y	23		SR6-4				
3		P10-E	.17	Y	23		SR6-5				
4-1		P10-F	.17	Y	23		SR6-6				
4-2		P10-H	.17	Y	23		SR6-7				
5-1		P10-J	.17	Y	23		SR6-8				
5-2		P10-K	.17	Y	23		SR6-9				
6-1		P10-L	.17	Y	23		SR6-10				
6-2		P10-M	.17	Y	23		SR6-11				
7					22						
7-A		SHLD-7					E20				
7-1		P10-N	.17	Y	23		SR6-12				
7-2		P10-P	.17	Y	23		SR6-13				
7-3		P10-R	.17	Y	23		SR6-14				

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NASA DRAWING NO.
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SHEET 2 of 13

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH		CUT WIRE OR SHIELD			TERMINATION		CUT WIRE OR SHIELD			TERMINATION	
FIND NUMBER	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	SPEC FIND NO.	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	SPEC FIND NO.	NO.
8		P10-S	17	Y	23		SR6-15				
9		P10-T	17	Y	23		SR6-16				
10-1		P10-U	17	Y	23		SR6-17				
10-2		P10-V	17	Y	23		SR6-18				
11-1		P10-W	.17	Y	23		SR6-19				
11-2		P10-X	.17	Y	23		SR6-20				
12		P12-A	.17	Y	23		SR6-26				
13		P12-B	.17	Y	23		SR6-27				
14		P12-C	.17	Y	23		SR6-28				
15					23						
15-A		SHLD-15			23		E21				
15-1		P12-D	.17	Y	23		SR6-29				
15-2		P12-E	.17	Y	23		SR6-30				
15-3		P12-F	.17	Y	23		SR6-31				
16		P12-H	.17	Y	23		SR6-32				
17		P12-J	.17	Y	23		SR6-33				
18		P12-K	.17	Y	23		SR6-34				

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NASA DRAWING NO.
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SHEET 3 of 13

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH		CUT WIRE OR SHIELD			TERMINATION		CUT WIRE OR SHIELD			TERMINATION	
FIND NUMBER	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	SPEC FIND NO.	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	SPEC FIND NO.	NO.
19-1		P12-L	.17	Y	23		SR6-35				
19-2		P12-M	.17	Y	23		SR6-36				
20-1		P12-N	.17	Y	23		SR6-37				
20-2		P12-P	.17	Y	23		SR6-38				
21	25	P12-R	.17	Y	23		B6-1	25	Y		
22	24	P12-S	.17	Y	23		B6-2	25	Y		
23		B6-BLK					B6-1	25	Y		
24		B6-WHT					B6-2	25	Y		
25		P12-T	.17	Y	23		SR6-39				
26		P12-U	.17	Y	23		SR6-40				
27-1		P12-Y	.17	Y	23		SR6-21				
27-2		P12-Z	.17	Y	23		SR6-22				
27-3		P12-a	.17	Y	23		SR6-23				
27-4		P12-b	.17	Y	23		SR6-24				
27-5		P12-c	.17	Y	23		SR6-25				

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NASA DRAWING NO.
2018611-011
SHEET 4 of 13

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH		CUT WIRE OR SHIELD			TERMINATION		CUT WIRE OR SHIELD			TERMINATION	
FIND NUMBER	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	SPEC FIND NO.	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	SPEC FIND NO.	NO.
28		J14-A	.17	Y	23		SR6-1				
29		J14-B	.17	Y	23		SR6-2				
30		J13-C	.17	Y	23		SR6-3				
31		J14-D	.17	Y	23		SR6-4				
32		J14-E	.17	Y	23		SR6-5				
33-1		J14-F	.17	Y	23		SR6-6				
33-2		J14-H	.17	Y	23		SR6-7				
34-1		J14-J	.17	Y	23		SR6-8				
34-2		J14-K	.17	Y	23		SR6-9				
35-1		J14-L	.17	Y	23		SR6-10				
35-2		J14-M	.17	Y	23		SR6-11				
36		J14-N	.17	Y	23		SR6-12				
37		J14-P	.17	Y	23		SR6-13				
38		J14-R	.17	Y	23		SR6-14				

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SHEET 5 of 13

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NASA DRAWING NO.
2018611-011
SHEET 6 of 13

CONDUCTOR			FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.		CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TERMINATION SPEC FIND NO.	NO.
39			J14-S	.17	Y	23		SR6-15				
40			J14-T	.17	Y	23		SR6-16				
41-1			J14-U	.17	Y	23		SR6-17				
41-2			J14-V	.17	Y	23		SR6-18				
42-1			J14-W	.17	Y	23		SR6-19				
42-2			J14-X	.17	Y	23		SR6-20				
43-1			J14-Y	.17	Y	23		SR6-21				
43-2			J14-Z	.17	Y	23		SR6-22				
43-3			J14-AA	.17	Y	23		SR6-23				
43-4			J14-BB	.17	Y	23		SR6-24				
43-5			J14-CC	.17	Y	23		SR6-25				
44			J14-DD	.17	Y	23		SR6-26				
45			J14-EE	.17	Y	23		SR6-27				
46			J14-FF	.17	Y	23		SR6-28				

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REVISION H

NASA DRAWING NO.
2018611-011
SHEET 7 of 13

CONDUCTOR			FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.		CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TERMINATION SPEC FIND NO.	NO.
47			J14-HH	.17	Y	23		SR6-29				
48			J14-JJ	.17	Y	23		SR6-30				
49			J14-KK	.17	Y	23		SR6-31				
50			J14-LL	.17	Y	23		SR6-32				
51			J14-MM	.17	Y	23		SR6-33				
52			J14-NN	.17	Y	23		SR6-34				
53-1			J14-PP	.17	Y	23		SR6-35				
53-2			J14-RR	.17	Y	23		SR6-36				
54-1			J14-SS	.17	Y	23		SR6-37				
54-2			J14-TT	.17	Y	23		SR6-38				
55			J14-UU	.17	Y	23		SR6-39				
56			J14-VV	.17	Y	23		SR6-40				

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NASA DRAWING NO.
2018611-021
SHEET 8 of 13

CONDUCTOR			FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.		CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TERMINATION SPEC FIND NO.	NO.
1						22						
1-A			SHLD-1					E20				
1-1			P10-A	.17	Y	23		SR6-1				
1-2			P10-B	.17	Y	23		SR6-2				
1-3			P10-C	.17	Y	23		SR6-3				
2			P10-D	.17	Y	23		SR6-4				
3			P10-E	.17	Y	23		SR6-5				
4-1			P10-F	.17	Y	23		SR6-6				
4-2			P10-H	.17	Y	23		SR6-7				
5-1			P10-J	.17	Y	23		SR6-8				
5-2			P10-K	.17	Y	23		SR6-9				
6-1			P10-L	.17	Y	23		SR6-10				
6-2			P10-M	.17	Y	23		SR6-11				
7						22						
7-A			SHLD-7					E20				
7-1			P10-N	.17	Y	23		SR6-12				
7-2			P10-P	.17	Y	23		SR6-13				
7-3			P10-R	.17	Y	23		SR6-14				

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REVISION H

NASA DRAWING NO.
2018611-021
SHEET 9 of 13

CONDUCTOR			FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.		CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TERMINATION SPEC FIND NO.	NO.
8			P10-S	.17	Y	23		SR6-15				
9			P10-T	.17	Y	23		SR6-16				
10-1			P10-U	.17	Y	23		SR6-17				
10-2			P10-V	.17	Y	23		SR6-18				
11-1			P10-W	.17	Y	23		SR6-19				
11-2			P10-X	.17	Y	23		SR6-20				
12			P12-A	.17	Y	23		SR6-26				
13			P12-B	.17	Y	23		SR6-27				
14			P12-C	.17	Y	23		sR6-28				
15						23						
15-A			SHLD-15			23		E21				
15-1			P12-D	.17	Y	23		SR6-29				
15-2			P12-E	.17	Y	23		SR6-30				
15-3			P12-F	.17	Y	23		SR6-31				
16			P12-H	.17	Y	23		SR6-32				
17			P12-J	.17	Y	23		SR6-33				
18			P12-K	.17	Y	23		SR6-34				

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REVISION H

NASA DRAWING NO.
2018611-021
SHEET 10 of 13

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC NO.
19-1		P12-L	.17 Y	23		SR6-35			
19-2		P12-M	.17 Y	23		SR6-36			
20-1		P12-N	.17 Y	23		SR6-37			
20-2		P12-P	.17 Y	23		SR6-38			
21	25	P12-R	.17 Y	23		B6-1	.25 Y		
22	24	P12-S	.17 Y	23		B6-2	.25 Y		
23		B6-BLK				B6-1	.25 Y		
24		B6-WHT				B6-2	.25 Y		
25		P12-T	.17 Y	23		SR6-39			
26		P12-U	.17 Y	23		SR6-40			
27-1		P12-Y	.17 Y	23		SR6-21			
27-2		P12-Z	.17 Y	23		SR6-22			
27-3		P12-a	.17 Y	23		SR6-23			
27-4		P12-b	.17 Y	23		sR6-24			
27-5		P12-c	.17 Y	23		SR6-25			

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REVISION H

NASA DRAWING NO.
2018611-021
SHEET 11 of 13

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC NO.
28		J14-A	.17 Y	23		SR6-1			
29		J14-B	.17 Y	23		SR6-2			
30		J14-C	.17 Y	23		SR6-3			
31		J14-D	.17 Y	23		SR6-4			
32		J14-E	.17 Y	23		SR6-5			
33-1		J14-J	.17 Y	23		SR6-6			
33-2		J14-K	.17 Y	23		SR6-7			
34-1		J14-F	.17 Y	23		SR6-8			
34-2		J14-H	.17 Y	23		SR6-9			
35-1		J14-M	.17 Y	23		SR6-10			
35-2		J14-L	.17 Y	23		SR6-11			
36		J14-N	.17 Y	23		SR6-12			
37		J14-P	.17 Y	23		SR6-13			
38		J14-R	.17 Y	23		SR6-14			

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REVISION H

NASA DRAWING NO.
2018611-021
SHEET 12 of 13

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC NO.
39		J14-S	.17 Y	23		SR6-15			
40		J14-T	.17 Y	23		SR6-16			
41-1		J14-U	.17 Y	23		SR6-17			
41-2		J14-V	.17 Y	23		SR6-18			
42-1		J14-X	.17 Y	23		SR6-19			
42-2		J14-W	.17 Y	23		SR6-20			
43-1		J14-Y	.17 Y	23		SR6-21			
43-2		J14-Z	.17 Y	23		SR6-22			
43-3		J14-AA	.17 Y	23		SR6-23			
43-4		J14-BB	.17 Y	23		SR6-24			
43-5		J14-CC	.17 Y	23		SR6-25			
44		J14-DD	.17 Y	23		SR6-26			
45		J14-EE	.17 Y	23		SR6-27			
46		J14-FF	.17 Y	23		SR6-28			

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REVISION H

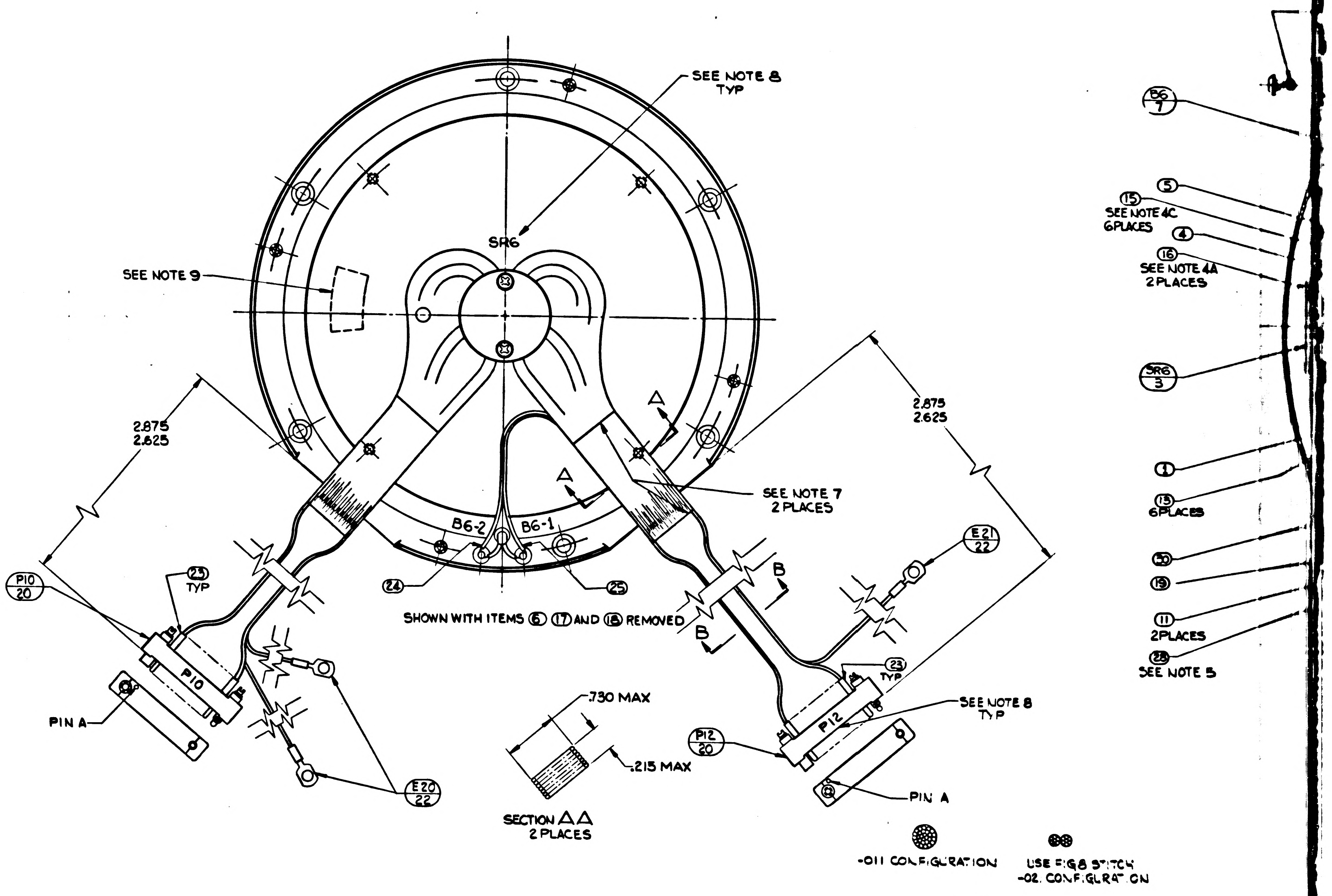
NASA DRAWING NO.
2018611-021
SHEET 13 of 13

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC NO.
47		J14-HH	.17 Y	23		SR6-29			
48		J14-JJ	.17 Y	23		SR6-30			
49		J14-KK	.17 Y	23		SR6-31			
50		J14-LL	.17 Y	23		SR6-32			
51		J14-MM	.17 Y	23		SR6-33			
52		J14-NN	.17 Y	23		SR6-34			
53-1		J14-PP	.17 Y	23		SR6-35			
53-2		J14-RR	.17 Y	23		SR6-36			
54-1		J14-SS	.17 Y	23		SR6-37			
54-2		J14-TT	.17 Y	23		SR6-38			
55		J14-UU	.17 Y	23		SR6-39			
56		J14-VV	.17 Y	23		SR6-40			

TABLE I	
ASSEMBLY NO.	P.S. NUMBER
20.86 .-011	P.S. 2018611
20 8611-021	P.S. 2016147

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF PS PER TABLE I.
3. ECCENTRICITY MARKS ON THE OUTER RACE OF ④ TO BE ALIGNED WITHIN ±5° OF -A- AND IN THE DIRECTION OF THE ARROW WHEN ② IS IN THE POSITION SHOWN. THE ECCENTRICITY MARKS ON THE INNER RACE OF ④ TO BE ALIGNED WITHIN ±5° OF -B- AND IN THE DIRECTION OF THE ARROW WHEN ① IS IN THE POSITION SHOWN. APPLY A THIN COAT OF ㉖ TO INSIDE DIAMETER OF ④ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING.
4. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN LB.
   - B. 5.0 IN LB.
   - C. 10.0 IN LB.
5. SOLDER LEADS FROM ⑦ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉗. SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑳ AND ㉑ PER ND 1002071 USING ㉘. WIRE INSULATION SHALL BE WITHIN .06 OF SOLDERED CONNECTION.
6. HEAT SHRINK SLEEVING ON ㉒ AFTER ASSEMBLY.
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032.
8. MARK CHARACTERS .10-.14 HIGH, COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019.
9. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002019.
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN.
11. CAUTION DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ⑦ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ⑦.
12. 'Y' OR 'N' IN TINNED COLUMN OF SHEETS 2 THRU, INDICATES YES OR NO.
13. CONDUCTORS WITH THE SAME NO. SHALL BE TWISTED TOGETHER PER ND 1002032 WITH EXEPTION OF THE FOLLOWING CONDUCTORS, (1-1, 1-2, 1-3), (7-1, 7-2, 7-3) & (15-1, 15-2, 15-3) WHICH ARE SHIELDED BUT NOT TWISTED.
14. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES AND 2 PLACE DECIMALS.
15. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING: A = SHIELD GROUND ON "FROM END". B = SHIELD GROUND ON "TO END".

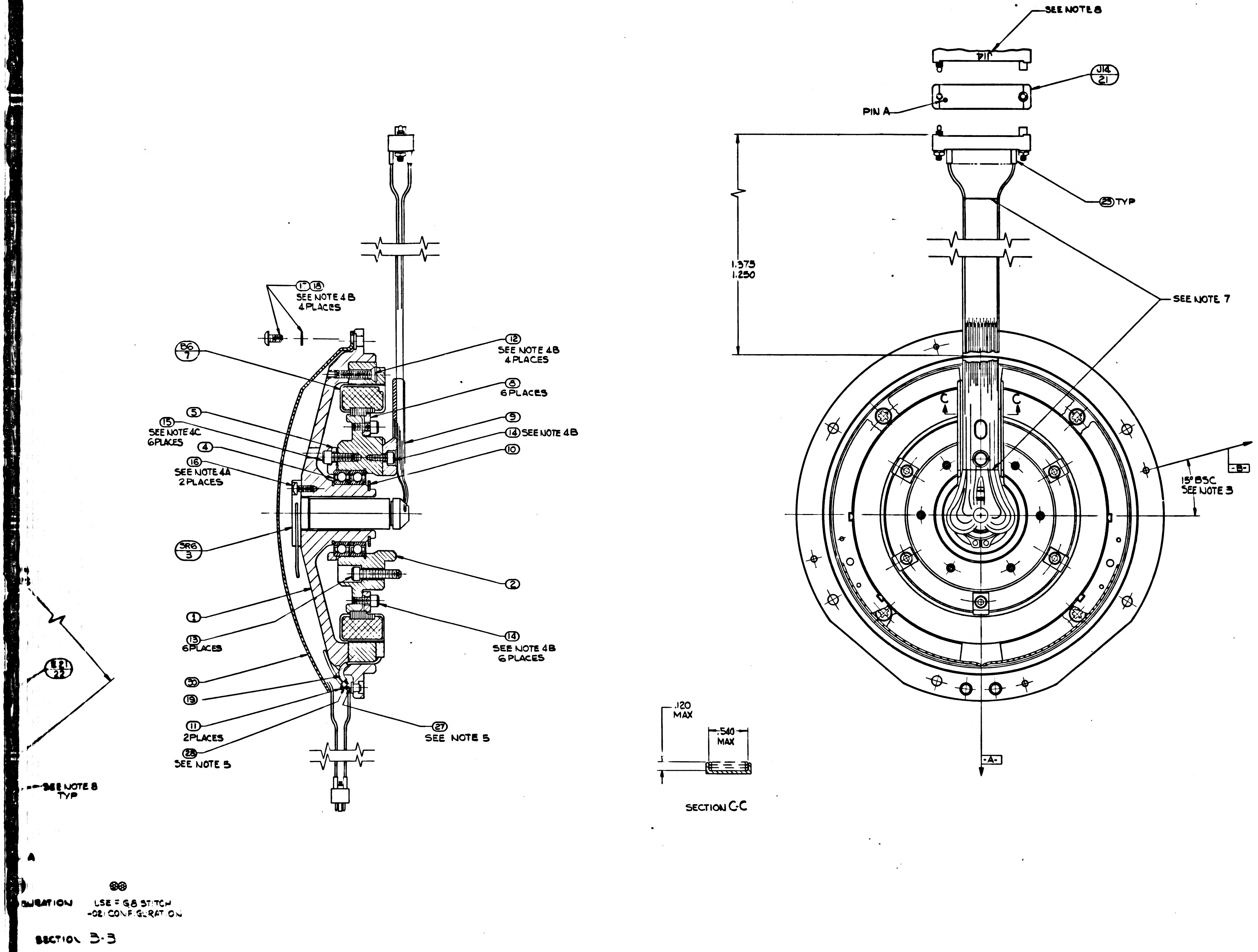

SEE NOTE 8
TYP
SR6
SEE NOTE 9
2.875
2.625
2.875
2.625
A
A
SEE NOTE 7
2 PLACES
B6-2
B6-1
P10
20
23
TYP
24
25
E21
22
B
B
SHOWN WITH ITEMS ⑥ ⑰ AND ⑱ REMOVED
P10
PIN A
E20
22
.730 MAX
.215 MAX
23
TYP
SEE NOTE 8
TYP
P12
20
P12
PIN A
B6
7
5
15
SEE NOTE 4C
6 PLACES
4
16
SEE NOTE 4A
2 PLACES
SR6
3
1
13
6 PLACES
30
19
11
2 PLACES
28
SEE NOTE 5
-011 CONFIGURATION
USE FIG 8 STITCH
-02 CONFIGURATION

SECTION A-A
2 PLACES

SECTION B-B

ZONE	LTR	DESCRIPTION		DATE	APPROVED
Ⓜ	J	REPLACES REV H WITHOUT CHANGE PER TDRR 33582	CHG NO.	27 APR '67	DG

REVISIONS


SEE NOTE 8
J14
J14 21
PIN A
25 TYP
1.375
1.250
SEE NOTE 7
C
C
-B-
15° BSC
SEE NOTE 3
-A-
17 18
SEE NOTE 4B
4 PLACES
B6 7
12
SEE NOTE 4B
4 PLACES
8
6 PLACES
5
9
15
SEE NOTE 4C
6 PLACES
14 SEE NOTE 4B
4
10
16
SEE NOTE 4A
2 PLACES
SR6 3
2
1
13
6 PLACES
14
SEE NOTE 4B
6 PLACES
E21 22
30
19
11
2 PLACES
27
SEE NOTE 5
28
SEE NOTE 5
SEE NOTE 8
TYP
.120
MAX
.540
MAX
SECTION C-C
A
LSE FOR 88 STITCH
-021 CONFIGURATION
SECTION B-B

		1	1	30	2018845	WIRE GUIDE BRG HSG T.M., I.A.
		AR	AR	29	MIL-T-713 TYPE P CL2	TAPE NYLON WAXED
		AR	AR	28	QQ-S-571 SN60	SOLDER
		AR	AR	27	QQ-S-571 SN10	SOLDER
		AR	AR	26	1010870	GREASE, LUBRICATING
		1	1	25	1010416-1	WIRE AWG 28E BLACK 8"LONG
		1	1	24	1010416-10	WIRE AWG 28E WHITE 8"LONG
		82	82	23	1006776-18	INS SLEEVING ELEC 5/16 LONG
		3	3	22	1000020-4	SHIELD AND GROUND ASSY
		1	1	21	1010917-109	CONN ELEC RECP 44 PIN
		2	2	20	1010917-806	CONN ELEC PLUG 26 PIN
		1	1	19	1010490-054	INS SLEEVING ELECT HEAT SHRINK
		4	4	18	MS15795-703	WASHER, FLAT, METAL ROUND
		4	4	17	1010891-12	SCR BUTTON HD SELF-LOCKING
		2	2	16	1010891-2	SCR BUTTON HD SELF-LOCKING
		6	6	15	1001488-18	SCR HEX SCH SELF-LOCKING
		7	7	14	1001488-2	SCR HEX SCH SELF-LOCKING
		6	6	13	1001489-22	SCR HEX SCH
		4	4	12	1010867-17	SCR FH SELF LOCKING SOC SPLINE
		2	2	11	1000100-1	TERMINAL INSULATED
		1	1	10	MS16624-4075	RING RET. EXTERNAL BASIC
		1	1	9	2018822	RET. WIRE INNER AXIS
		6	6	8	2018745	CLIP RET. TOR MOT INNER AXIS
		1	1	7	2018623	MOT TOR DC FRAMELESS
		1	1	5	2018747	PLATE BRG RET. T.M., I.A.
		1	1	4	2018621	BALL BEARING DUPLEX
		1	1	3	2018634	SLIP RING ASSY ELEC 40 CONT
		1	1	2	2018743	SHAFT STUB TOR MOT INNER AXIS
		1	1	1	2018746	HSG BRG TORQUE MOTOR I.A
		021	011	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION

QUANTITY REQUIRED — LIST OF PARTS AND MATERIALS — CODE IDENT

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

NEXT ASSY	USED ON
2018604	DL 2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCE ON
DECIMALS ANGLES
.XX ± ±
.XXX ±
.XXXX ±
DO NOT SCALE THIS DRAWING
MATERIAL

DRAWN L MORSE 6-8-64
CHECKED G QUINN 2-17-65
DESIGNER
ENGINEER S.A. HOFF
ENGINEER
AUTH NO.
RELEASE
PROJECT APPROVAL I. HALZEL 2/24/65

INSTRUMENTATION LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASS.

INTER-GIMBAL SUB-ASSEMBLY TORQUE MOTOR INNER AXIS

SIZE J2 CODE IDENT NO. 80230 2018611
SCALE 2/1 SHEET 1 OF 13

2018611

2/2018611

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REVISION J

NASA DRAWING NO. 2018611-011
SHEET 4 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
19-1		P12-L	.17	Y	23		SR6-35				
19-2		P12-M	.17	Y	23		SR6-36				
20-1		P12-N	.17	Y	23		SR6-37				
20-2		P12-P	.17	Y	23		SR6-38				
21	25	P12-R	.17	Y	23		B6-1	25	Y		
22	24	P12-S	.17	Y	23		B6-2	25	Y		
23		B6-BLK					B6-1	25	Y		
24		B6-WHT					B6-2	25	Y		
25		P12-T	.17	Y	23		SR6-39				
26		P12-U	.17	Y	23		SR6-40				
27-1		P12-Y	.17	Y	23		SR6-21				
27-2		P12-Z	.17	Y	23		SR6-22				
27-3		P12-a	.17	Y	23		SR6-23				
27-4		P12-b	.17	Y	23		SR6-24				
27-5		P12-c	.17	Y	23		SR6-25				

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NASA DRAWING NO. 2018611-011
SHEET 2 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
1					22						
1-A		SHLD-1					E20				
1-1		P10-A	.17	Y	23		SR6-1				
1-2		P10-B	.17	Y	23		SR6-2				
1-3		P10-C	.17	Y	23		SR6-3				
2		P10-D	.17	Y	23		SR6-4				
3		P10-E	.17	Y	23		SR6-5				
4-1		P10-F	.17	Y	23		SR6-6				
4-2		P10-H	.17	Y	23		SR6-7				
5-1		P10-J	.17	Y	23		SR6-8				
5-2		P10-K	.17	Y	23		SR6-9				
6-1		P10-L	.17	Y	23		SR6-10				
6-2		P10-M	.17	Y	23		SR6-11				
7					22						
7-A		SHLD-7					E20				
7-1		P10-N	.17	Y	23		SR6-12				
7-2		P10-P	.17	Y	23		SR6-13				
7-3		P10-R	.17	Y	23		SR6-14				

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NASA DRAWING NO. 2018611-011
SHEET 5 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
28		J14-A	.17	Y	23		SR6-1				
29		J14-B	.17	Y	23		SR6-2				
30		J13-C	.17	Y	23		SR6-3				
31		J14-D	.17	Y	23		SR6-4				
32		J14-E	.17	Y	23		SR6-5				
33-1		J14-F	.17	Y	23		SR6-6				
33-2		J14-H	.17	Y	23		SR6-7				
34-1		J14-J	.17	Y	23		SR6-8				
34-2		J14-K	.17	Y	23		SR6-9				
35-1		J14-L	.17	Y	23		SR6-10				
35-2		J14-M	.17	Y	23		SR6-11				
36		J14-N	.17	Y	23		SR6-12				
37		J14-P	.17	Y	23		SR6-13				
38		J14-R	.17	Y	23		SR6-14				

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NASA DRAWING NO. 2018611-011
SHEET 3 of 13

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
8		P10-S	.17	Y	23		SR6-15				
9		P10-T	.17	Y	23		SR6-16				
10-1		P10-U	.17	Y	23		SR6-17				
10-2		P10-V	.17	Y	23		SR6-18				
11-1		P10-W	.17	Y	23		SR6-19				
11-2		P10-X	.17	Y	23		SR6-20				
12		P12-A	.17	Y	23		SR6-26				
13		P12-B	.17	Y	23		SR6-27				
14		P12-C	.17	Y	23		SR6-28				
15					23						
15-A		SHLD-15			23		E21				
15-1		P12-D	.17	Y	23		SR6-29				
15-2		P12-E	.17	Y	23		SR6-30				
15-3		P12-F	.17	Y	23		SR6-31				
16		P12-H	.17	Y	23		SR6-32				
17		P12-J	.17	Y	23		SR6-33				
18		P12-K	.17	Y	23		SR6-34				

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NASA DRAWING NO. 2018611-011
SHEET 6 of 13

Conductor Find Number	No.	Individual Length	From: Circuit Point	Strip Wire or Jacket	Y/N	Termination Spec Find No.	No.	To: Circuit Point	Y/N	Termination Spec Find No.	No.
39			J14-S	.17	Y	23		SR6-15			
40			J14-T	.17	Y	23		SR6-16			
41-1			J14-U	.17	Y	23		SR6-17			
41-2			J14-V	.17	Y	23		SR6-18			
42-1			J14-W	.17	Y	23		SR6-19			
42-2			J14-X	.17	Y	23		SR6-20			
43-1			J14-Y	.17	Y	23		SR6-21			
43-2			J14-Z	.17	Y	23		SR6-22			
43-3			J14-AA	.17	Y	23		SR6-23			
43-4			J14-BB	.17	Y	23		SR6-24			
43-5			J14-CC	.17	Y	23		SR6-25			
44			J14-DD	.17	Y	23		SR6-26			
45			J14-EE	.17	Y	23		SR6-27			
46			J14-FF	.17	Y	23		SR6-28			

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NASA DRAWING NO. 2018611-011
SHEET 7 of 13

Conductor Find Number	No.	Individual Length	From: Circuit Point	Strip Wire or Jacket	Y/N	Termination Spec Find No.	No.	To: Circuit Point	Y/N	Termination Spec Find No.	No.
47			J14-HH	.17	Y	23		SR6-29			
48			J14-JJ	.17	Y	23		SR6-30			
49			J14-KK	.17	Y	23		SR6-31			
50			J14-LL	.17	Y	23		SR6-32			
51			J14-MM	.17	Y	23		SR6-33			
52			J14-NN	.17	Y	23		SR6-34			
53-1			J14-PP	.17	Y	23		SR6-35			
53-2			J14-RR	.17	Y	23		SR6-36			
54-1			J14-SS	.17	Y	23		SR6-37			
54-2			J14-TT	.17	Y	23		SR6-38			
55			J14-UU	.17	Y	23		SR6-39			
56			J14-VV	.17	Y	23		SR6-40			

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NASA DRAWING NO. 2018611-021
SHEET 8 of 13

Conductor Find Number	No.	Individual Length	From: Circuit Point	Strip Wire or Jacket	Y/N	Termination Spec Find No.	No.	To: Circuit Point	Y/N	Termination Spec Find No.	No.
1						22					
1-A			SHLD-1					E20			
1-1			P10-A	.17	Y	23		SR6-1			
1-2			P10-B	.17	Y	23		SR6-2			
1-3			P10-C	.17	Y	23		SR6-3			
2			P10-D	.17	Y	23		SR6-4			
3			P10-E	.17	Y	23		SR6-5			
4-1			P10-F	.17	Y	23		SR6-6			
4-2			P10-H	.17	Y	23		SR6-7			
5-1			P10-J	.17	Y	23		SR6-8			
5-2			P10-K	.17	Y	23		SR6-9			
6-1			P10-L	.17	Y	23		SR6-10			
6-2			P10-M	.17	Y	23		SR6-11			
7						22					
7-A			SHLD-7					E20			
7-1			P10-N	.17	Y	23		SR6-12			
7-2			P10-P	.17	Y	23		SR6-13			
7-3			P10-R	.17	Y	23		SR6-14			

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NASA DRAWING NO. 2018611-021
SHEET 9 of 13

Conductor Find Number	No.	Individual Length	From: Circuit Point	Strip Wire or Jacket	Y/N	Termination Spec Find No.	No.	To: Circuit Point	Y/N	Termination Spec Find No.	No.
8			P10-S	.17	Y	23		SR6-15			
9			P10-T	.17	Y	23		SR6-16			
10-1			P10-U	.17	Y	23		SR6-17			
10-2			P10-V	.17	Y	23		SR6-18			
11-1			P10-W	.17	Y	23		SR6-19			
11-2			P10-X	.17	Y	23		SR6-20			
12			P12-A	.17	Y	23		SR6-26			
13			P12-B	.17	Y	23		SR6-27			
14			P12-C	.17	Y	23		sR6-28			
15						23					
15-A			SHLD-15			23		E21			
15-1			P12-D	.17	Y	23		SR6-29			
15-2			P12-E	.17	Y	23		SR6-30			
15-3			P12-F	.17	Y	23		SR6-31			
16			P12-H	.17	Y	23		SR6-32			
17			P12-J	.17	Y	23		SR6-33			
18			P12-K	.17	Y	23		SR6-34			

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NASA DRAWING NO.
2018611-021
SHEET 12 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
39			J14-S	.17	Y	23		SR6-15				
40			J14-T	.17	Y	23		SR6-16				
41-1			J14-U	.17	Y	23		SR6-17				
41-2			J14-V	.17	Y	23		SR6-18				
42-1			J14-X	.17	Y	23		SR6-19				
42-2			J14-W	.17	Y	23		SR6-20				
43-1			J14-Y	.17	Y	23		SR6-21				
43-2			J14-Z	.17	Y	23		SR6-22				
43-3			J14-AA	.17	Y	23		SR6-23				
43-4			J14-BB	.17	Y	23		SR6-24				
43-5			J14-CC	.17	Y	23		SR6-25				
44			J14-DD	.17	Y	23		SR6-26				
45			J14-EE	.17	Y	23		SR6-27				
46			J14-FF	.17	Y	23		SR6-28				

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NASA DRAWING NO.
2018611-021
SHEET 10 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
19-1			P12-L	.17	Y	23		SR6-35				
19-2			P12-M	.17	Y	23		SR6-36				
20-1			P12-N	.17	Y	23		SR6-37				
20-2			P12-P	.17	Y	23		SR6-38				
21	25		P12-R	.17	Y	23		B6-1	.25	Y		
22	24		P12-S	.17	Y	23		B6-2	.25	Y		
23			B6-BLK					B6-1	.25	Y		
24			B6-WHT					B6-2	.25	Y		
25			P12-T	.17	Y	23		SR6-39				
26			P12-U	.17	Y	23		SR6-40				
27-1			P12-Y	.17	Y	23		SR6-21				
27-2			P12-Z	.17	Y	23		SR6-22				
27-3			P12-a	.17	Y	23		SR6-23				
27-4			P12-b	.17	Y	23		SR6-24				
27-5			P12-c	.17	Y	23		SR6-25				

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NASA DRAWING NO.
2018611-021
SHEET 13 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
47			J14-HH	.17	Y	23		SR6-29				
48			J14-JJ	.17	Y	23		SR6-30				
49			J14-KK	.17	Y	23		SR6-31				
50			J14-LL	.17	Y	23		SR6-32				
51			J14-MM	.17	Y	23		SR6-33				
52			J14-NN	.17	Y	23		SR6-34				
53-1			J14-PP	.17	Y	23		SR6-35				
53-2			J14-RR	.17	Y	23		SR6-36				
54-1			J14-SS	.17	Y	23		SR6-37				
54-2			J14-TT	.17	Y	23		SR6-38				
55			J14-UU	.17	Y	23		SR6-39				
56			J14-VV	.17	Y	23		SR6-40				

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REVISION
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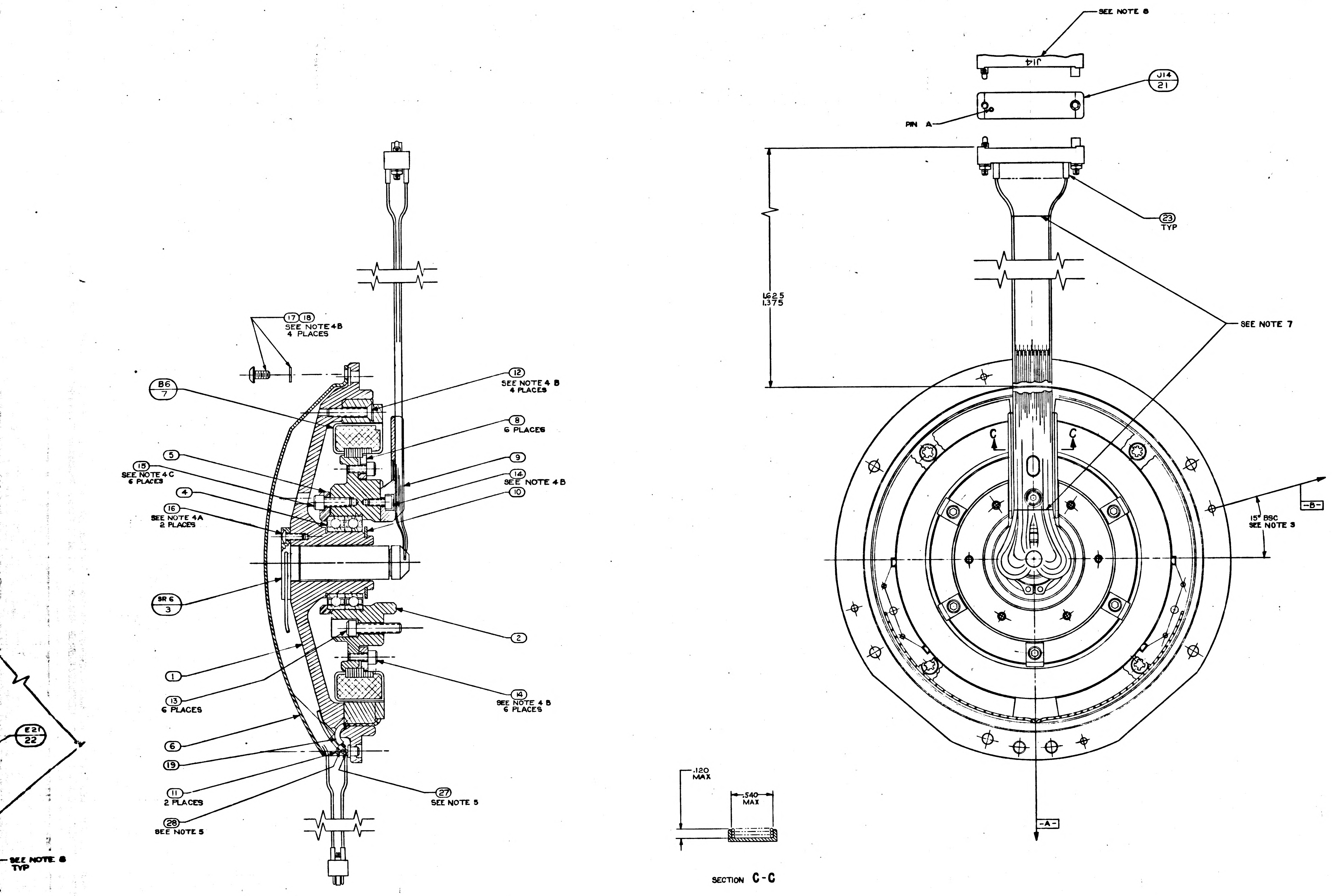
NASA DRAWING NO.
2018611-021
SHEET 11 of 13

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
28			J14-A	.17	Y	23		SR6-1				
29			J14-B	.17	Y	23		SR6-2				
30			J14-C	.17	Y	23		SR6-3				
31			J14-D	.17	Y	23		SR6-4				
32			J14-E	.17	Y	23		SR6-5				
33-1			J14-J	.17	Y	23		SR6-6				
33-2			J14-K	.17	Y	23		SR6-7				
34-1			J14-F	.17	Y	23		SR6-8				
34-2			J14-H	.17	Y	23		SR6-9				
35-1			J14-M	.17	Y	23		SR6-10				
35-2			J14-L	.17	Y	23		SR6-11				
36			J14-N	.17	Y	23		SR6-12				
37			J14-P	.17	Y	23		SR6-13				
38			J14-R	.17	Y	23		SR6-14				

REVISIONS TDRR 16813			
SYM	DESCRIPTION	DATE	APPROVAL



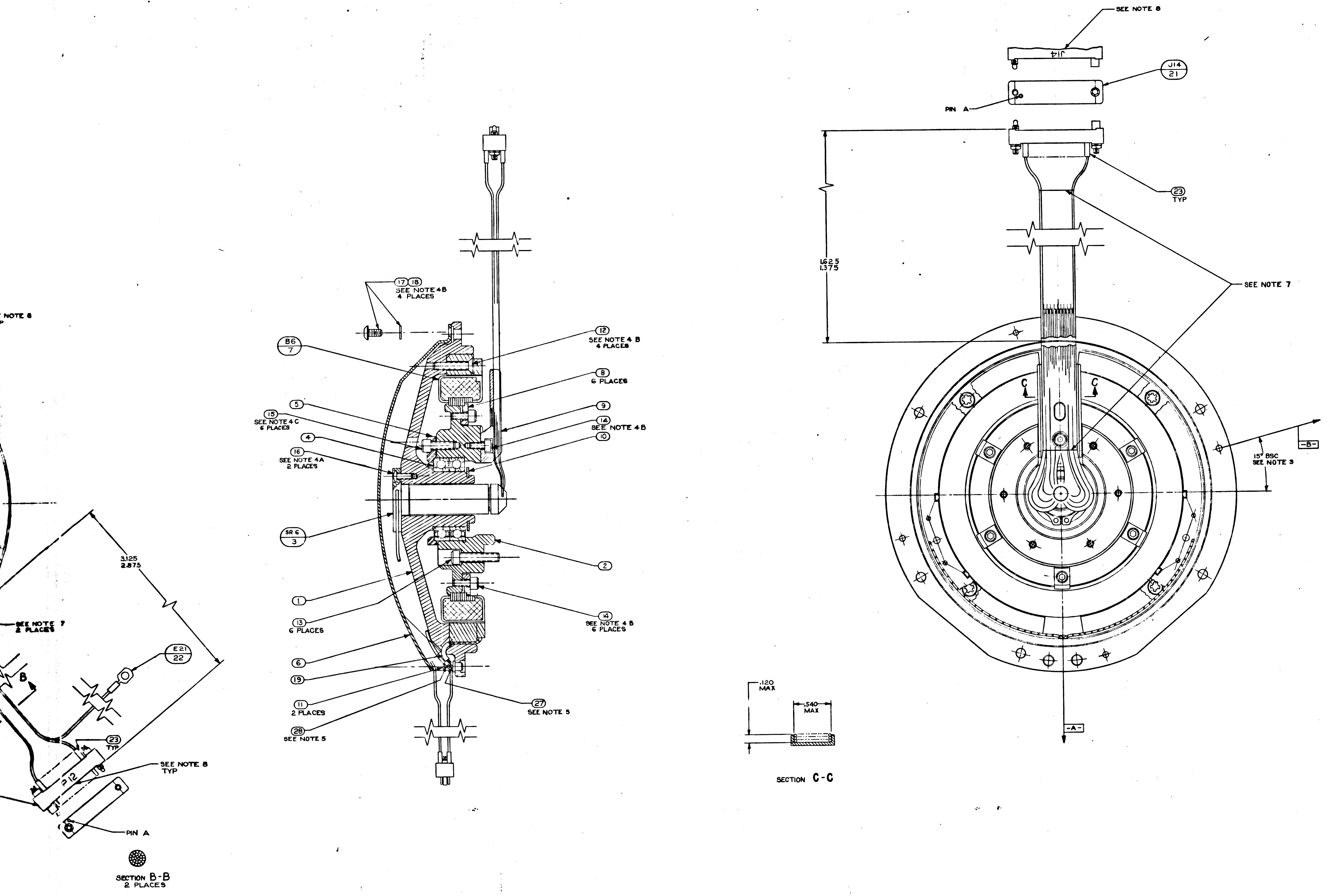
4
3
2
1
D
C
B
A
SEE NOTE 8
J14
J14 21
PIN A
23 TYP
1.625
1.375
SEE NOTE 7
C
C
-B-
15° BSC SEE NOTE 3
-A-
17 18 SEE NOTE 4B 4 PLACES
86 7
12 SEE NOTE 4 B 4 PLACES
8 6 PLACES
5
9
15 SEE NOTE 4 C 6 PLACES
14 SEE NOTE 4 B
4
10
16 SEE NOTE 4A 2 PLACES
BR 6 3
2
1
13 6 PLACES
14 SEE NOTE 4 B 6 PLACES
6
19
11 2 PLACES
27 SEE NOTE 5
28 SEE NOTE 5
E21 22
SEE NOTE 8 TYP
B-B
.120 MAX
.540 MAX
SECTION C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	1012507-002	TAPE LACING	29
A/R	QQ-S-571 SN60	SOLDER	28
A/R	QQ-S-571 SN10	SOLDER	27
A/R	1010870	GREASE, LUBRICATING	26
1	1010416-1	WIRE, AWG 28E BLACK 8" LONG	25
1	1010416-10	WIRE, AWG 28E WHITE 8" LONG	24
82	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	23
3	1000020-4	SHIELD AND GROUND ASSY	22
1	1010813-1	CONN ELEC RECEPT 44 PIN	21
2	1000123	CONN ELEC PLUG 26 PIN	20
1	1010490-054	INSULATION SLEEVING, ELEC HEAT SHRINK	19
4	MS15795-703	WASHER, FLAT, METAL, ROUND	18
4	1010891-12	SCREW BUTTON HD SELF LKG SOC SPLINE	17
2	1010891-2	SCREW BUTTON HD SELF LKG SOC SPLINE	16
6	1001488-18	SCREW HEX SOC HD SELF-LOCKING	15
7	1001488-2	SCREW HEX SOC HD SELF-LOCKING	14
6	1001489-22	SCREW HEX SOC HD	13
4	1010867-17	SCREW FLAT HD SELF LOCKING SOC SPLINE	12
2	1000100-1	TERMINAL INSULATED	11
1	MS-16624-4075	RING RETAINING EXTERNAL BASIC	10
1	2018715	RETAINER WIRE INNER AXIS	9
6	2018745	CLIP RETAINER TORQUE MOTOR INNER AXIS	8
1	2018623	MOTOR TORQUE DC FRAMELESS	7
1	2018781	WIRE GUIDE BRG HSG T.M. I.A.	6
1	2018747	PLATE BEARING RETAINER T.M. I.A.	5
1	2018621	BALL BEARING DUPLEX	4
1	2018634	SLIP RING ASSY ELEC 40 CONTACT	3
1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS	2
1	2018746	HOUSING BEARING TORQUE MOTOR I.A.	1
011	LIST OF MATERIALS		

2018611

2018604	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	MIT INSTRUMENTATION LAB Cambridge, Mass DWG. NO. CONTRACT DRAWN L. Morse DATE 6-8-64 CHECKED G. QUINN 2-17-65 APPROVAL APPROVAL NASA APPROVAL MIT APPROVAL L Hafilr	MANNED SPACECRAFT CENTER HOUSTON, TEXAS INTER-GIMBAL SUB-ASSEMBLY TORQUE MOTOR INNER AXIS
NEXT ASSY	USED ON			CODE IDENT NO. SIZE J NASA DRAWING NO. 2018611
APPLICATION				SCALE 2/1 WT SHEET 1 OF 7

2018611	REV	SHEET 1


SEE NOTE 8
J14
J14
21
PIN A
23
TYP
1.625
1.375
SEE NOTE 7
C
C
15° BSC
SEE NOTE 3
-B-
-A-
17 18
SEE NOTE 4B
4 PLACES
B6
7
12
SEE NOTE 4 B
4 PLACES
8
6 PLACES
5
9
15
SEE NOTE 4 C
6 PLACES
14
SEE NOTE 4 B
10
4
16
SEE NOTE 4A
2 PLACES
SR 6
3
2
1
13
6 PLACES
14
SEE NOTE 4 B
6 PLACES
6
19
11
2 PLACES
27
SEE NOTE 5
28
SEE NOTE 5
.120
MAX
.540
MAX
SECTION C-C
SEE NOTE 8
SEE NOTE 7
2 PLACES
3.125
2.875
E21
22
B
23
TYP
SEE NOTE 8
TYP
P12
PIN A
SECTION B-B
2 PLACES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
A/R	1012507-002	TAPE LACING
A/R	QQ-S-571 SN60	SOLDER
A/R	QQ-S-571 SN10	SOLDER
A/R	1010870	GREASE, LUBRICATING
1	1010416-1	WIRE, AWG 28E BLACK 8" LONG
1	1010416-10	WIRE, AWG 28E WHITE 8" LONG
82	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG
3	1000020-4	SHIELD AND GROUND ASS
1	1010813-1	CONN ELEC RECEPT 44 PIN
2	1000123	CONN ELEC PLUG 26 PIN
1	1010490-054	INSULATION SLEEVING, ELEC HEAT SHRINK
4	MS15795-703	WASHER, FLAT, METAL, ROUND
4	1010891-12	SCREW BUTTON HD SELF LKG SOC SPLINE
2	1010891-2	SCREW BUTTON HD SELF LKG SOC SPLINE
6	1001488-18	SCREW HEX SOC HD SELF-LOCKING
7	1001488-2	SCREW HEX SOC HD SELF-LOCKING
6	1001489-22	SCREW HEX SOC HD
4	1010867-17	SCREW FLAT HD SELF LOCKING SOC SPLINE
2	1000100-1	TERMINAL INSULATED
1	MS-16624-4075	RING RETAINING EXTERNAL BASIC
1	2018715	RETAINER WIRE INNER AXIS
6	2018745	CLIP RETAINER TORQUE MOTOR INNER AXIS
1	2018623	MOTOR TORQUE DC FRAMELESS
1	2018781	WIRE GUIDE BRG HSG T.A. I.A.
1	2018747	PLATE BEARING RETAINER T.A. I.A.
1	2018621	BALL BEARING DUPLEX
1	2018634	SLIP RING ASSY ELEC 40 CONTACT
1	2018743	SHAFT STUB TORQUE MOTOR INNER AXIS
1	2018746	HOUSING BEARING TORQUE MOTOR I.A.

011 LIST OF MATERIALS

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN L. Morse DATE 6-8-64
CHECKED J. QUINN
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

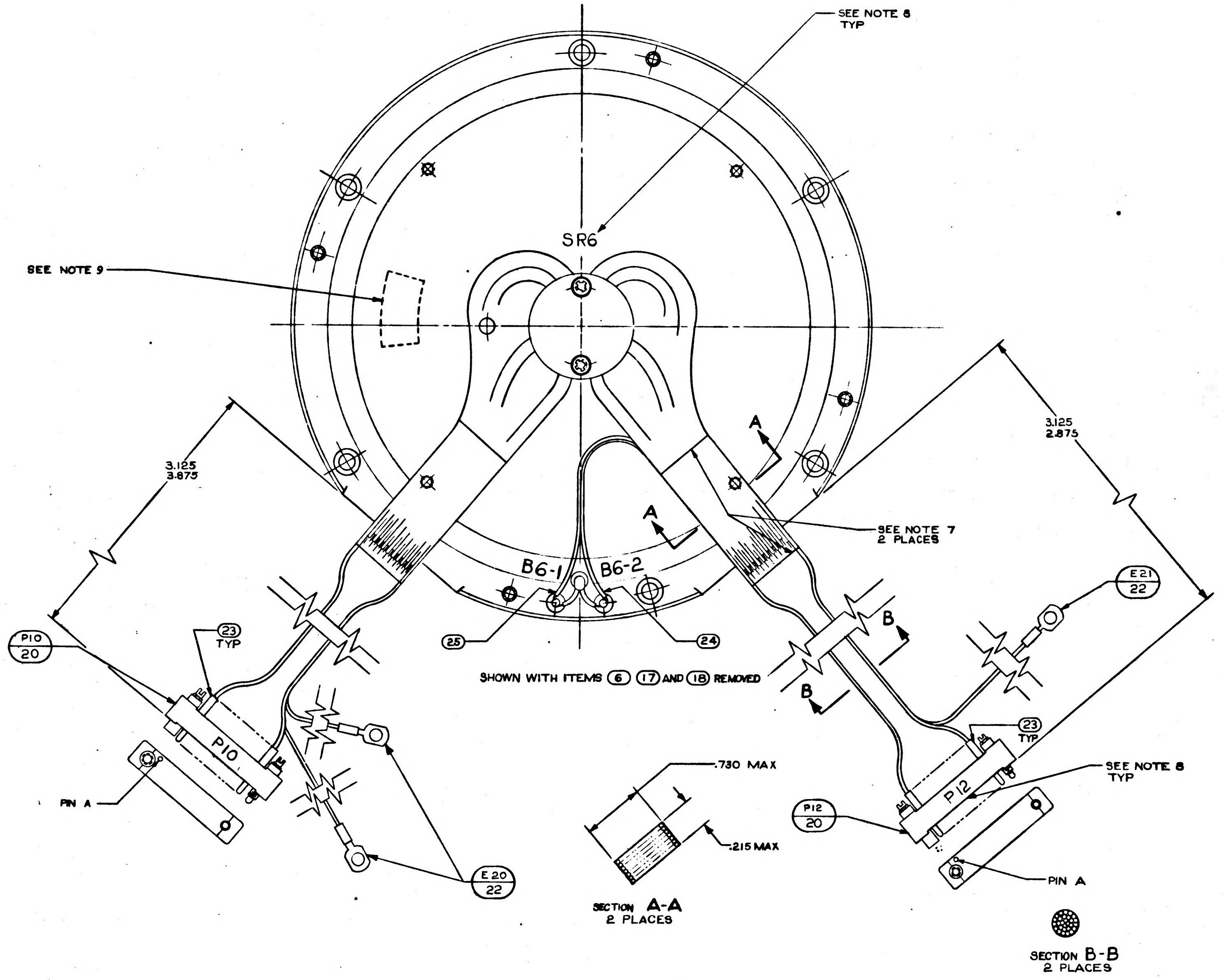
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

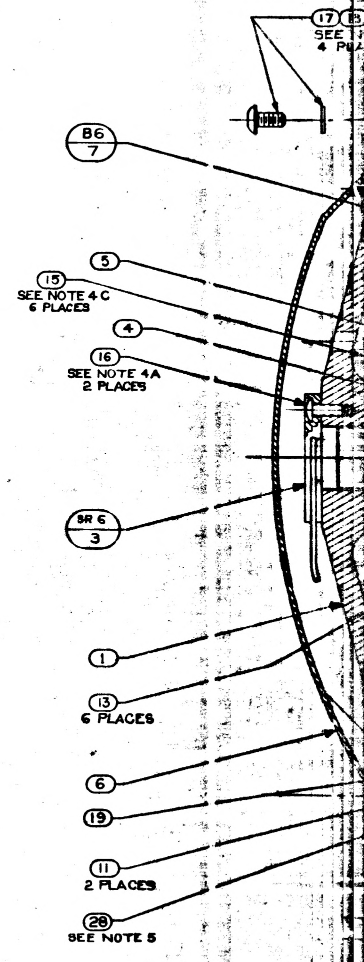
INTER-GIMBAL SUBASSEMBLY
TORQUE MOTOR
INNER AXIS

CODE IDENT NO.
SIZE J
20 611
SCALE 2/1
WT
SHEET 1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE AND TEST PER THE REQUIREMENTS OF ATP2018601
3. ECCENTRICITY MARKS ON THE OUTER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-A-}$ AND IN THE DIRECTION OF THE ARROW WHEN ② IS IN THE POSITION SHOWN
   THE ECCENTRICITY MARKS ON THE INNER RACE OF ④ TO BE ALIGNED WITHIN ± 5° OF $\boxed{-B-}$ AND IN THE DIRECTION OF THE ARROW WHEN ① IS IN THE POSITION SHOWN
   APPLY A THIN COAT OF ㉖ TO INSIDE DIAMETER OF ④ AND TO FAYING SURFACE OF ① BEFORE ASSEMBLING
4. SCREW TORQUE REQUIREMENTS ± 7%
   - A. 3.5 IN LB
   - B. 5.0 IN LB
   - C. 10.0 IN LB
5. SOLDER LEADS FROM ⑦ TO LOWER SECTION OF APPROPRIATE TERMINAL PER ND 1002071 USING ㉗ SOLDER ALL OTHER LEADS TO EITHER UPPER SECTION OF APPROPRIATE TERMINAL OR ⑳ AND ㉑ PER ND 1002071 USING ㉘ WIRE INSULATION SHALL BE WITHIN .06 OF SOLDERED CONNECTION
6. HEAT SHRINK SLEEVING ON ㉒ AFTER ASSEMBLY
7. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
8. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
9. IDENTIFY USING DRAWING NO., REVISION LETTER AND MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 8 AND SERIALIZE PER ND 1002023
10. MAXIMUM ALLOWABLE TORQUE 12 OZ-IN
11. CAUTION: DO NOT SEPARATE STUB SHAFT ② FROM HOUSING BEARING ① OR REMOVE TORQUE MOTOR ⑦ WITHOUT FIRST ASSEMBLING KEEPER TO TORQUE MOTOR ⑦
12. YES OR NO IN TINNED COLUMN OF SHEETS 2 THRU INDICATES YES OR NO
13. CONDUCTORS WITH THE SAME NO. SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (1-1, 1-2, 1-3), (7-1, 7-2, 7-3) & (15-1, 15-2, 15-3) WHICH ARE SHIELDED BUT NOT TWISTED


SEE NOTE 8
TYP
SR6
SEE NOTE 9
3.125
3.875
3.125
2.875
A
A
SEE NOTE 7
2 PLACES
B6-1
B6-2
E21
22
P10
20
23
TYP
25
24
SHOWN WITH ITEMS 6 17 AND 18 REMOVED
B
B
P10
PIN A
E20
22
.730 MAX
.215 MAX
SECTION A-A
2 PLACES
23
TYP
SEE NOTE 8
TYP
P12
20
P12
PIN A
SECTION B-B
2 PLACES


17
SEE
4 PLA
B6
7
5
15
SEE NOTE 4C
6 PLACES
4
16
SEE NOTE 4A
2 PLACES
SR6
3
1
13
6 PLACES
6
19
11
2 PLACES
28
SEE NOTE 5

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NASA DRAWING NO.
2018611
SHEET 2 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN Y/N	FROM TERMINATION FIND NO.	FROM SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN Y/N	TO TERMINATION FIND NO.	TO SPEC NO.
1						22						
1-A			SHLD-1					E20				
1-1			P10-A	13	Y	23		SR6-1				
1-2			P10-B	13	Y	23		SR6-2				
1-3			P10-C	13	Y	23		SR6-3				
2			P10-D	13	Y	23		SR6-4				
3			P10-E	13	Y	23		SR6-5				
4-1			P10-F	13	Y	23		SR6-6				
4-2			P10-H	13	Y	23		SR6-7				
5-1			P10-J	13	Y	23		SR6-8				
5-2			P10-K	13	Y	23		SR6-9				
6-1			P10-L	13	Y	23		SR6-10				
6-2			P10-M	13	Y	23		SR6-11				
7						22						
7-A			SHLD-7					E20				
7-1			P10-N	13	Y	23		SR6-12				
7-2			P10-P	13	Y	23		SR6-13				
7-3			P10-R	13	Y	23		SR6-14				

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NASA DRAWING NO.
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SHEET 3 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN Y/N	FROM TERMINATION FIND NO.	FROM SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN Y/N	TO TERMINATION FIND NO.	TO SPEC NO.
8			P10-S	13	Y	23		SR6-15				
9			P10-T	13	Y	23		SR6-16				
10-1			P10-U	13	Y	23		SR6-17				
10-2			P10-V	13	Y	23		SR6-18				
11-1			P10-W	13	Y	23		SR6-19				
11-2			P10-X	13	Y	23		SR6-20				
12			P12-A	13	Y	23		SR6-26				
13			P12-B	13	Y	23		SR6-27				
14			P12-C	13	Y	23		SR6-28				
15						23						
15-A			SHLD-15			23		E21				
15-1			P12-D	13	Y	23		SR6-29				
15-2			P12-E	13	Y	23		SR6-30				
15-3			P12-F	13	Y	23		SR6-31				
16			P12-H	13	Y	23		SR6-32				
17			P12-J	13	Y	23		SR6-33				
18			P12-K	13	Y	23		SR6-34				

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NASA DRAWING NO.
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SHEET 4 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN Y/N	FROM TERMINATION FIND NO.	FROM SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN Y/N	TO TERMINATION FIND NO.	TO SPEC NO.
19-1			P12-L	13	Y	23		SR6-35				
19-2			P12-M	13	Y	23		SR6-36				
20-1			P12-N	13	Y	23		SR6-37				
20-2			P12-P	13	Y	23		SR6-38				
21	25		P12-R	13	Y	23		B6-1	13	Y		
22	24		P12-S	13	Y	23		B6-2	13	Y		
23			B6-BLK					B6-1	13	Y		
24			B6-WHT					B6-2	13	Y		
25			P12-T	13	Y	23		SR6-39				
26			P12-U	13	Y	23		SR6-40				
27-1			P12-Y	13	Y	23		SR6-21				
27-2			P12-Z	13	Y	23		SR6-22				
27-3			P12-a	13	Y	23		SR6-23				
27-4			P12-b	13	Y	23		SR6-24				
27-5			P12-c	13	Y	23		SR6-25				

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NASA DRAWING NO.
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SHEET 5 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TIN Y/N	FROM TERMINATION FIND NO.	FROM SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TIN Y/N	TO TERMINATION FIND NO.	TO SPEC NO.
28			J14-A	13	Y	23		SR6-1				
29			J14-B	13	Y	23		SR6-2				
30			J13-C	13	Y	23		SR6-3				
31			J14-D	13	Y	23		SR6-4				
32			J14-E	13	Y	23		SR6-5				
33-1			J14-F	13	Y	23		SR6-6				
33-2			J14-H	13	Y	23		SR6-7				
34-1			J14-J	13	Y	23		SR6-8				
34-2			J14-K	13	Y	23		SR6-9				
35-1			J14-L	13	Y	23		SR6-10				
35-2			J14-M	13	Y	23		SR6-11				
36			J14-N	13	Y	23		SR6-12				
37			J14-P	13	Y	23		SR6-13				
38			J14-R	13	Y	23		SR6-14				

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NASA DRAWING NO.
2018611
SHEET 6 of 7

CONDUCTOR			FROM							TO						
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION FIND	NO.	SPEC	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION FIND	NO.	SPEC	NO.
39			J14-S	13	Y		23			SR6-15						
40			J14-T	13	Y		23			SR6-16						
41-1			J14-U	13	Y		23			SR6-17						
41-2			J14-V	13	Y		23			SR6-18						
42-1			J14-W	13	Y		23			SR6-19						
42-2			J14-X	13	Y		23			SR6-20						
43-1			J14-Y	13	Y		23			SR6-21						
43-2			J14-Z	13	Y		23			SR6-22						
43-3			J14-AA	13	Y		23			SR6-23						
43-4			J14-BB	13	Y		23			SR6-24						
43-5			J14-CC	13	Y		23			SR6-25						
44			J14-DD	13	Y		23			SR6-26						
45			J14-EE	13	Y		23			SR6-27						
46			J14-FF	13	Y		23			SR6-28						

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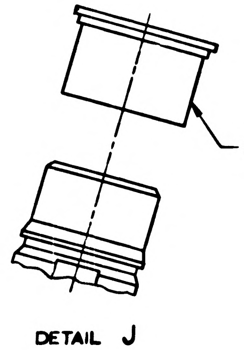
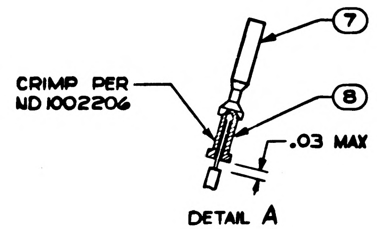
NASA DRAWING NO.
2018611
SHEET 7 of 7

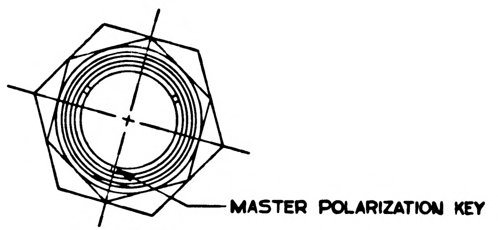
CONDUCTOR			FROM							TO						
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION FIND	NO.	SPEC	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TERMINATION FIND	NO.	SPEC	NO.
47			J14-HH	13	Y		23			SR6-29						
48			J14-JJ	13	Y		23			SR6-30						
49			J14-KK	13	Y		23			SR6-31						
50			J14-LL	13	Y		23			SR6-32						
51			J14-MM	13	Y		23			SR6-33						
52			J14-NN	13	Y		23			SR6-34						
53-1			J14-PP	13	Y		23			SR6-35						
53-2			J14-RR	13	Y		23			SR6-36						
54-1			J14-SS	13	Y		23			SR6-37						
54-2			J14-TT	13	Y		23			SR6-38						
55			J14-UU	13	Y		23			SR6-39						
56			J14-VV	13	Y		23			SR6-40						



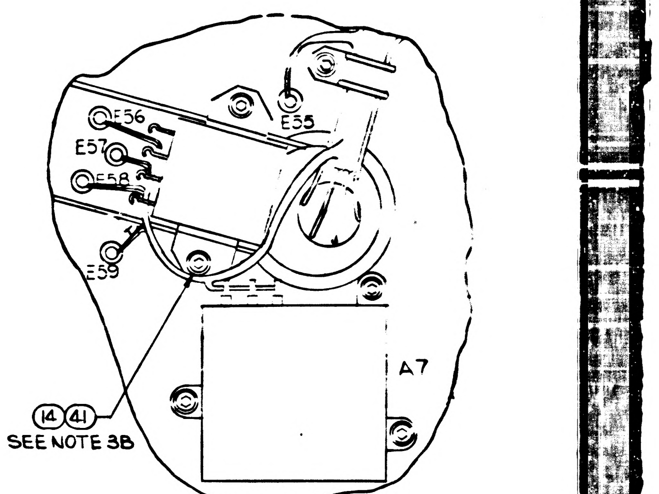
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

DETAIL A
SCALE 4/1

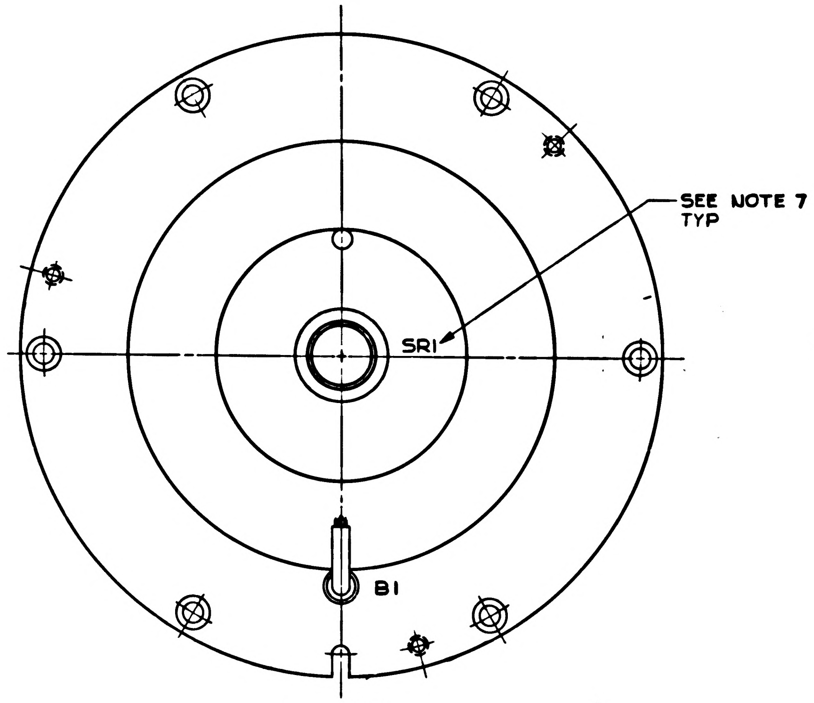

MASTER POLARIZATION KEY

VIEW C-C

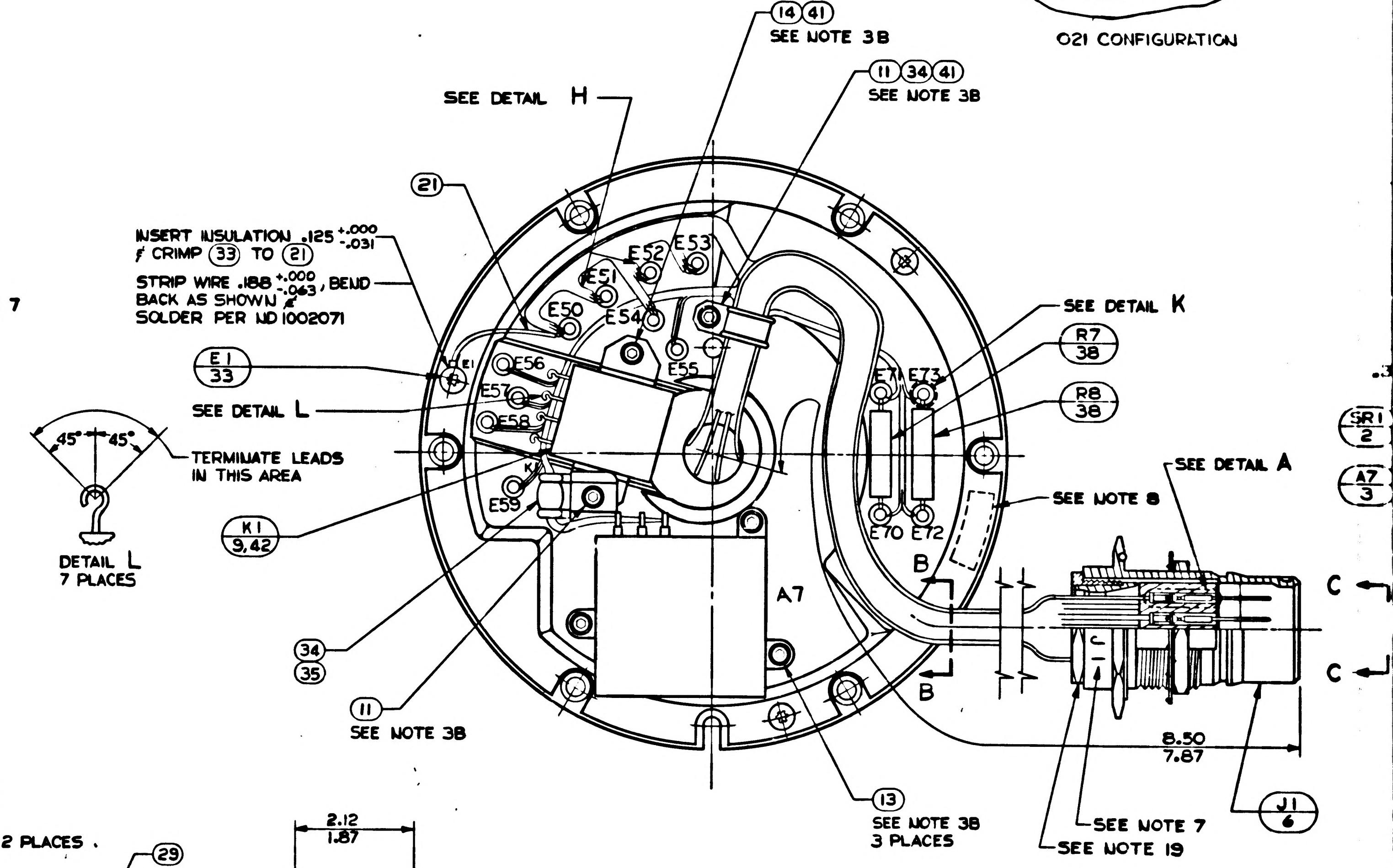

E56
E55
E57
E58
E59
A7
14 41
SEE NOTE 3B

021 CONFIGURATION

TABLE I	
CABLE CLAMP (34)	
PART NO.	DIA REF
1000220 - 1	1/6
- 2	3/32
- 3	1/8
- 13	5/32
- 4	3/16
- 14	7/32
- 5	1/4
- 15	9/32
1000220 - 6	5/16

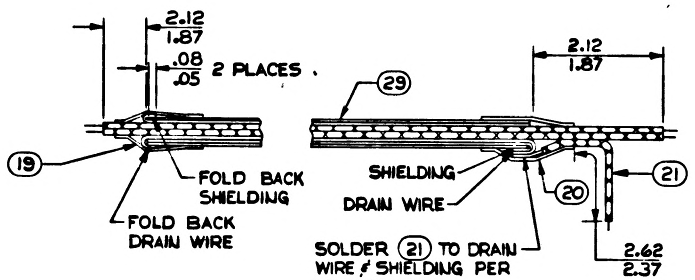

SEE NOTE 7
TYP
SR1
B1

VIEW D-D


14 41
SEE NOTE 3B
11 34 41
SEE NOTE 3B
SEE DETAIL H
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1
33
SEE DETAIL L
45° 45°
TERMINATE LEADS IN THIS AREA
DETAIL L
7 PLACES
K1
9,42
34
35
11
SEE NOTE 3B
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
E1
K
E71
E73
E70
E72
A7
SEE DETAIL K
R7
38
R8
38
SEE DETAIL A
SEE NOTE 8
B
B
C
C
SR1
2
A7
3
8.50
7.87
13
SEE NOTE 3B
3 PLACES
SEE NOTE 7
SEE NOTE 19
J1
6

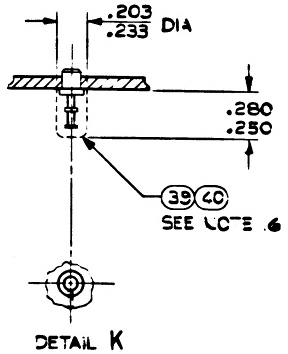
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS PER TABLE I.
3. SCREW TORQUE REQUIREMENTS ±7%.
   A. 3.5 IN.-LB.
   B. 5.0 IN.-LB.
   C. 10.0 IN.-LB.
4. SOLDER LEADS TO ③, ④, ⑤, ⑨ & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON ㉚ AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032.
7. MARK CHARACTERS .10-.14 HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND1002019.
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURER'S SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO.
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND1002032.
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS.
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
    A. = SHIELD GROUND ON "FROM END"
    B. = SHIELD GROUND ON "TO END"
    K. = BLACK
    L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J.
15. ITEM ㉞ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS ㊴ & ㊵ PER ND1002009 METHOD B.
17. TAPE HARNESS IN AREA INDICATED USING ITEM ㊸ TO MAINTAIN HARNESS CONFIGURATION PER SECTION F-F AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM ㊸.
8. TAPE ㊹ SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
9. TORQUE RETAINING NUT TO 45-55 IN.-LB.


2.12
1.87
.08
.05
2 PLACES
29
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND 1002071
2.62
2.37

DETAIL H
SCALE NONE

TABLE I	
ASSEMBLY NO.	P.S. NUMBER
2018612-011	PS 2018612
2018612-021	PS 2016143


.203
.233 DIA
.280
.250
39 40
SEE NOTE 16

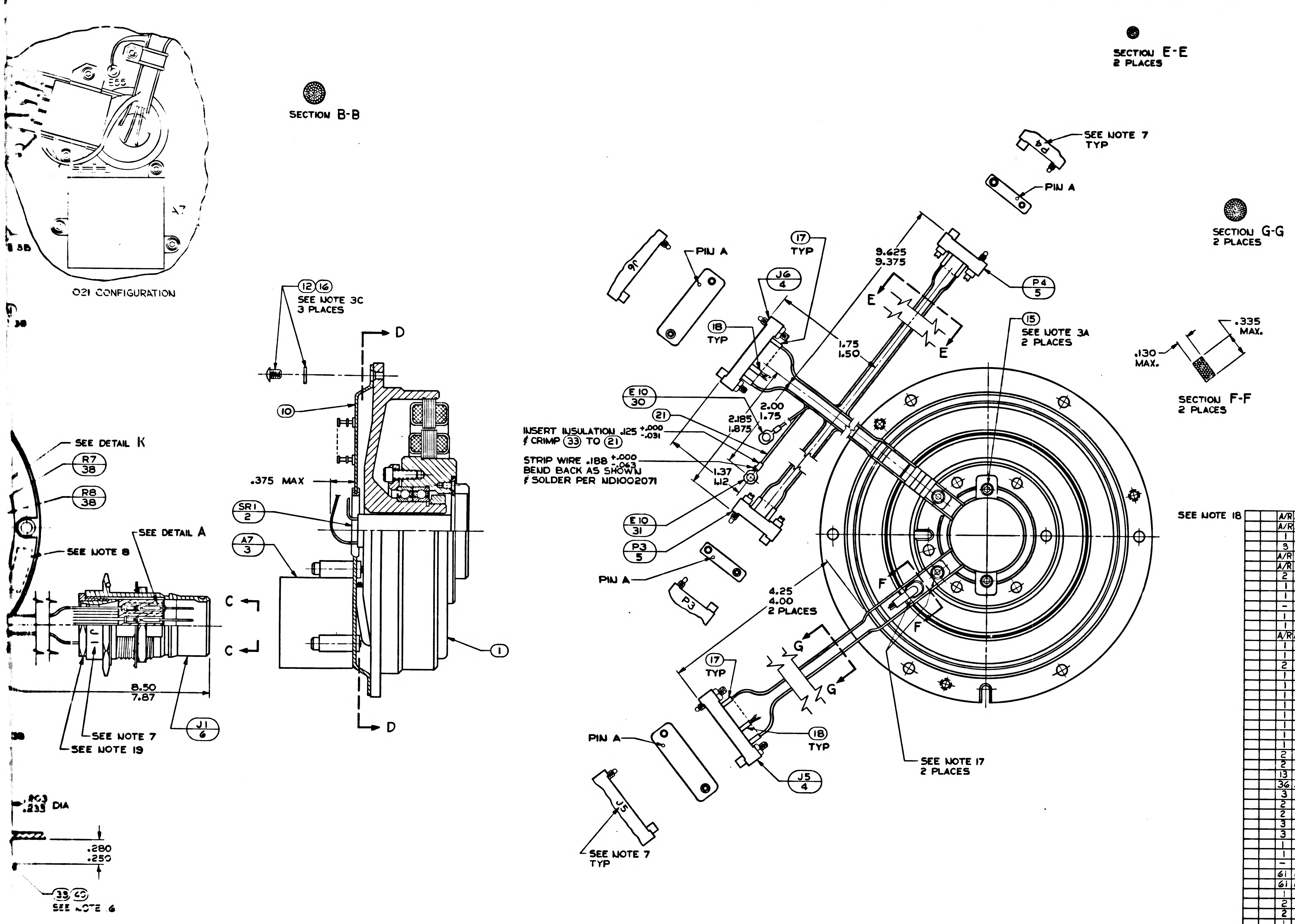
DETAIL K
4 PLACES

2018612	REV AA	SHEET 1

1/2018612

REVISIONS

ZONE	LTR	DESCRIPTION		DATE	APPROVED
	Z	① REPLACES REV Y WITHOUT CHANGE PER TDRR 39582	CHG NO	28 APR 67	DG
	AA	① REVISED PER TDRR 33690		1 ... 67	



O21 CONFIGURATION
SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335
MAX.
.130
MAX.
SEE NOTE 7
TYP
PIN A
P4
5
9.625
9.375
E
E
15
SEE NOTE 3A
2 PLACES
17
TYP
J6
4
18
TYP
1.75
1.50
E10
30
21
2.00
1.75
2.185
1.875
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN
& SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
PIN A
P3
4.25
4.00
2 PLACES
F
F
G
G
17
TYP
18
TYP
J5
4
PIN A
J6
J5
SEE NOTE 7
TYP
SEE NOTE 17
2 PLACES
SEE NOTE 18
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
A7
3
1
C
C
SEE DETAIL K
R7
38
R8
38
SEE DETAIL A
SEE NOTE 8
8.50
7.87
J1
6
SEE NOTE 7
SEE NOTE 19
.093
.235 DIA
.280
.250
33 40
SEE NOTE 6
E55
A7

021	011	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	CODE IDENT
A/R	A/R	44	MIL-I-151-26 TYPE ACT	TAPE, ADH, ELEC. PRESS SENSITIVE ½ WIDE	
A/R	A/R	43	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION ¼ WIDTH	
1	–	42	1010353-13	RELAY ELECTRO MAG SENSITIVE	
3	1	41	MS15795-803	WASHER, FLAT METAL ROUND	
A/R	A/R	40	1006835	CURING AGENT	
A/R	A/R	39	1006834	RESIN	
2	2	38	2021504-44	RESISTOR	
1	1	37	1010416-4	WIRE AWG 28E ORN 10" LONG	
1	1	36	1010416-5	WIRE AWG 28E YEL 10" LONG	
–	1	35	1000223	WASHER, CABLE CLAMP	
1	2	34	1000220 SEE NOTE 15	CLAMP, CABLE	
1	1	33	1010717-3	TERMINAL, LUG	
A/R	A/R	32	MIL-T-713 TYPE P, CLASS 2	TAPE, NYLON, WAXED	
1	1	31	1010717-1	TERMINAL, LUG	
1	1	30	1000020-11	SHEILD & GROUND ASSY	
2	2	29	1010778-2	WIRE SHIELED, TEFLON, MULTICOND 11" LONG	
1	1	28	1010416-10	WIRE AWG 28E WHT 16" LONG	
1	1	27	1010416-9	WIRE AWG 28E GY 30" LONG	
1	1	26	1010416-8	WIRE AWG 28E VIO 25" LONG	
1	1	25	1010416-7	WIRE AWG 28E BLU 18" LONG	
1	1	24	1010416-6	WIRE AWG 28E GRN 15" LONG	
1	1	23	1010416-3	WIRE AWG 28E RED 20" LONG	
1	1	22	1010416-2	WIRE AWG 28E BRN 20" LONG	
1	1	21	1010416-1	WIRE AWG 28E BLK 42" LONG	
2	2	20	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	
2	2	19	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	
13	13	18	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	
36	36	17	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	
3	3	16	MS15795-705	WASHER, FLAT, METAL, ROUND	
2	2	15	1010867-2	SCREW, SELF-LKG FLAT HD, SOC SPLINE	
2	1	14	1001488-1	SCREW, HEX SOC HD, SELF-LKG	
3	3	13	1001488-8	SCREW, HEX SOC HD, SELF-LKG	
3	3	12	1010891-23	SCREW, BUTTON HD SELF-LKG SOC SPLINE	
1	2	11	1001488-2	SCREW, HEX SOC HD, SELF-LKG	
1	1	10	2018792	GUIDE, WIRE ASSEMBLY	
–	1	9	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	
61	61	8	1010862	BUSHING, SLEEVE	
61	61	7	1010781-1	CONTACT, ELEC	
1	1	6	1010783-1	CONNECTOR, ELEC, RECP, 6 PINS	
2	2	5	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	
2	2	4	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	
1	1	3	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	
1	1	2	2018625	SLIP RING ASSEMBLY, 50 CONTACT	
1	1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	

QUANTITY REQUIRED

LIST OF PARTS AND MATERIALS

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

NEXT ASSY	USED ON
2018601	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCE ON
DECIMALS .XX ± — .XXX ± — .XXXX ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

DRAWN DTB 1/8/65
CHECKED G Quinn 3/8/65
DESIGNER
ENGINEER S.A. Hoff
ENGINEER
ISSUE
RELEASE
PROJECT APPROVAL

INSTRUMENTATION LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASS.

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

SIZE J2 | CODE IDENT NO. 80230 | 2018612

SCALE 2/1 | SHEET | OF 21

2018612

2018612

18612 | AA | 1

2/2018612

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CIRCUIT POINT	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	FROM: Y/N	FROM: TERMINATION FIND NO.	FROM: SPEC	FROM: NO.	TO: CIRCUIT POINT	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	TO: Y/N	TO: TERMINATION FIND NO.	TO: SPEC	TO: NO.
1	21		J1-1	17	N				E50	25	Y			
2	21		E1	25	Y	31			E50	25	Y			
3			SR1-1						E50	25	Y			
4	29			1 50	1 25	19				1 25	1 00	20		
4B	21		E50	25	Y				SHLD 4	25	Y			
4L			J1-2	17	N				E51	25	Y			
4K			J1-4	17	N				E52	25	Y			
5	29			1 50	1 25	19				1 25	1 00	20		
5B	21		E50	25	Y				SHLD 5	25	Y			
5L			J1-3	17	N				E51	25	Y			
5K			J1-5	17	N				E52	25	Y			
6-1			SR1-2						E51	25	Y			
6-2			SR1-3						E51	25	Y			
6-3			SR1-4						E52	25	Y			
6-4			SR1-5						E52	25	Y			
6-5			SR1-19	17	Y				K1-1	18	Y			
6-6			SR1-20						E52	25	Y			
7	25		K1-1	18	Y				E51	25	Y			

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HOUSTON TEXAS

REVISION AA

NASA DRAWING NO. 2018612-011
SHEET 2 of 21

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CIRCUIT POINT	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	FROM: Y/N	FROM: TERMINATION FIND NO.	FROM: SPEC	FROM: NO.	TO: CIRCUIT POINT	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	TO: Y/N	TO: TERMINATION FIND NO.	TO: SPEC	TO: NO.
8-1	24		J1-6	17	N				E53	25	Y			
8-2	26		J1-8	17	N				E54	25	Y			
8-3	25		J1-7	17	N				E53	25	Y			
8-4	27		J1-9	17	N				E54	25	Y			
9-1			SR1-6						E53	25	Y			
9-2			SR1-7						E53	25	Y			
9-3			SR1-8						E54	25	Y			
9-4			SR1-9						E54	25	Y			
10-1	28		J1-10	17	N				K1-4	18	Y			
10-2	21		J1-11	17	N				K1-8	18	Y			
11			J1-12	17	N				SR1-12					
71	25		J1-19	17	N				E72	25	Y			
72-1			SR1-14						E55	25	Y			
72-2			SR1-15						E56	25	Y			
73			SR1-16						E57	25	Y			
74-1			SR1-17						E58	25	Y			
74-2			SR1-18						E59	25	Y			

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NASA DRAWING NO. 2018612-011
SHEET 3 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CIRCUIT POINT	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	FROM: Y/N	FROM: TERMINATION FIND NO.	FROM: SPEC	FROM: NO.	TO: CIRCUIT POINT	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	TO: Y/N	TO: TERMINATION FIND NO.	TO: SPEC	TO: NO.
12			J1-13	17	N				SR1-13					
13-1	37		J1-14	17	N				E55	25	Y			
13-2	36		J1-15	17	N				E56	25	Y			
13-3	37		J1-29	17	N				E55	26	Y			
13-4	36		J1-30	17	N				E56	25	Y			
14	24		J1-16	17	N				E57	25	Y			
15-1	25		J1-17	17	N				E58	25	Y			
15-2	26		J1-18	17	N				E59	25	Y			
15-3	25		J1-31	17	N				E58	25	Y			
15-4	26		J1-32	17	N				E59	25	Y			
16			K1-5	18	Y				SR1-26					
17	21		J1-20	17	N				E70	25	Y			
18-1			J1-21	17	N				SR1-21					
18-2			J1-22	17	N				SR1-22					
18-3			J1-23	17	N				SR1-23					
18-4			J1-24	17	N				SR1-24					
18-5			J1-25	17	N				SR1-25					
19	24		J1-26	17	N				E57	25	Y			

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NASA DRAWING NO. 2018612-011
SHEET 4 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CIRCUIT POINT	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	FROM: Y/N	FROM: TERMINATION FIND NO.	FROM: SPEC	FROM: NO.	TO: CIRCUIT POINT	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	TO: Y/N	TO: TERMINATION FIND NO.	TO: SPEC	TO: NO.
20-1	27		J1-27	17	N				A7-3	17	Y			
20-2	23		J1-28	17	N				A7-2	17	Y			
21-1			J1-33	17	N				SR1-33					
21-2			J1-34	17	N				SR1-34					
22-1			J1-35	17	N				SR1-35					
22-2			J1-36	17	N				SR1-36					
23-1			J1-37	17	N				SR1-37					
23-2			J1-38	17	N				SR1-38					
24-1			J1-39	17	N				SR1-39					
24-2			J1-40	17	N				SR1-40					
25-1			J1-41	17	N				SR1-41					
25-2			J1-42	17	N				SR1-42					
26-1			J1-43	17	N				SR1-43					
26-2			J1-44	17	N				SR1-44					
27-1			J1-45	17	N				SR1-45					
27-2			J1-46	17	N				SR1-46					

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NASA DRAWING NO. 2018612-011
SHEET 5 of 21

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION SPEC FIND NO.	NO.
44-1		J5-L	17	Y	17		SR1-35				
44-2		J5-M	17	Y	17		SR1-36				
45-1		J5-N	17	Y	17		SR1-37				
45-2		J5-P	17	Y	17		SR1-38				
46-1		J5-R	17	Y	17		SR1-39				
46-2		J5-S	17	Y	17		SR1-40				
47-1		J5-T	17	Y	17		SR1-41				
47-2		J5-U	17	Y	17		SR1-42				
48-1		J5-V	17	Y	17		SR1-43				
48-2		J5-W	17	Y	17		SR1-44				
49-1		J5-X	17	Y	17		SR1-45				
49-2		J5-Y	17	Y	17		SR1-46				
50-1		J5-Z	17	Y	17		SR1-47				
50-2		J5-a	17	Y	17		SR1-48				
51-1		J5-b	17	Y	18		SR1-49				
51-2		J5-c	17	Y	18		SR1-50				
52-1		J5-b	17	Y			B1A-P2				
52-2		J5-c	17	Y			B1A-P4				

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NASA DRAWING NO. 201862-011
SHEET 8 of 21

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION SPEC FIND NO.	NO.
28-1		J1-47	17	N			SR1-47				
28-2		J1-48	17	N			SR1-48				
29-1		J1-51	17	N			B1A-S3				
29-2		J1-52	17	N			B1A-S1				
30-1		J1-53	17	N			B1A-S2				
30-2		J1-54	17	N			B1A-S4				
31-1		J1-55	17	N			B1B-S3				
31-2		J1-56	17	N			B1B-S1				
32-1		J1-57	17	N			B1B-S2				
32-2		J1-58	17	N			B1B-S4				
33-1		SR1-27					A7-3	17	Y		
33-2		SR1-28					A7-2	17	Y		
34-1		SR1-10					K1-4	18	Y		
34-2		SR1-11					K1-8	18	Y		

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REVISION AA

NASA DRAWING NO. 201862-011
SHEET 6 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION SPEC FIND NO.	NO.
53		J6-A	17	Y	18		SR1-1				
54		J6-A	17	Y			E10	25	Y	31	
55					30						
55-A		SHLD-55					E10				
55-1		J6-B	17	Y	18		SR1-2				
55-2		J6-C	17	Y	18		SR1-3				
55-3		J6-D	17	Y	18		SR1-4				
55-4		J6-E	17	Y	18		SR1-5				
55-5		J6-W	17	Y	17		SR1-19				
55-6		J6-X	17	Y	17		SR1-20				
56-1		J6-F	17	Y	18		SR1-6				
56-2		J6-F	17	Y			SR1-7				
56-3		J6-J	17	Y	18		SR1-8				
56-4		J6-J	17	Y			SR1-9				

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HOUSTON TEXAS

REVISION AA

NASA DRAWING NO. 201862-011
SHEET 9 of 21

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION SPEC FIND NO.	NO.
35-1		SR1-29					A7-6	17	Y		
35-2		SR1-30					A7-1	17	Y		
36-1		SR1-31					A7-6	17	Y		
36-2		SR1-32					A7-5	17	Y		
37-1		SR1-49					A7-6	17	Y		
37-2		SR1-50					A7-4	17	Y		
38		J5-A	17	Y	17		SR1-26				
38-1		J5-B	17	Y	18		SR1-27				
39-2		J5-C	17	Y	18		SR1-28				
40-1		J5-B	17	Y			B1A-P3				
40-2		J5-C	17	Y			B1A-P1				
41-1		J5-D	17	Y	17		SR1-29				
41-2		J5-E	17	Y	17		SR1-30				
42-1		J5-F	17	Y	17		SR1-31				
42-2		J5-H	17	Y	17		SR1-32				
43-1		J5-J	17	Y	17		SR1-33				
43-2		J5-K	17	Y	17		SR1-34				

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HOUSTON TEXAS

REVISION AA

NASA DRAWING NO. 201862-011
SHEET 7 of 21

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION AA

NASA DRAWING NO. 2018612 -011
SHEET 10 of 21

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH NO.	CIRCUIT POINT	STRIP WIRE OR JACKET T/N	CUT WIRE OR SHIELD	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET T/N	CUT WIRE OR SHIELD	TERMINATION SPEC FIND NO.	NO.
57		J6-N	17Y		18		SR1-12				
58	22	J6-N	17Y				P3-C	17Y		18	
59	22	P3-C	17Y				P4-C	17Y			
60		P3-D	17Y		17		SR1-10				
61		P4-D	17Y		17		SR1-11				
62		J6-P	17Y		17		SR1-13				
63-1		J6-R	17Y		17		SR1-14				
63-2		J6-S	17Y		17		SR1-15				
64		J6-T	17Y		17		SR1-16				
65-1		J6-U	17Y		17		SR1-17				
65-2		J6-V	17Y		17		SR1-18				
66	23	J6-B	17Y				J6-C	17Y			
67	21	J6-D	17Y				J6-E	17Y			

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION AA

NASA DRAWING NO. 2018612 -011
SHEET 11 of 21

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH NO.	CIRCUIT POINT	STRIP WIRE OR JACKET T/N	CUT WIRE OR SHIELD	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET T/N	CUT WIRE OR SHIELD	TERMINATION SPEC FIND NO.	NO.
68-1		J6-Y	17Y		17		SR1-21				
68-2		J6-Z	17Y		17		SR1-22				
68-3		J6-a	17Y		17		SR1-23				
68-4		J6-b	17Y		17		SR1-24				
68-5		J6-d	17Y		17		SR1-25				
69	25	E73	25Y				K1-1	18Y			
70	21	K1-8	18Y				E71	25Y			

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION AA

NASA DRAWING NO. 2018612-021
SHEET 12 of 21

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH NO.	CIRCUIT POINT	STRIP WIRE OR JACKET T/N	CUT WIRE OR SHIELD	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET T/N	CUT WIRE OR SHIELD	TERMINATION SPEC FIND NO.	NO.
1	21	J1-1	17N				E50	25Y			
2	21	E1	25Y		31		E50	25Y			
3		SR1-1					E50	25Y			
4	29		1 50	1 25	19			1 25	1 00	20	
4B	21	E50	25Y				SHLD 4	25Y			
4L		J1-2	17N				E51	25Y			
4K		J1-4	17N				E52	25Y			
5	29		1 50	1 25	19			1 25	1 00	20	
5B	21	E50	25Y				SHLD 5	25Y			
5L		J1-3	17N				E51	25Y			
5K		J1-5	17N				E52	25Y			
6-1		SR1-2					E51	25Y			
6-2		SR1-3					E51	25Y			
6-3		SR1-4					E52	25Y			
6-4		SR1-5					E52	25Y			
6-5		SR1-19					E73	25Y			
6-6		SR1-20					E52	25Y			
7	25	E73	16Y				E51	25Y			

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION AA

NASA DRAWING NO. 2018612-021
SHEET 13 of 21

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH NO.	CIRCUIT POINT	STRIP WIRE OR JACKET T/N	CUT WIRE OR SHIELD	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	STRIP WIRE OR JACKET T/N	CUT WIRE OR SHIELD	TERMINATION SPEC FIND NO.	NO.
8-1	24	J1-6	17N				E53	25Y			
8-2	43	J1-8	17N				E54	25Y			
8-3	25	J1-7	17N				E53	25Y			
8-4	27	J1-9	17N				E54	25Y			
9-1		SR1-6					E53	25Y			
9-2		SR1-7					E53	25Y			
9-3		SR1-8					E54	25Y			
9-4		SR1-9					E54	25Y			
~~10-1~~	~~20~~	~~J1-10~~	~~17N~~				~~K1-4~~	~~18Y~~			
10-	21	J1-11	17N				K1-8	18Y			
11		J1-12	17N				SR1-12				
12	25	J1-19	17N				E72	25Y			
13-1		SR1-14					E55	25Y			
13-2		SR1-15					E56	25Y			
14		SR1-16					E57	25Y			
15-1		SR1-17					E58	25Y			
15-2		SR1-18					E59	25Y			

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION AA

NASA DRAWING NO. 2018612-021
SHEET 14 of 21

CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
16			J1-13	17	N				SR1-13					
17-1	37		J1-14	17	N				E55	25	Y			
17-2	36		J1-15	17	N				E56	25	Y			
17-3	37		J1-29	17	N				E55	25	Y			
17-4	36		J1-30	17	N				E56	25	Y			
18	24		J1-16	17	N				E57	25	Y			
19-1	25		J1-17	17	N				E58	25	Y			
19-2	26		J1-18	17	N				E59	25	Y			
19-3	25		J1-31	17	N				E58	25	Y			
19-4	26		J1-32	17	N				E59	25	Y			
20			K1-5	18					SR1-26					
21	21		J1-20	17	N				E70	25	Y			
22-1			J1-21	17	N				SR1-21					
22-2			J1-22	17	N				SR1-22					
22-3			J1-23	17	N				SR1-23					
22-4			J1-24	17	N				SR1-24					
22-5			J1-25	17	N				SR1-25					
23	24		J1-26	17	N				E57	25	Y			

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NASA DRAWING NO. 2018612-021
SHEET 15 of 21

CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
24-1	27		J1-27	17	N				A7-3	17	Y			
24-2	23		J1-28	17	N				A7-2	17	Y			
25-1			J1-33	17	N				SR1-33					
25-2			J1-34	17	N				SR1-34					
26-1			J1-35	17	N				SR1-35					
26-2			J1-36	17	N				SR1-36					
27-1			J1-37	17	N				SR1-37					
27-2			J1-38	17	N				SR1-38					
28-1			J1-39	17	N				SR1-39					
28-2			J1-40	17	N				SR1-40					
29-1			J1-41	17	N				SR1-41					
29-2			J1-42	17	N				SR1-42					
30-1			J1-43	17	N				SR1-43					
30-2			J1-44	17	N				SR1-44					
31-1			J1-45	17	N				SR1-45					
31-2			J1-46	17	N				SR1-46					

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NASA DRAWING NO. 2018612-021
SHEET 16 of 21

CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
32-1			J1-47	17	N				SR1-47					
32-2			J1-48	17	N				SR1-48					
33-1			J1-51	17	N				B1A-S3					
33-2			J1-52	17	N				B1A-S1					
34-1			J1-53	17	N				B1A-S2					
34-2			J1-54	17	N				B1A-S4					
35-1			J1-55	17	N				B1B-S3					
35-2			J1-56	17	N				B1B-S1					
36-1			J1-57	17	N				B1B-S2					
36-2			J1-58	17	N				B1B-S4					
37-1			SR1-27						A7-3	17	Y			
37-2			SR1-28						A7-2	17	Y			
38-1			SR1-10						K1-6	18	Y			
38-2			SR1-11						K1-2	18	Y			
39	26		J1-59	17	N				K1-1	18	Y			

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REVISION AA

NASA DRAWING NO. 2018612-021
SHEET 17 of 21

CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
40-1			SR1-29						A7-6	17	Y			
40-2			SR1-30						A7-1	17	Y			
41-1			SR1-31						A7-6	17	Y			
41-2			SR1-32						A7-5	17	Y			
42-1			SR1-49						A7-6	17	Y			
42-2			SR1-50						A7-4	17	Y			
43			J5-A	17	Y		17		SR1-26					
44-1			J5-B	17	Y		18		SR1-27					
44-2			J5-C	17	Y		18		SR1-28					
45-1			J5-B	17	Y				B1A-P3					
45-2			J5-C	17	Y				B1A-P1					
46-1			J5-D	17	Y		17		SR1-29					
46-2			J5-E	17	Y		17		SR1-30					
47-1			J5-F	17	Y		17		SR1-31					
47-2			J5-H	17	Y		17		SR1-32					
48-1			J5-J	17	Y		17		SR1-33					
48-2			J5-K	17	Y		17		SR1-34					

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION SPEC FIND NO.
49-1		J5-L	17	Y	17	SR1-35			
49-2		J5-M	17	Y	17	SR1-36			
50-1		J5-N	17	Y	17	SR1-37			
50-2		J5-P	17	Y	17	SR1-38			
51-1		J5-R	17	Y	17	SR1-39			
51-2		J5-S	17	Y	17	SR1-40			
52-1		J5-T	17	Y	17	SR1-41			
52-2		J5-U	17	Y	17	SR1-42			
53-1		J5-V	17	Y	17	SR1-43			
53-2		J5-W	17	Y	17	SR1-44			
54-1		J5-X	17	Y	17	SR1-45			
54-2		J5-Y	17	Y	17	SR1-46			
55-1		J5-Z	17	Y	17	SR1-47			
55-2		J5-a	17	Y	17	SR1-48			
56-1		J5-b	17	Y	18	SR1-49			
56-2		J5-c	17	Y	18	SR1-50			
57-1		J5-b	17	Y		B1A-P2			
57-2		J5-c	17	Y		B1A-P4			

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2018612-021
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CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION SPEC FIND NO.
58		J6-A	17	Y	18	SR1-1			
59		J6-A	17	Y		E10	25	Y	31
60					30				
61 A		SHLD-55				E10			
61-1		J6-B	17	Y	18	SR1-2			
61-2		J6-C	17	Y	18	SR1-3			
61-3		J6-D	17	Y	18	SR1-4			
61-4		J6-E	17	Y	18	SR1-5			
61-5		J6-W	17	Y	17	SR1-19			
61-6		J6-X	17	Y	17	SR1-20			
62-1		J6-F	17	Y	18	SR1-6			
62-2		J6-F	17	Y		SR1-7			
62-3		J6-J	17	Y	18	SR1-8			
62-4		J6-[illegible]	17	Y		SR1-9			

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CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION SPEC FIND NO.
63		J6-N	17	Y	18	SR1-12			
64	22	J6-N	17	Y		P3-C	17	Y	18
65	22	P3-C	17	Y		P4-C	17	Y	
66		P3-D	17	Y	17	SR1-10			
67		P4-D	17	Y	17	SR1-11			
68		J6-P	17	Y	17	SR1-13			
69-1		J6-R	17	Y	17	SR1-14			
69-2		J6-S	17	Y	17	SR1-15			
70		J6-T	17	Y	17	SR1-16			
71-1		J6-U	17	Y	17	SR1-17			
71-2		J6-V	17	Y	17	SR1-18			
72		J6-B	17	Y		J6-C	17	Y	
73		J6-D	17	Y		J6-E	17	Y	

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2018612-021
SHEET 20 of 21

CONDUCTOR		FROM				TO			
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION SPEC FIND NO.
74-1		J6-Y	17	Y	17	SR1-21			
74-2		J6-Z	17	Y	17	SR1-22			
74-3		J6-a	17	Y	17	SR1-23			
74-4		J6-b	17	Y	17	SR1-24			
74-5		J6-c	17	Y	17	SR1-25			
75	21	K1-3	18	Y		E71	25	Y	
76	28	K1-4	18	Y		K1-8	18	Y	

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NASA DRAWING NO.
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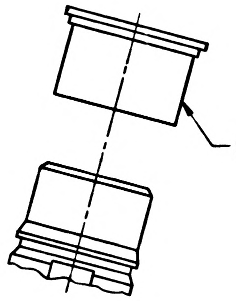
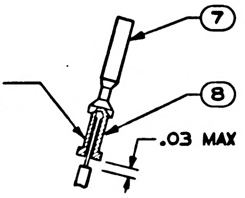
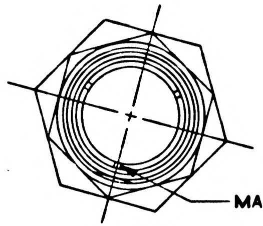
TABLE I	
CABLE CLAMP (34)	
PART NO.	DIA REF
1000220 - 1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
1000220 - 6	5/16



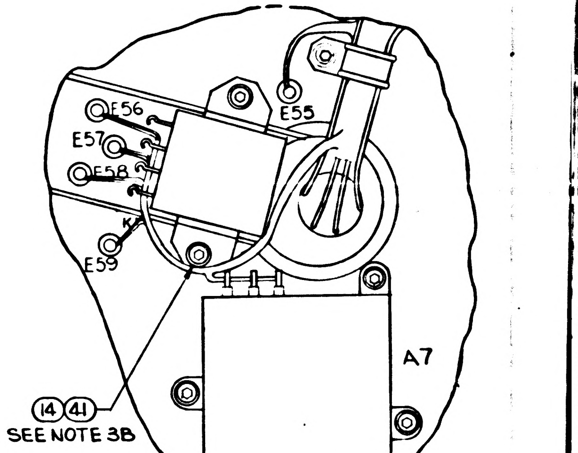
DETAIL J


7
CRIMP PER ND1002206
8
.03 MAX

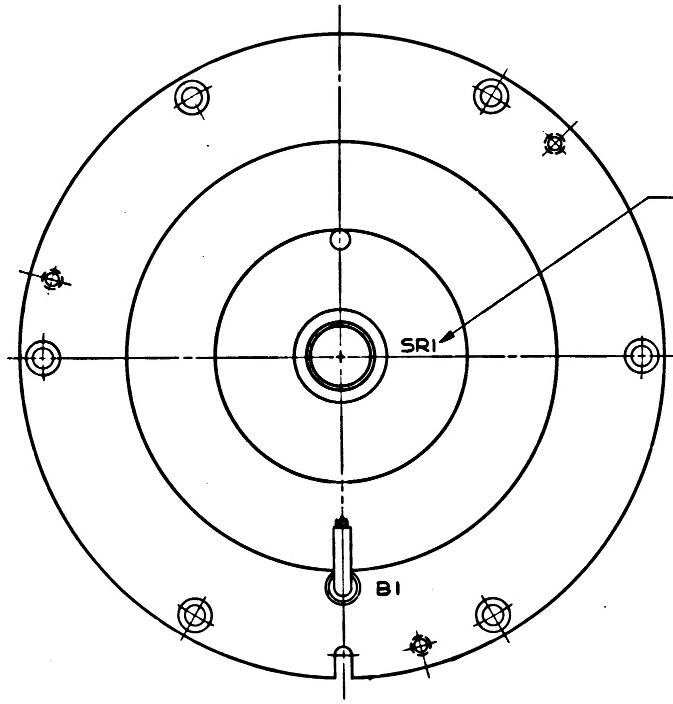
DETAIL A
SCALE 4/1


MASTER POLARIZATION KEY

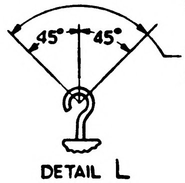
VIEW C-C


E56
E55
E57
E58
E59
A7
14 41
SEE NOTE 3B

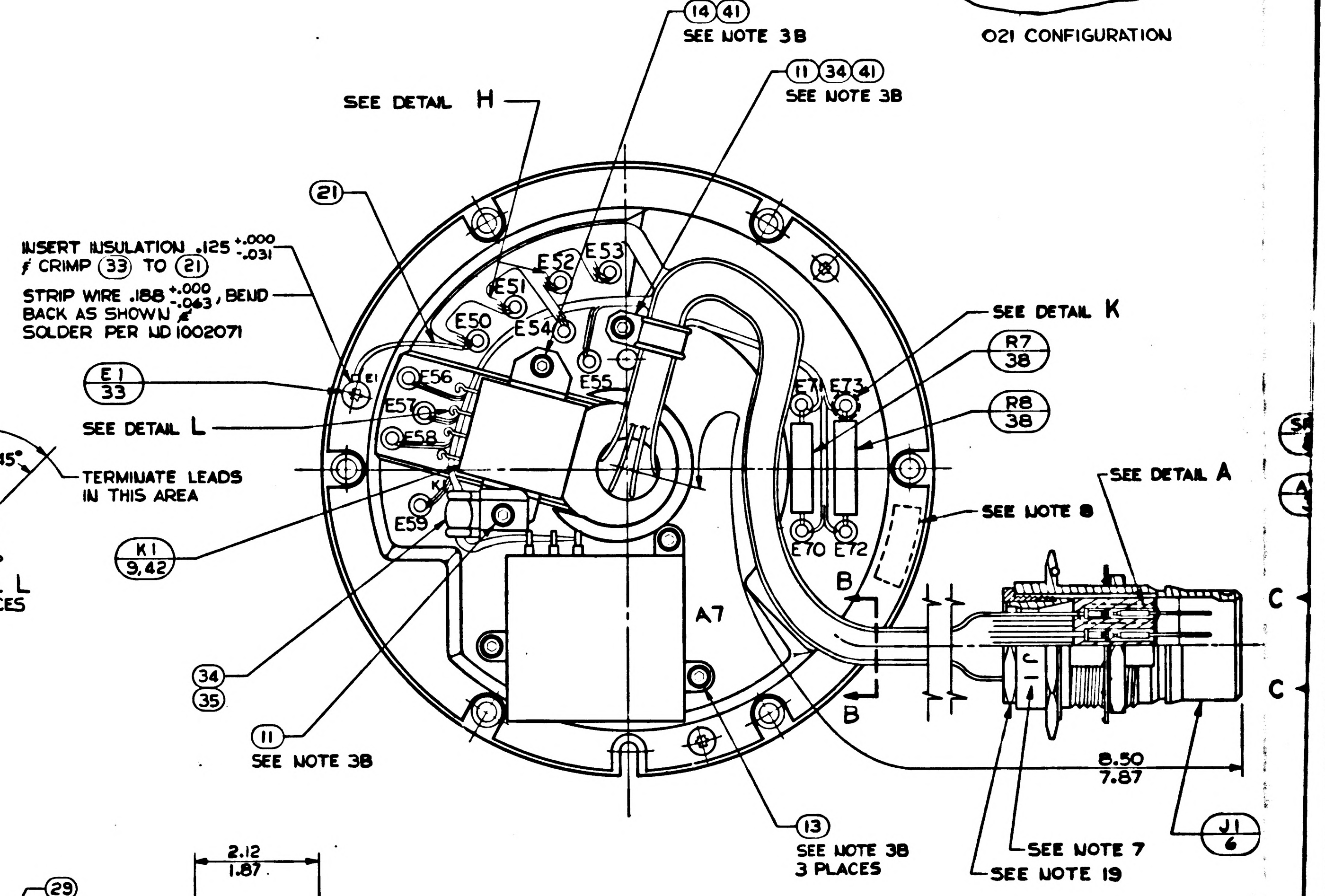
021 CONFIGURATION

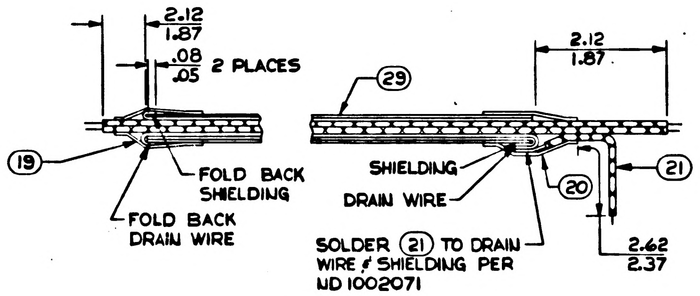

SEE NOTE 7
TYP
SR1
B1

VIEW D-D

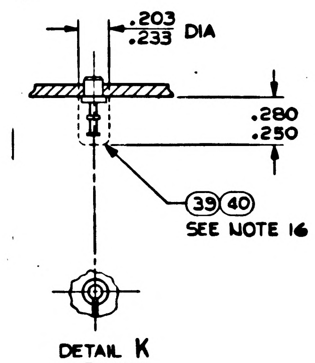

45°
45°
TERMINATE LEADS IN THIS AREA

DETAIL L
7 PLACES


14 41
SEE NOTE 3B
11 34 41
SEE NOTE 3B
SEE DETAIL H
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND1002071
E51
E52
E53
E50
E54
E55
E56
E57
E58
E59
E1
33
SEE DETAIL L
K1
9,42
34
35
11
SEE NOTE 3B
A7
E71
E73
E70
E72
SEE DETAIL K
R7
38
R8
38
SEE DETAIL A
SEE NOTE 8
B
B
C
C
8.50
7.87
13
SEE NOTE 3B
3 PLACES
SEE NOTE 7
SEE NOTE 19
J1
6


2.12
1.87
.08
.05
2 PLACES
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
29
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
2.62
2.37
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND1002071

DETAIL H
SCALE NONE


.203
.233 DIA
.280
.250
39 40
SEE NOTE 16

DETAIL K
4 PLACES

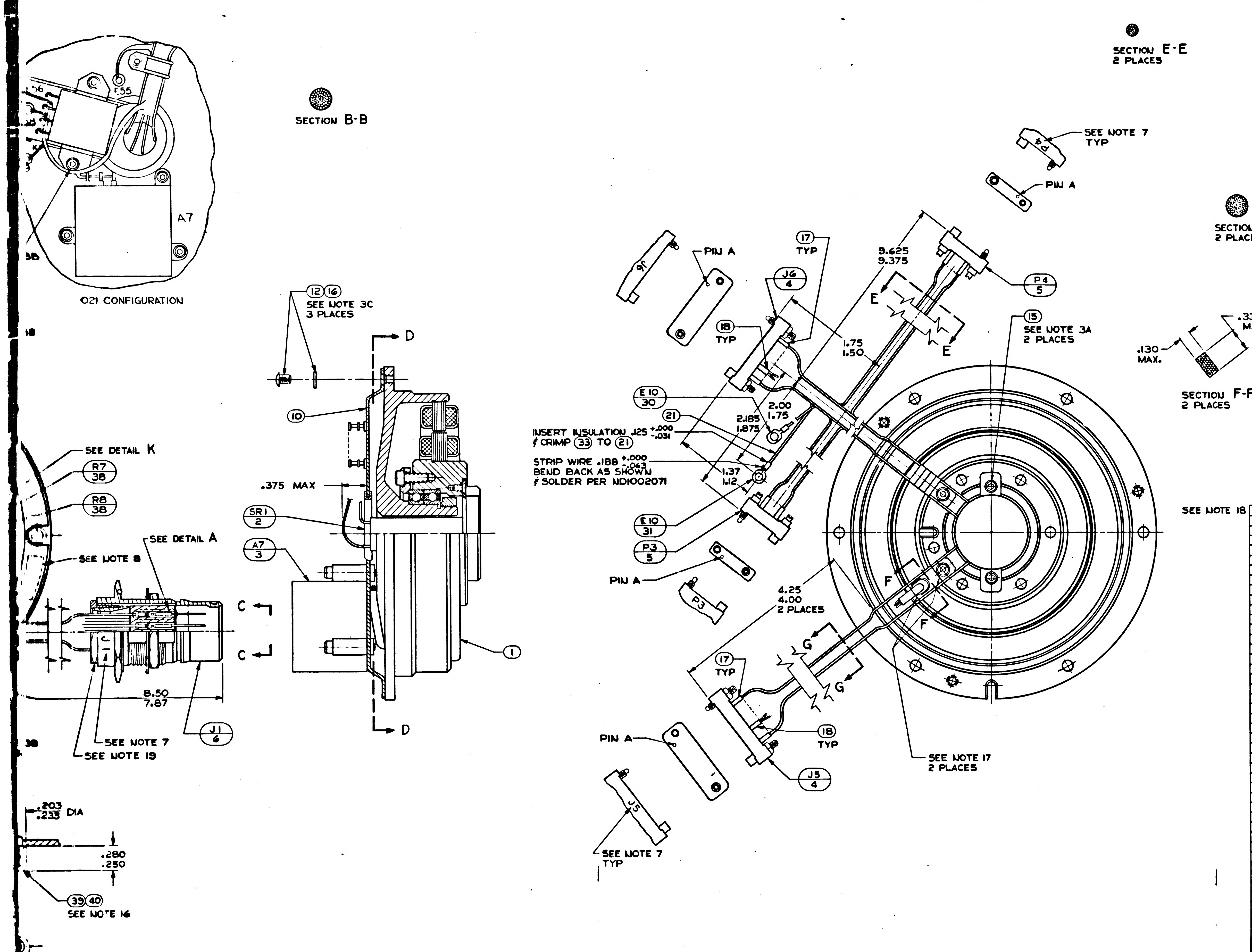
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS PER TABLE I.
3. SCREW TORQUE REQUIREMENTS ±7%.
   - A. 3.5 IN.-LB.
   - B. 5.0 IN.-LB.
   - C. 10.0 IN.-LB.
4. SOLDER LEADS TO ③, ④, ⑤, ⑨ & E50 THRU E54 PER ND1002071, EXCEPT SEE NOTE 20.
5. HEAT SHRINK SLEEVING ON ㉚ AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND1002032, EXCEPT SEE NOTE 20.
7. MARK CHARACTERS .10-.14 HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND1002019.
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURER'S SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO.
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND1002032.
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS.
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
    - A. = SHIELD GROUND ON "FROM END"
    - B. = SHIELD GROUND ON "TO END"
    - K. = BLACK
    - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J.
15. ITEM ㉞ TO BE SELECTED FROM TABLE I AT ASSEMBLY CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS ㊴ & ㊵ PER ND1002009 METHOD B.
17. TAPE HARNESS IN AREA INDICATED USING ITEM ㊸ TO MAINTAIN HARNESS CONFIGURATION PER SECTION F-F AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM ㊸.
18. TAPE ㊹ SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
19. TORQUE RETAINING NUT TO 45-55 IN.-LB.
20. ANTI-WICKING TOOLS SHALL BE USED IN ACCORDANCE WITH ND1002071. WICKING SHALL BE LIMITED TO ENABLE IDENTIFICATION OF THE EXTERIOR CONTOUR OF THE STRANDS.

TABLE I	
ASSEMBLY NO.	P.S. NUMBER
2018612-011	PS 2018612
2018612-021	PS 2016143

2018612	REV AB	SHEET 1

REVISIONS					
ZONE	LTR	DESCRIPTION		DATE	APPROVED
	Z	① REPLACES REV Y WITHOUT CHANGE PER TDRR 33582	CHG NO	28 APR 67	DG
	AA	① REVISED PER TDRR 33690		1 AUG 67	
	AB	REVISED PER TDRR 34787		9 OCT 67	GD



SECTION B-B
O21 CONFIGURATION
A7
F.55
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX.
.130 MAX.
SEE NOTE 7 TYP
PIN A
P4 5
15 SEE NOTE 3A 2 PLACES
9.625
9.375
17 TYP
J6 4
18 TYP
1.75
1.50
E
E
12 16 SEE NOTE 3C 3 PLACES
D
D
C
C
10
E10 30
21
2.00
1.75
2.185
1.875
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN
& SOLDER PER ND1002071
1.37
1.12
.375 MAX
SR1 2
A7 3
E10 31
P3 5
PIN A
P3
J6
1
SEE DETAIL K
R7 38
R8 38
SEE DETAIL A
SEE NOTE 8
8.50
7.87
J1 6
SEE NOTE 7
SEE NOTE 19
4.25
4.00
2 PLACES
F
F
G
G
17 TYP
18 TYP
J5 4
PIN A
J5
SEE NOTE 7 TYP
SEE NOTE 17 2 PLACES
.203
.233 DIA
.280
.250
39 40 SEE NOTE 16
SEE NOTE 18

		A/R	A/R	44	MIL-T-151-26 TYPE ACT	TAPE, ADH, ELEC. PRESS SENSITIVE ½ WIDE	
		A/R	A/R	43	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION ¼ WIDTH	
		1	–	42	1010353-13	RELAY ELECTRO MAG SENSITIVE	
		3	1	41	MS15795-803	WASHER, FLAT METAL ROUND	
		A/R	A/R	40	1006835	CURING AGENT	
		A/R	A/R	39	1006834	RESIN	
		2	2	38	2021504-44	RESISTOR	
		1	1	37	1010416-4	WIRE AWG 28E ORN 10" LONG	
		1	1	36	1010416-5	WIRE AWG 28E YEL 10" LONG	
		–	1	35	1000223	WASHER, CABLE CLAMP	
		1	2	34	1000220 SEE NOTE 15	CLAMP, CABLE	
		1	1	33	1010717-3	TERMINAL, LUG	
		A/R	A/R	32	MIL-T-713 TYPE P, CLASS 2	TAPE, NYLON, WAXED	
		1	1	31	1010717-1	TERMINAL, LUG	
		1	1	30	1000020-11	SHEILD & GROUND ASSY	
		2	2	29	1010778-2	WIRE, SHIELED, TEFLON, MULTICOND 11" LONG	
		1	1	28	1010416-10	WIRE AWG 28E WHT 16" LONG	
		1	1	27	1010416-9	WIRE AWG 28E GY 30" LONG	
		1	1	26	1010416-8	WIRE AWG 28E VIO 25" LONG	
		1	1	25	1010416-7	WIRE AWG 28E BLU 18" LONG	
		1	1	24	1010416-6	WIRE AWG 28E GRN 15" LONG	
		1	1	23	1010416-3	WIRE AWG 28E RED 20" LONG	
		1	1	22	1010416-2	WIRE AWG 28E BRN 20" LONG	
		1	1	21	1010416-1	WIRE AWG 28E BLK 42" LONG	
		2	2	20	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	
		2	2	19	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	
		13	13	18	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	
		36	36	17	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	
		3	3	16	MS15795-705	WASHER, FLAT, METAL, ROUND	
		2	2	15	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	
		2	1	14	1001488-1	SCREW, HEX SOC HD, SELF-LKG	
		3	3	13	1001488-8	SCREW, HEX SOC HD, SELF-LKG	
		3	3	12	1010891-23	SCREW, BUTTON HD SELF-LKG SOC SPLINE	
		1	2	11	1001488-2	SCREW, HEX SOC HD, SELF-LKG	
		1	1	10	2018792	GUIDE, WIRE ASSEMBLY	
		–	1	9	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	
		61	61	8	1010862	BUSHING, SLEEVE	
		61	61	7	1010781-1	CONTACT ELEC	
		1	1	6	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	
		2	2	5	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	
		2	2	4	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	
		1	1	3	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	
		1	1	2	2018625	SLIP RING ASSEMBLY, 50 CONTACT	
		1	1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	
		021	011	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	CODE IDENT
QUANTITY REQUIRED				LIST OF PARTS AND MATERIALS			

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCE ON
DECIMALS .XX ± — .XXX ± — .XXXX ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —

DRAWN DTB 1/8/65
CHECKED G Quinn 3/8/65
DESIGNER
ENGINEER S.A. Hopp
ENGINEER
RELEASE
PROJECT APPROVAL

INSTRUMENTATION LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASS.

INTERGIMBAL SUB-ASSEMBLY RESOLVER OUTER AXIS

SIZE J2 CODE IDENT NO. 80230 2018612
SCALE 2/1 SHEET 1 OF 21

2018612 AB

018612 B 1

2/2018612

Conductor Find Number	Individual Length No.	From: Circuit Point	Strip Wire or Jacket	Y/N	Termination Find No.	Spec	No.	To: Circuit Point	Strip Wire or Jacket	Y/N	Termination Find No.	Spec	No.
1	21	J1-1	17	N				E50	25	Y			
2	21	E1	25	Y	31			E50	25	Y			
3		SR1-1						E50	25	Y			
4	29		1 50 1 25		19				1 25 1 00		20		
4B	21	E50	25	Y				SHLD 4	25	Y			
4L		J1-2	17	N				E51	25	Y			
4K		J1-4	17	N				E52	25	Y			
5	29		1 50 1 25		19				1 25 1 00		20		
5B	21	E50	25	Y				SHLD 5	25	Y			
5L		J1-3	17	N				E51	25	Y			
5K		J1-5	17	N				E52	25	Y			
6-1		SR1-2						E51	25	Y			
6-2		SR1-3						E51	25	Y			
6-3		SR1-4						E52	25	Y			
6-4		SR1-5						E52	25	Y			
6-5		SR1-19	17	Y				E11	18	Y			
6-6		SR1-20						E52	25	Y			
7	25	[illegible]	18					E51	25	Y			

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HOUSTON TEXAS

REVISION AB

NASA DRAWING NO. 2018612-011
SHEET 2 of 21

Conductor Find Number	Individual Length No.	From: Circuit Point	Strip Wire or Jacket	Y/N	Termination Find No.	Spec	No.	To: Circuit Point	Strip Wire or Jacket	Y/N	Termination Find No.	Spec	No.
8-1	24	J1-6	17	N				E53	25	Y			
8-2	26	J1-8	17	N				E54	25	Y			
8-3	25	J1-7	17	N				E53	25	Y			
8-4	27	J1-9	17	N				E54	25	Y			
9-1		SR1-6						E53	25	Y			
9-2		SR1-7						E53	25	Y			
9-3		SR1-8						E54	25	Y			
9-4		SR1-9						E54	25	Y			
10-1	28	J1-10	17	N				K1-4	18	Y			
10-2	21	J1-11	17	N				K1-8	18	Y			
11		J1-12	17	N				SR1-12					
71	25	J1-19	17	N				E72	25	Y			
72-1		SR1-14						E55	25	Y			
72-2		SR1-15						E56	25	Y			
73		SR1-16						E57	25	Y			
74-1		SR1-17						E58	25	Y			
74-2		SR1-18						E59	25	Y			

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NASA DRAWING NO. 2018612-011
SHEET 3 of 21

Conductor Find Number	Individual Length No.	From: Circuit Point	Strip Wire or Jacket	Y/N	Termination Find No.	Spec	No.	To: Circuit Point	Strip Wire or Jacket	Y/N	Termination Find No.	Spec	No.
12		J1-13	17	N				SR1-13					
13-1	37	J1-14	17	N				E55	25				
13-2	36	J1-15	17	N				E56	25				
13-3	37	J1-29	17	N				E55	25				
13-4	36	J1-30	17	N				E56	25				
14	24	J1-16	17	N				E57	25				
15-1	25	J1-17	17	N				E58	25				
15-2	26	J1-18	17	N				E59	25				
15-3	25	J1-31	17	N				E58	25				
15-4	26	J1-32	17	N				E59	25				
16		K1-5	18					SR1-26					
17	21	J1-20	17	N				E70	25				
18-1		J1-21	17	N				SR1-21					
18-2		J1-22	17	N				SR1-22					
18-3		J1-23	17	N				SR1-23					
18-4		J1-24	17	N				SR1-24					
18-5		J1-25	17	N				SR1-25					
19	24	J1-26	17	N				E57	25				

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SHEET 4 of 21

Conductor Find Number	Individual Length No.	From: Circuit Point	Strip Wire or Jacket	Y/N	Termination Find No.	Spec	No.	To: Circuit Point	Strip Wire or Jacket	Y/N	Termination Find No.	Spec	No.
20-1	27	J1-27	17	N				A7-3	17				
20-2	33	J1-28	17	N				A7-2	17				
21-1		J1-33	17	N				SR1-33					
21-2		J1-34	17	N				SR1-34					
22-1		J1-35	17	N				SR1-35					
22-2		J1-36	17	N				SR1-36					
23-1		J1-37	17	N				SR1-37					
23-2		J1-38	17	N				SR1-38					
24-1		J1-39	17	N				SR1-39					
24-2		J1-40	17	N				SR1-40					
25-1		J1-41	17	N				SR1-41					
25-2		J1-42	17	N				SR1-42					
26-1		J1-43	17	N				SR1-43					
26-2		J1-44	17	N				SR1-44					
27-1		J1-45	17	N				SR1-45					
27-2		J1-46	17	N				SR1-46					

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HOUSTON TEXAS

REVISION AB

NASA DRAWING NO. 2018612-011
SHEET 5 of 21

TDRR 17167 9 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION SPEC FIND NO.	NO.
44-1		J5-L	17	Y	17		SR1-35				
44-2		J5-M	17	Y	17		SR1-36				
45-1		J5-N	17	Y	17		SR1-37				
45-2		J5-P	17	Y	17		SR1-38				
46-1		J5-R	17	Y	17		SR1-39				
46-2		J5-S	17	Y	17		SR1-40				
47-1		J5-T	17	Y	17		SR1-41				
47-2		J5-U	17	Y	17		SR1-42				
48-1		J5-V	17	Y	17		SR1-43				
48-2		J5-W	17	Y	17		SR1-44				
49-1		J5-X	17	Y	17		SR1-45				
49-2		J5-Y	17	Y	17		SR1-46				
50-1		J5-Z	17	Y	17		SR1-47				
50-2		J5-a	17	Y	17		SR1-48				
51-1		J5-b	17	Y	18		SR1-49				
51-2		J5-c	17	Y	18		SR1-50				
52-1		J5-b	17	Y			B1A-P2				
52-2		J5-c	17	Y			B1A-P4				

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HOUSTON TEXAS

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NASA DRAWING NO. 2018612 -011
SHEET 8 of 21

TDRR 17167 9 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION SPEC FIND NO.	NO.
28-1		J1-47	17	N			SR1-47				
28-2		J1-48	17	N			SR1-48				
29-1		J1-51	17	N			B1A-S3				
29-2		J1-52	17	N			B1A-S1				
30-1		J1-53	17	N			B1A-S2				
30-2		J1-54	17	N			B1A-S4				
31-1		J1-55	17	N			B1B-S3				
31-2		J1-56	17	N			B1B-S1				
32-1		J1-57	17	N			B1B-S2				
32-2		J1-58	17	N			B1B-S4				
33-1		SR1-27					A7-3	17	Y		
33-2		SR1-28					A7-2	17	Y		
34-1		SR1-10					K1-4	18	Y		
34-2		SR1-11					K1-B	18	Y		

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION SPEC FIND NO.	NO.
53		J6-A	17	Y	18		SR1-1				
54		J6-A	17	Y			E10	25	Y	31	
55					30						
55-A		SHLD-55					E10				
55-1		J6-B	17	Y	18		SR1-2				
55-2		J6-C	17	Y	18		SR1-3				
55-3		J6-D	17	Y	18		SR1-4				
55-4		J6-E	17	Y	18		SR1-5				
55-5		J6-W	17	Y	17		SR1-19				
55-6		J6-X	17	Y	17		SR1-20				
56-1		J6-F	17	Y	18		SR1-6				
56-2		J6-F	17	Y			SR1-7				
56-3		J6-J	17	Y	18		SR1-8				
56-4		J6-J	17	Y			SR1-9				

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SHEET 9 of 21

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION SPEC FIND NO.	NO.
35-1		SR1-29					A7-6	17	Y		
35-2		SR1-30					A7-1	17	Y		
36-1		SR1-31					A7-C	17	Y		
36-2		SR1-32					A7-5	17	Y		
37-1		SR1-49					A7-6	17	Y		
37-2		SR1-50					A7-4	17	Y		
38		J5-A	17	Y	17		SR1-26				
38-1		J5-B	17	Y	18		SR1-27				
39-2		J5-C	17	Y	18		SR1-28				
40-1		J5-B	17	Y			B1A-P3				
40-2		J5-C	17	Y			B1A-P1				
41-1		J5-D	17	Y	17		SR1-29				
41-2		J5-E	17	Y	17		SR1-30				
42-1		J5-F	17	Y	17		SR1-31				
42-2		J5-H	17	Y	17		SR1-32				
43-1		J5-J	17	Y	17		SR1-33				
43-2		J5-K	17	Y	17		SR1-34				

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION SPEC FIND NO.	NO.
57			J6-N	17Y	18		SR1-12			
58	22		J6-N	17Y			P3-C	17Y	18	
59	22		P3-C	17Y			P4-C	17Y		
60			P3-D	17Y	17		SR1-10			
61			P4-D	17Y	17		SR1-11			
62			J6-P	17Y	17		SR1-13			
63-1			J6-R	17Y	17		SR1-14			
63-2			J6-S	17Y	17		SR1-15			
64			J6-T	17Y	17		SR1-16			
65-1			J6-U	17Y	17		SR1-17			
65-2			J6-V	17Y	17		SR1-18			
66	23		J6-B	17Y			J6-C	17Y		
67	21		J6-D	17Y			J6-E	17Y		

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NASA DRAWING NO. 2018612-011 SHEET 11 of 21

O.A. RESOLV.

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION SPEC FIND NO.	NO.
68-1			J6-Y	17Y	17		SR1-21			
68-2			J6-Z	17Y	17		SR1-22			
68-3			J6-a	17Y	17		SR1-23			
68-4			J6-b	17Y	17		SR1-24			
68-5			J6-c	17Y	17		SR1-25			
69	25		E73	25Y			K1-1	18Y		
*70	21		K1-8	18Y			E71	25Y		

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NASA DRAWING NO. 2018612-021 SHEET 12 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION SPEC FIND NO.	NO.
1	21		J1-1	17Y			E50	25Y		
2	21		E1	25Y	21		E50	25Y		
3			SR1-1				E50	25Y		
4	20			1 50 1 25	24			1 1 20	20	
4B	21		E50	25Y			SHLD 4	25Y		
4L			J1-2	17Y			E51	25Y		
4K			J1-4	17Y			E52	25Y		
5	20			1 20 1 25	19			1 1 20	20	
5B	21		E50	25Y			SHLD 5	25Y		
5L			J1-3	17Y			E51	25Y		
5K			J1-5	17Y			E52	25Y		
6-1			SR1-2				E51	25Y		
6-2			SR1-3				E51	25Y		
6-3			SR1-4				E52	25Y		
6-4			SR1-5				E52	25Y		
6-5			SR1-19				E73	25Y		
6-6			SR1-20				E72	25Y		
7	25		E73	1Y			E51	25Y		

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION SPEC FIND NO.	NO.
8-1	24		J1-6	17Y			E53	25Y		
8-2	43		J1-8	17Y			E54	25Y		
8-3	25		J1-7	17Y			E53	25Y		
8-4	27		J1-9	17Y			E54	25Y		
9-1			SR1-6				E53	25Y		
9-2			SR1-7				E53	25Y		
9-3			SR1-8				E54	25Y		
9-4			SR1-9				E54	25Y		
~~10-1~~	~~20~~		~~J1-10~~	~~17N~~			~~[illegible]~~	~~17~~		
10-[illegible]	21		J1-11	17Y			K1-8	18Y		
11			J1-12	17Y			SR1-12			
12	25		J1-19	17Y			E72	25Y		
13-1			SR1-14				E55	25Y		
13-2			SR1-15				E56	25Y		
14			SR1-16				E57	25Y		
15-1			SR1-17				E58	25Y		
15-2			SR1-18				E59	25Y		

MANNED SPACECRAFT CENTER
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NASA DRAWING NO. 2018612-021
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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM FIND NO.	Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO FIND NO.	Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
16		J1-13	17	Y				SR1-13					
17-1	37	J1-14	17	Y				E55	25	Y			
17-2	36	J1-15	17	Y				E56	25	Y			
17-3	37	J1-29	17	Y				E55	25	Y			
17-4	36	J1-30	17	Y				E56	25	Y			
18	24	J1-16	17					E57	25	Y			
19-1	25	J1-17	17	Y				E58	25	Y			
19-2	26	J1-18	17	Y				E59	25	Y			
19-3	25	J1-31	17	Y				E58	25	Y			
19-4	26	J1-32	17	Y				E59	25	Y			
20		K1-5	18					SR1-26					
21	21	J1-20	17	Y				E60	25	Y			
22-1		J1-21	17					SR1-21					
22-2		J1-22	17					SR1-22					
22-3		J1-23	17					SR1-23					
22-4		J1-24	17					SR1-24					
22-5		J1-25	17					SR1-25					
23	24	J1-26	17					E57	25	Y			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM FIND NO.	Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO FIND NO.	Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
24-1	27	J1-27	17	Y				A7-3	17				
24-2	23	J1-28	17	Y				A7-2	17				
25-1		J1-33	17	Y				SR1-33					
25-2		J1-34	17	Y				SR1-34					
26-1		J1-35	17	Y				SR1-35					
26-2		J1-36	17	Y				SR1-36					
27-1		J1-37	17	Y				SR1-37					
27-2		J1-38	17	Y				SR1-38					
28-1		J1-39	17	Y				SR1-39					
28-2		J1-40	17	Y				SR1-40					
29-1		J1-41	17	Y				SR1-41					
29-2		J1-42	17					SR1-42					
30-1		J1-43	17	Y				SR1-43					
30-2		J1-44	17	Y				SR1-44					
31-1		J1-45	17					SR1-45					
31-2		J1-46	17					SR1-46					

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NASA DRAWING NO. 2018612-021
SHEET 16 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM FIND NO.	Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO FIND NO.	Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
32-1		J1-47	17	Y				SR1-47					
32-2		J1-48	17					SR1-48					
33-1		J1-51	17	Y				B1A-S3					
33-2		J1-52	17					B1A-S1					
34-1		J1-53	17	Y				B1A-S2					
34-2		J1-54	17					B1A-S4					
35-1		J1-55	17	N				B1B-S3					
35-2		J1-56	17					B1B-S1					
36-1		J1-57	17	Y				B1B-S2					
36-2		J1-58	17	Y				B1B-S4					
37-1		SR1-27						A7-3	17	Y			
37-2		SR1-28						A7-2	17	Y			
38-1		SR1-10						K1-6	18	Y			
38-2		SR1-11						K1-2	18	Y			
39	26	J1-50	17	Y				K1-1	18				

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HOUSTON TEXAS
REVISION AB
NASA DRAWING NO. 2018612-021
SHEET 17 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM FIND NO.	Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO FIND NO.	Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
40-1		SR1-29						A7-5	17				
40-2		SR1-30						A7-1	17	Y			
41-1		SR1-31						A7-6	17	Y			
41-2		SR1-32						A7-5	17	Y			
42-1		SR1-49						A7-6	17	Y			
42-2		SR1-50						A7-4	17	Y			
43		J5-A	17	Y	17			SR1-26					
44-1		J5-B	17	Y	17			SR1-27					
44-2		J5-C	17	Y	[illegible]			SR1-28					
45-1		J5-B	17	Y				B1A-P3					
45-2		J5-C	17	Y				B1A-P1					
46-1		J5-D	17	Y	17			SR1-29					
46-2		J5-E	17	Y	17			SR1-30					
47-1		J5-F	17	Y	17			SR1-31					
47-2		J5-H	17	Y	17			SR1-32					
48-1		J5-J	17	Y	17			SR1-33					
48-2		J5-K	17	Y	17			SR1-34					

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION FIND NO	SPEC	NO.
63			J6-K	17	Y	18			SP1-12					
64	28		J6-N	17	Y				P3-C	17	Y	18		
65	28		P3-C	17	Y				P4-C	17	Y			
66			P3-D	17	Y	17			SR1-10					
67			P4-D	17	Y	17			SR1-11					
68			J6-P	17	Y	17			SR1-13					
69-1			J6-R	17	Y	17			SR1-14					
69-2			J6-S	17	Y	17			SR1-15					
70			J6-T	17	Y	17			SR1-16					
71-1			J6-U	17	Y	17			SR1-17					
71-2			J6-V	17	Y	17			SR1-18					
72			J6-B	17	Y				J6-C	17	Y			
73			J6-D	17	Y				J6-E	17	Y			

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NASA DRAWING NO. 2018612-021

SHEET 20 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION FIND NO	SPEC	NO.
49-1			J5-L	17	Y	17			SR1-35					
49-2			J5-M	17	Y	17			SR1-36					
50-1			J5-N	17	Y	17			SR1-37					
50-2			J5-P	17	Y	17			SR1-38					
51-1			J5-R	17	Y	17			SR1-39					
51-2			J5-S	17	Y	17			SR1-40					
52-1			J5-T	17	Y	17			SR1-41					
52-2			J5-U	17	Y	17			SR1-42					
53-1			J5-V	17	Y	17			SR1-43					
53-2			J5-W	17	Y	17			SR1-44					
54-1			J5-X	17	Y	17			SR1-45					
54-2			J5-Y	17	Y	17			SR1-46					
55-1			J5-Z	17	Y	17			SR1-47					
55-2			J5-a	17	Y	17			SR1-48					
56-1			J5-b	17	Y	17			SR1-49					
56-2			J5-c	17	Y	17			SR1-50					
57-1			J5-b	17	Y				B1A-P2					
57-2			J5-c	17	Y				B1A-P4					

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REVISION AB

NASA DRAWING NO. 2018612-021

SHEET 18 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION FIND NO	SPEC	NO.
74-1			J6-Y	17	Y	17			SR1-21					
74-2			J6-Z	17	Y	17			SR1-22					
74-3			J6-a	17	Y	17			SR1-23					
74-4			J6-b	17	Y	17			SR1-24					
74-5			J6-c	17	Y	17			SR1-25					
75	21		K1-3	18	Y				E71	25	Y			
76	28		K1-4	18	Y				K1-8	18	Y			

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REVISION AB

NASA DRAWING NO. 2018612-021

SHEET 21 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION FIND NO	SPEC	NO.
58			J6-A	17	Y	18			SR1-1					
59			J6-A	17	Y				E10	25	Y	31		
60						33								
61 A			SHLD-55						E10					
61-1			J6-B	17	Y	18			SR1-2					
61-2			J6-C	17	Y	18			SR1-3					
61-3			J6-D	17	Y	18			SR1-4					
61-4			J6-E	17	Y	18			SR1-5					
61-5			J6-W	17	Y	17			SR1-19					
61-6			J6-X	17	Y	17			SR1-20					
62-1			J6-F	17	Y	18			SR1-6					
62-2			J6-F	17	Y				SR1-7					
62-3			J6-J	17	Y	18			SR1-8					
62-4			J6-J	17	Y				SR1-9					

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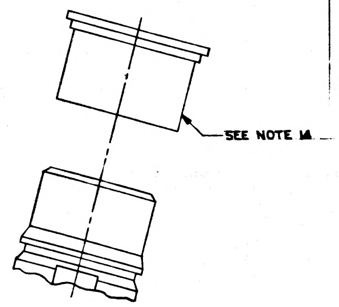
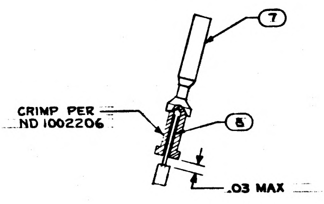
REVISION AB

NASA DRAWING NO. 2018612-021

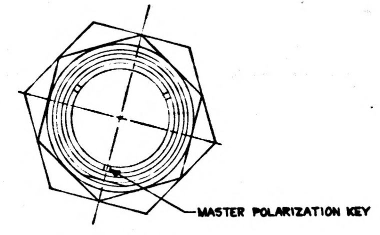
SHEET 19 of 21



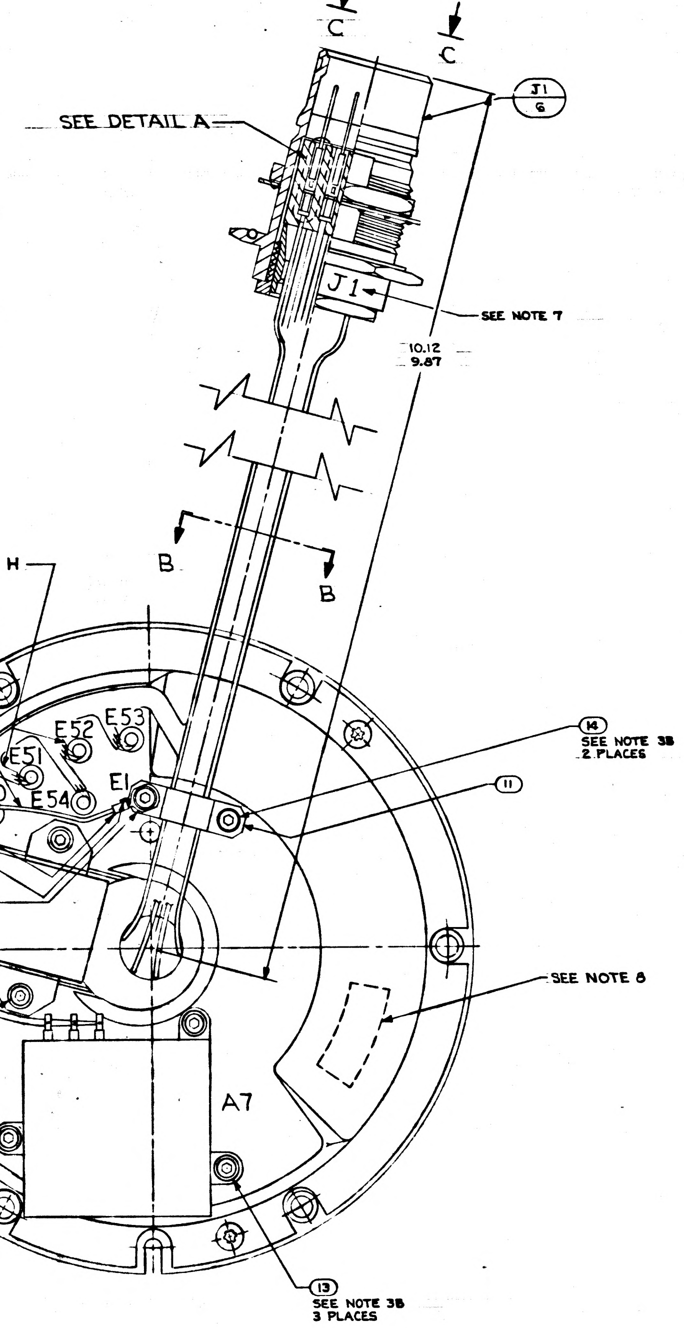
DETAIL J

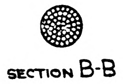

7
CRIMP PER ND 1002206
8
.03 MAX

DETAIL A
SCALE 4/1

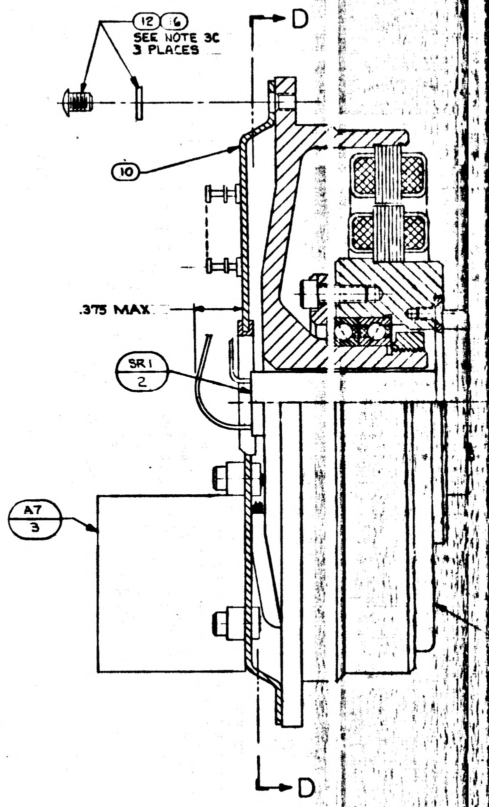

MASTER POLARIZATION KEY

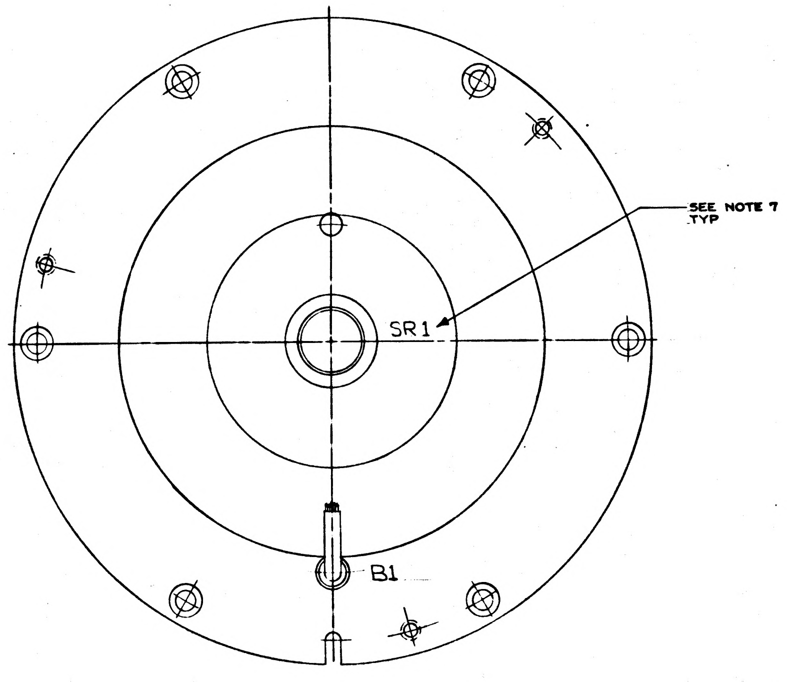
VIEW C-C


C
C
J1
6
SEE DETAIL A
J1
SEE NOTE 7
10.12
9.87
SEE DETAIL H
B
B
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 31 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E52
E53
E51
E50
E54
E1
14
SEE NOTE 3B
2 PLACES
11
E1
31
K1
9
K1
SEE NOTE 8
A7
14
SEE NOTE 3B
2 PLACES
13
SEE NOTE 3B
3 PLACES

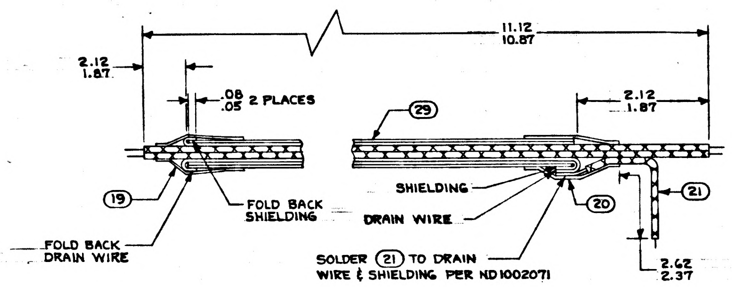


SECTION B-B


D
12 6
SEE NOTE 3C
3 PLACES
10
.375 MAX
SR1
2
A7
3
D


SEE NOTE 7
TYP
SR1
B1

VIEW D-D


11.12
10.87
2.12
1.87
.08
.05 2 PLACES
29
2.12
1.87
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND 1002071
2.62
2.37

DETAIL H
SCALE: NONE

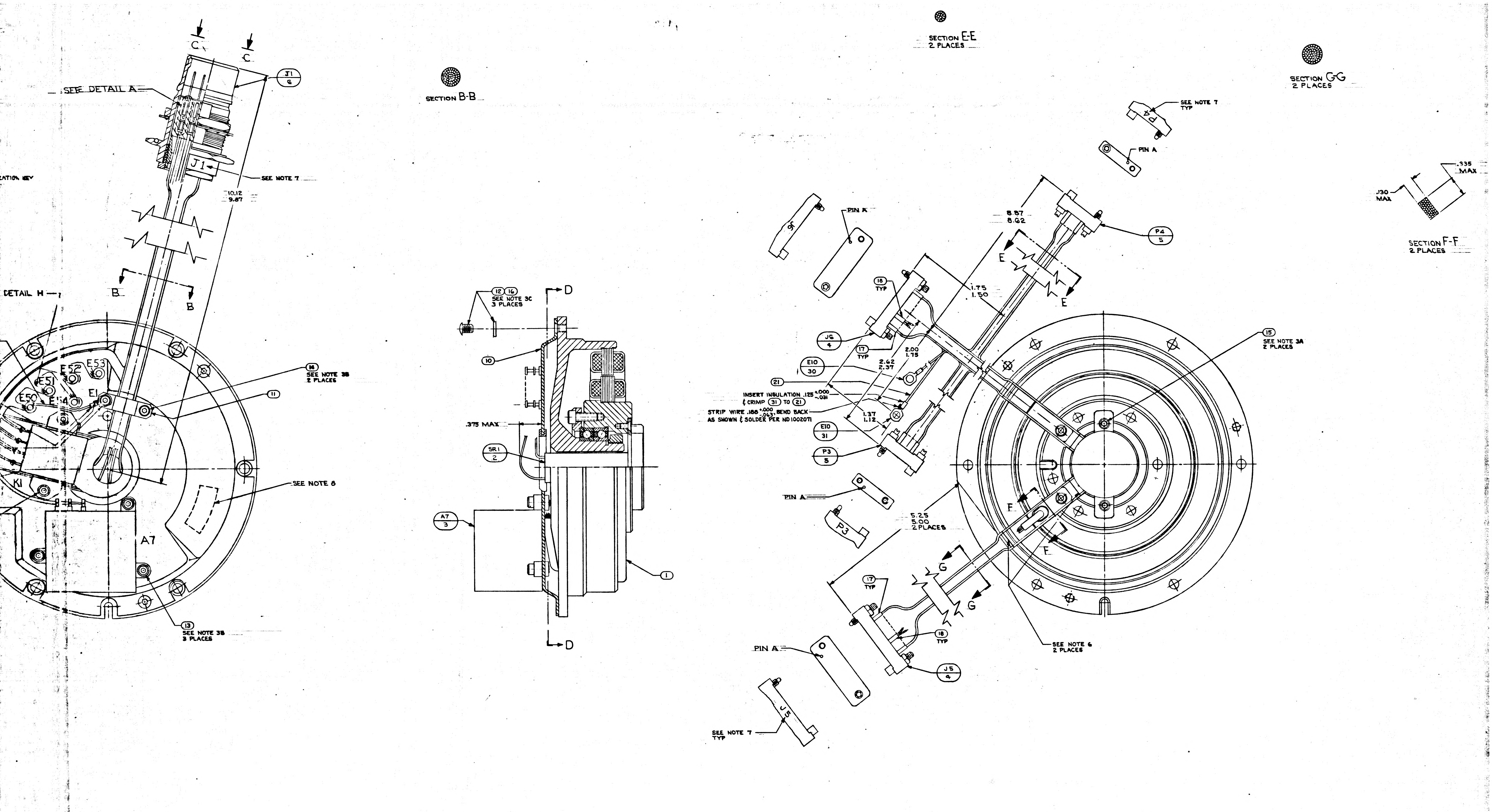
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS 2007203
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO ③, ④, ⑤, ⑨ & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON ㉚ AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
   - A. = SHIELD GROUND ON "FROM END"
   - B. = SHIELD GROUND ON "TO END"
   - K. = BLACK
   - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J

3A

	REV	SHT
2018612	A	1

F-1



C
C
SEE DETAIL A
J1
6
J1
SEE NOTE 7
10.12
9.87
B
B
DETAIL H
E53
E52
E51
E50
E54
E1
K1
A7
16
SEE NOTE 3B
2 PLACES
11
SEE NOTE 8
13
SEE NOTE 3B
3 PLACES
SECTION B-B
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
A7
3
1
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SEE NOTE 7
TYP
P4
PIN A
.335
MAX
.130
MAX
SECTION F-F
2 PLACES
8.87
8.62
P4
5
E
E
PIN A
P6
18
TYP
1.75
1.50
J6
4
17
TYP
2.00
1.75
15
SEE NOTE 3A
2 PLACES
E10
30
2.62
2.37
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 31 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
PIN A
P3
F
F
5.25
5.00
2 PLACES
G
G
17
TYP
18
TYP
SEE NOTE 6
2 PLACES
PIN A
J5
4
J5
SEE NOTE 7
TYP

A/R	[illegible] TYPE
2	1010717-1
1	1000020-8
2	1010778-2
1	1010416-10
1	1010416-9
1	1010416-8
1	1010416-7
1	1010416-6
1	1010416-3
1	1010416-2
1	1010416-1
2	1010490-112
2	1010490-032
11	1006776-1A
36	1006776-1B
3	MS15795-706
2	1010867-2
4	1001488-1
3	1001488-4
3	1010891-23
1	2018799
1	2018792
1	1010353-10
61	1010862
61	1010781-1
1	1010783-1
2	1011757-000
2	1000122
1	2007204-
1	2018625
1	2018608-011
QTY REQD	PART OR IDENTIFYING
011	

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

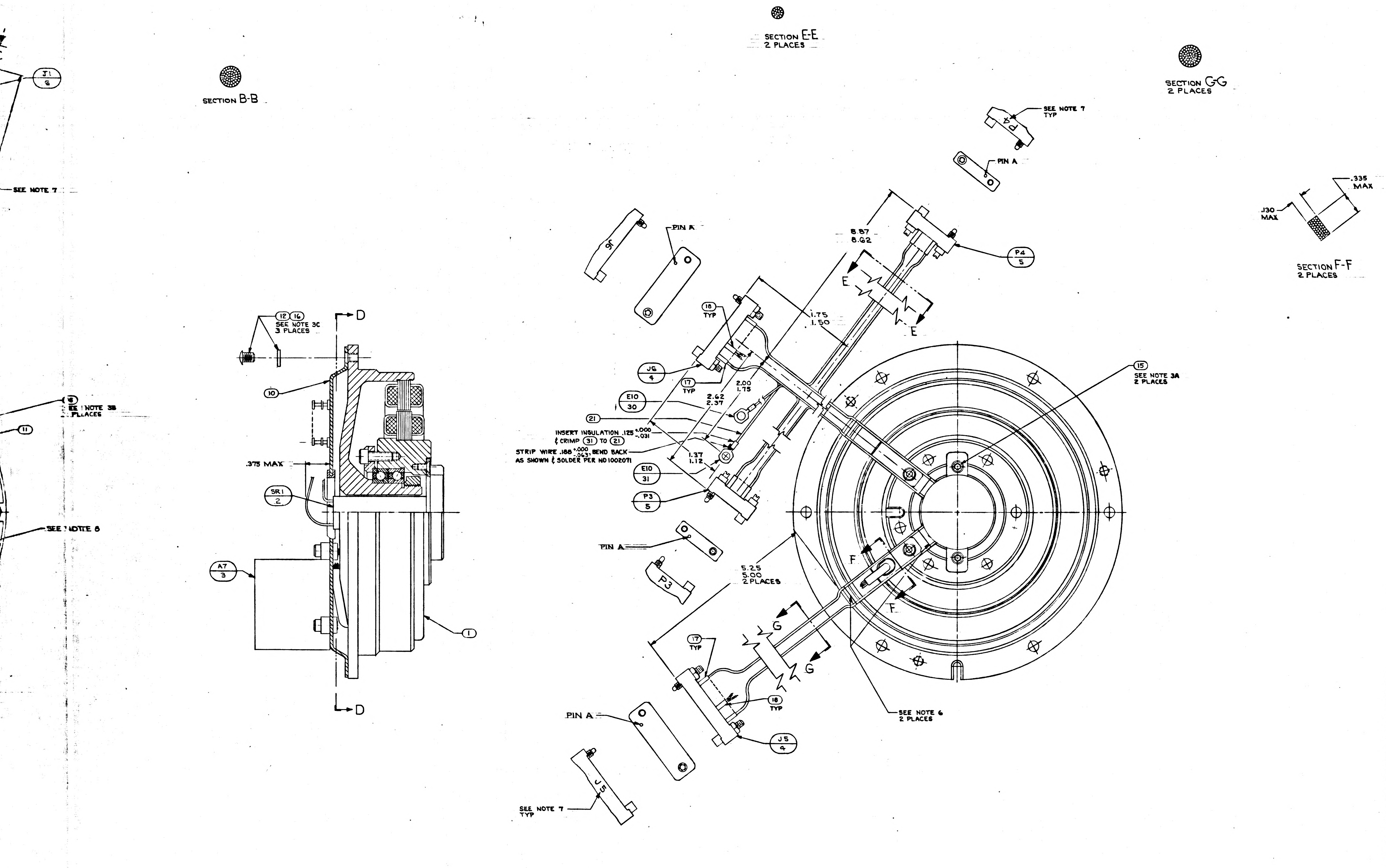
MIT
INSTRUMENTATION LA
CAMBRIDGE, MASS
DRAWN DTB DATE
CHECKED S. Swan
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

2018612	REV A	SHT 1

F-2

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 18324	4-4-65	

REVISIONS TDRR 17167


SECTION E-E
2 PLACES
SECTION B-B
SECTION G-G
2 PLACES
J1
6
SEE NOTE 7
SEE NOTE 7
TYP
PIN A
.335
MAX
.130
MAX
SECTION F-F
2 PLACES
PIN A
8.87
8.62
P4
5
E
E
1.75
1.50
12 16
SEE NOTE 3C
3 PLACES
D
18
TYP
J6
4
17
TYP
2.00
1.75
2.62
2.37
E10
30
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 31 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
15
SEE NOTE 3A
2 PLACES
10
18
SEE NOTE 3B
2 PLACES
11
.375 MAX
SR1
2
SEE NOTE 8
PIN A
P3
5.25
5.00
2 PLACES
F
F
A7
3
1
G
G
17
TYP
18
TYP
SEE NOTE 6
2 PLACES
D
PIN A
J5
4
SEE NOTE 7
TYP
J5

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
2	1010717-1	TERMINAL, LUG	31
1	1000020-8	SHIELD & GROUND ASSY	30
2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1010416-3	WIRE AWG 28E RED 18" LONG	23
1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1010416-1	WIRE AWG 28E BLK 40" LONG	21
2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
11	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
4	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	1001488-4	SCREW, HEX SOC HD, SELF-LKG	13
3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	2018799	CLAMP, WIRE	11
1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	1010862	BUSHING, SLEEVE	8
61	1010781-1	CONTACT ELEC	7
1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	1011757-000	CONNECTOR, ELEC, RECP, 7 PINS	5
2	1000122	CONNECTOR, ELEC, RECP, 26 PINS	4
1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1

011 LIST OF MATERIALS

NEXT ASSY	USED ON
2018601	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN DTB DATE 1/8/65
CHECKED G QUINN 3/8/65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 1 OF 11

2018612 REV A SHT 1

TDRR 17167 MAR 9 1965

O.A. RESOLV.

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HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612
SHEET 2 of 11

CONDUCTOR		FROM						TO					
FIND NUMBER	INDIVIDUAL LENGTH NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.
1	21	J1-1	13	N				E50	16	Y			
2	21	E1	19	Y		31		E50	16	Y			
3		SR1-1						E50	16	Y			
4	29		1 50		1 25	19			1 25		1 00	20	
4B	21	E50	16	Y				SHLD 4	16	Y			
4L		J1-2	13	N				E51	16	Y			
4K		J1-4	13	N				E52	16	Y			
5	29		1 50		1 25	19			1 25		1 00	20	
5B	21	E50	16	Y				SHLD 5	16	Y			
5L		J1-3	13	N				E51	16	Y			
5K		J1-5	13	N				E52	16	Y			
6-1		SR1-2						E51	16	Y			
6-2		SR1-3						E51	16	Y			
6-3		SR1-4						E52	16	Y			
6-4		SR1-5						E52	16	Y			
7	25	K1-1	13	Y				E51	16	Y			

TDRR 17167 MAR 9 1965

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HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612
SHEET 3 of 11

CONDUCTOR		FROM						TO					
FIND NUMBER	INDIVIDUAL LENGTH NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.
8-1	24	J1-6	13	N				E53	16	Y			
8-2	26	J1-8	13	N				E54	16	Y			
8-3	25	J1-7	13	N				E53	16	Y			
8-4	27	J1-9	13	N				E54	16	Y			
9-1		SR1-6						E53	16	Y			
9-2		SR1-7						E53	16	Y			
9-3		SR1-8						E54	16	Y			
9-4		SR1-9						E54	16	Y			
10-1	28	J1-10	13	N				K1-4	13	Y			
10-2	21	J1-11	13	N				K1-8	13	Y			
11		J1-12	13	N				SR1-12					

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HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612
SHEET 4 of 11

CONDUCTOR		FROM						TO					
FIND NUMBER	INDIVIDUAL LENGTH NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.
12		J1-13	13	N				SR1-13					
13-1		J1-14	13	N				SR1-14					
13-2		J1-15	13	N				SR1-15					
14		J1-16	13	N				SR1-16					
15-1		J1-17	13	N				SR1-17					
15-2		J1-18	13	N				SR1-18					
16		K1-5	13	Y				SR1-19					
17		J1-20	13	N				SR1-20					
18-1		J1-21	13	N				SR1-21					
18-2		J1-22	13	N				SR1-22					
18-3		J1-23	13	N				SR1-23					
18-4		J1-24	13	N				SR1-24					
18-5		J1-25	13	N				SR1-25					
19		J1-26	13	N				SR1-26					
20-1	27	J1-27	13	N				A7-3	13	Y			
20-2	23	J1-28	13	N				A7-2	13	Y			

TDRR 17167 MAR 9 1965

O.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612
SHEET 5 of 11

CONDUCTOR		FROM						TO					
FIND NUMBER	INDIVIDUAL LENGTH NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.
21-1		J1-33	13	N				SR1-33					
21-2		J1-34	13	N				SR1-34					
22-1		J1-35	13	N				SR1-35					
22-2		J1-36	13	N				SR1-36					
23-1		J1-37	13	N				SR1-37					
23-2		J1-38	13	N				SR1-38					
24-1		J1-39	13	N				SR1-39					
24-2		J1-40	13	N				SR1-40					
25-1		J1-41	13	N				SR1-41					
25-2		J1-42	13	N				SR1-42					
26-1		J1-43	13	N				SR1-43					
26-2		J1-44	13	N				SR1-44					
27-1		J1-45	13	N				SR1-45					
27-2		J1-46	13	N				SR1-46					

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REVISION —

NASA DRAWING NO.
2018612
SHEET 6 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
28-1			J1-47	13	N				SR1-47					
28-2			J1-48	13	N				SR1-48					
29-1			J1-51	13	N				B1A-S3					
29-2			J1-52	13	N				B1A-S1					
30-1			J1-53	13	N				B1A-S2					
30-2			J1-54	13	N				B1A-S4					
31-1			J1-55	13	N				B1B-S3					
31-2			J1-56	13	N				B1B-S1					
32-1			J1-57	13	N				B1B-S2					
32-2			J1-58	13	N				B1B-S4					
33-1			SR1-27						A7-3	13	Y			
33-2			SR1-28						A7-2	13	Y			
34-1			SR1-10						K1-6	13	Y			
34-2			SR1-11						K1-2	13	Y			

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REVISION —

NASA DRAWING NO.
2018612
SHEET 7 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
35-1			SR1-29						A7-6	13	Y			
35-2			SR1-30						A7-1	13	Y			
36-1			SR1-31						A7-6	13	Y			
36-2			SR1-32						A7-5	13	Y			
37-1			SR1-49						A7-6	13	Y			
37-2			SR1-50						A7-4	13	Y			
38			J5-A	13	Y	17			SR1-26					
38-1			J5-B	13	Y	18			SR1-27					
39-2			J5-C	13	Y	18			SR1-28					
40-1			J5-B	13	Y				B1A-P3					
40-2			J5-C	13	Y				B1A-P1					
41-1			J5-D	13	Y	17			SR1-29					
41-2			J5-E	13	Y	17			SR1-30					
42-1			J5-F	13	Y	17			SR1-31					
42-2			J5-H	13	Y	17			SR1-32					
43-1			J5-J	13	Y	17			SR1-33					
43-2			J5-K	13	Y	17			SR1-34					

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NASA DRAWING NO.
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SHEET 8 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
44-1			J5-L	13	Y	17			SR1-35					
44-2			J5-M	13	Y	17			SR1-36					
45-1			J5-N	13	Y	17			SR1-37					
45-2			J5-P	13	Y	17			SR1-38					
46-1			J5-R	13	Y	17			SR1-39					
46-2			J5-S	13	Y	17			SR1-40					
47-1			J5-T	13	Y	17			SR1-41					
47-2			J5-U	13	Y	17			SR1-42					
48-1			J5-V	13	Y	17			SR1-43					
48-2			J5-W	13	Y	17			SR1-44					
49-1			J5-X	13	Y	17			SR1-45					
49-2			J5-Y	13	Y	17			SR1-46					
50-1			J5-Z	13	Y	17			SR1-47					
50-2			J5-a	13	Y	17			SR1-48					
51-1			J5-b	13	Y	18			SR1-49					
51-2			J5-c	13	Y	18			SR1-50					
52-1			J5-b	13	Y				B1A-P2					
52-2			J5-c	13	Y				B1A-P4					

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NASA DRAWING NO.
2018612
SHEET 9 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
53			J6-A	13	Y	18			SR1-1					
54			J6-A	13	Y				E10	19	Y	31		
55						30								
55-A			SHLD-55						E10					
55-1			J6-B	13	Y	18			SR1-2					
55-2			J6-B	13	Y				SR1-3					
55-3			J6-D	13	Y	18			SR1-4					
55-4			J6-D	13	Y				SR1-5					
56-1			J6-F	13	Y	18			SR1-6					
56-2			J6-F	13	Y				SR1-7					
56-3			J6-J	13	Y	18			SR1-8					
56-4			J6-J	13	Y				SR1-9					

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CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.
68-1		J6-Y	13	Y	17		SR1-21				
68-2		J6-Z	13	Y	17		SR1-22				
68-3		J6-a	13	Y	17		SR1-23				
68-4		J6-b	13	Y	17		SR1-24				
68-5		J6-d	13	Y	17		SR1-25				

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REVISION —

NASA DRAWING NO.
2018612
SHEET 10 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC FIND NO.	NO.
57		J6-N	13	Y	18		SR1-12				
58	22	J6-N	13	Y			P3-C	13	Y	18	
59	22	P3-C	13	Y			P4-C	13	Y		
60		P3-D	13	Y	17		SR1-10				
61		P4-D	13	Y	17		SR1-11				
62		J6-P	13	Y	17		SR1-13				
63-1		J6-R	13	Y	17		SR1-14				
63-2		J6-S	13	Y	17		SR1-15				
64		J6-T	13	Y	17		SR1-16				
65-1		J6-U	13	Y	17		SR1-17				
65-2		J6-V	13	Y	17		SR1-18				
66		J6-W	13	Y	17		SR1-19				
67		J6-X	13	Y	17		SR1-20				

APOLLO G&N Specification
PS2018612 Rev A
Original Issue Date: 6/28/65
Release Authority: TDRR 20443
Class A Release

PROCUREMENT SPECIFICATION
PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS
INTERGIMBAL SUBASSEMBLY, RESOLVER, OUTER AXIS
Drawing No. 2018612

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
7/15/65	A	20744	4 & 5	WK.	

This specification consists of page 1 to 7 inclusive.

APPROVALS	[illegible] NASA/MSC	28 June 65 MIT/IL	ACSP

TABLE II

CONTINUITY AND DC RESISTANCE

FROM	TO	RESISTANCE (ohms)	FROM	TO	RESISTANCE (ohms)
J1-1	E50	<0.1	J1-33	J5-J	<0.4
↕	E1	<0.2	J1-34	J5-K	<0.4
	J6-A	<0.4	J1-35	J5-L	<0.4
J1-1	E10	<0.5	J1-36	J5-M	<0.4
J1-2	E51	<0.1	J1-37	J5-N	<0.4
↕	J6-B	<0.2	J1-38	J5-P	<0.4
	K1-1	<0.1	J1-39	J5-R	<0.4
	J6-W	<0.2	J1-40	J5-S	<0.4
J1-2	J1-3	<0.1	J1-41	J5-T	<0.4
J1-3	J6-B	<0.2	J1-42	J5-U	<0.4
J1-4	E52	<0.1	J1-43	J5-V	<0.4
J1-4	J6-D	<0.2	J1-44	J5-W	<0.4
J1-4	J1-5	<0.1	J1-45	J5-X	<0.4
J1-5	J6-D	<0.2	J1-46	J5-Y	<0.4
J1-6	E53	<0.1	J1-47	J5-Z	<0.4
J1-6	J6-F	<0.2	J1-48	J5-a	<0.4
J1-6	J1-7	<0.1	J1-51	J1-52	39 to 65
J1-7	J6-F	<0.2	J1-53	J1-54	39 to 65
J1-8	E54	<0.1	J1-55	J1-56	60 to 100
J1-8	J6-J	<0.2	J1-57	J1-58	60 to 100
J1-8	J1-9	<0.1	A7-1	J5-E	<0.4
J1-9	J6-J	<0.2	A7-6	J5-b	<0.4
J1-10	K1-4	<0.1	A7-6	J5-D	<0.4
J1-10	P3-D	<0.5	A7-6	J5-F	<0.4
J1-11	K1-8	<0.1	A7-5	J5-H	<0.4
J1-11	P4-D	<0.5	A7-4	J5-c	<0.4
J1-12	J6-N	<0.4	J5-B	J5-c	160 to 269
J1-12	P3-C	<0.5	SHLD on		
J1-12	P4-C	<0.5	J1-2,4 &		
J1-13	J6-P	<0.4	J1-3, 5	E1	<0.2
J1-14	J6-R	<0.4	J1-23	J6-a	<0.4
J1-14	E55	<0.4			
J1-15	J6-S	<0.4	J1-24	J6-b	<0.4
J1-15	E56	<0.4			
J1-16	J6-T	<0.4	J1-25	J6-c	<0.4
J1-16	E57	<0.4			
J1-17	J6-U	<0.4			
J1-17	E58	<0.4			
J1-18	J6-V	<0.4	J1-27	A7-3	<0.1
J1-18	E59	<0.4			
			J1-27	J5-B	<0.4
J1-21	J6-Y	<0.4			
J1-22	J6-Z	<0.4	J1-28	A7-2	<0.1
J1-28	J5-C	<0.4	SHLD on		
			J6-B, D	E10	<0.2
			C,E,W,X		
J1-27	J1-28	45 to 78	J6-D	J6-E	<0.2
			J1-20	K1-3	4500 to 5500
J1-2	J6-C	<0.2	J1-29	E55	<0.2
J6-B	J6-C	<0.2			
J1-2	J1-19	4500 to 5500	J1-30	E56	<0.2
J1-4	J6-X	<0.2	J1-26	E57	<0.2
J1-4	J6-E	<0.2	J1-31	E58	<0.2
			J1-32	E59	<0.2
			J1-2	J5-A	2790 to 3410

TABLE III

INSULATION RESISTANCE

FROM	TO	RESISTANCE (Megohms)
All pins on J1 except J1-1	Chassis	$\geq$ 100
J6-B, D	E10	$\geq$ 100
Between all pins on J1 except J1-2 to J1-3, J1-4 to J1-5, J1-6 to J1-7, J1-8 to J1-9, J1-27 to J1-28, J1-51 to J1-52, J1-53 to J1-54, J1-55 to J1-56, & J1-57 to J1-58		$\geq$ 100

APOLLO G&N Specification
PS2018612 Rev B
Original Issue Date: 6/28/65
Release Authority: TDRR 20443
Class A **Release**

PROCUREMENT SPECIFICATION

PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS

INTERGIMBAL SUBASSEMBLY, RESOLVER, OUTER AXIS

Drawing No. 2018612

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
7/15/65	A	20744	4 & 5	WK.	
11/23/65	B	24305	4 & 5	WK	TM

This specification consists of page 1 **to** 7 **inclusive.**

APPROVALS	NASA/MSC	28 June 65 MIT/IL	ACSP

TABLE II

CONTINUITY AND DC RESISTANCE

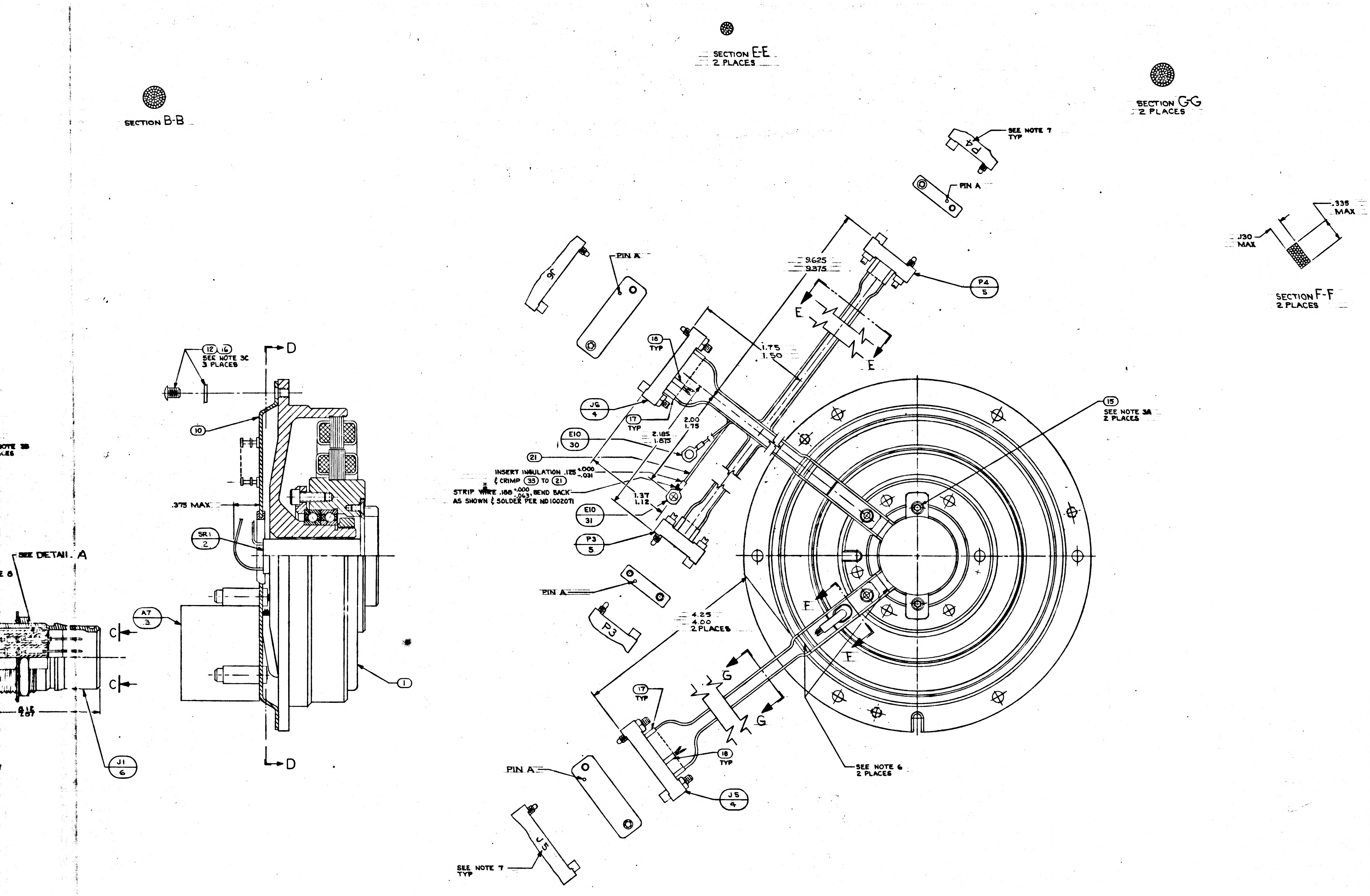
FROM	TO	RESISTANCE (ohms)	FROM	TO	RESISTANCE (ohms)
J1-1	E50	<0.1	J1-33	J5-J	<0.4
↕	E1	<0.2	J1-34	J5-K	<0.4
	J6-A	<0.4	J1-35	J5-L	<0.4
J1-1	E10	<0.5	J1-36	J5-M	<0.4
J1-2	E51	<0.1	J1-37	J5-N	<0.4
↕	J6-B	<0.2	J1-38	J5-P	<0.4
	K1-1	<0.1	J1-39	J5-R	<0.4
	J6-W	<0.2	J1-40	J5-S	<0.4
J1-2	J1-3	<0.1	J1-41	J5-T	<0.4
J1-3	J6-B	<0.2	J1-42	J5-U	<0.4
J1-4	E52	<0.1	J1-43	J5-V	<0.4
J1-4	J6-D	<0.2	J1-44	J5-W	<0.4
J1-4	J1-5	<0.1	J1-45	J5-X	<0.4
J1-5	J6-D	<0.2	J1-46	J5-Y	<0.4
J1-6	E53	<0.1	J1-47	J5-Z	<0.4
J1-6	J6-F	<0.2	J1-48	J5-a	<0.4
J1-6	J1-7	<0.1	J1-51	J1-52	39 to 65
J1-7	J6-F	<0.2	J1-53	J1-54	39 to 65
J1-8	E54	<0.1	J1-55	J1-56	60 to 100
J1-8	J6-J	<0.2	J1-57	J1-58	60 to 100
J1-8	J1-9	<0.1	A7-1	J5-E	<0.4
J1-9	J6-J	<0.2	A7-6	J5-b	<0.4
J1-10	K1-4	<0.1	A7-6	J5-D	<0.4
J1-10	P3-D	<0.5	A7-6	J5-F	<0.4
J1-11	K1-8	<0.1	A7-5	J5-H	<0.4
J1-11	P4-D	<0.5	A7-4	J5-c	<0.4
J1-12	J6-N	<0.4	J5-B	J5-c	160 to 269
J1-12	P3-C	<0.5	SHLD on		
J1-12	P4-C	<0.5	J1-2,4 &		
J1-13	J6-P	<0.4	J1-3, 5	E1	<0.2
J1-14	J6-R	<0.4	J1-23	J6-a	<0.4
J1-14	E55	<0.4			
J1-15	J6-S	<0.4	J1-24	J6-b	<0.4
J1-15	E56	<0.4			
J1-16	J6-T	<0.4	J1- 25	J6-c	<0.4
J1-16	E57	<0.4			
J1-17	J6-U	<0.4			
J1-17	E58	<0.4			
J1-18	J6-V	<0.4	J1-27	A7-3	<0.1
J1-18	E59	<0.4			
			J1-27	J5-B	<0.4
J1-21	J6-Y	<0.4			
J1-22	J6-Z	<0.4	J1-28	A7-2	<0.1
J1-28	J5-C	<0.4	SHLD on		
			J6-B, D	E10	<0.2
			C,E,W,X		
J1-27	J1-28	45 to 78	J6-D	J6-E	<0.2
			J1-20	K1-3	4949 to 5051
J1-2	J6-C	<0.2	J1-29	E55	<0.2
J6-B	J6-C	<0.2			
J1-2	J1-19	4949 to 5051	J1-30	E56	<0.2
J1-4	J6-X	<0.2	J1-26	E57	<0.2
J1-4	J6-E	<0.2	J1-31	E58	<0.2
			J1-32	E59	<0.2
			J1-2	J5-A	2790 to 3410

TABLE III

INSULATION RESISTANCE

FROM	TO	RESISTANCE (Megohms)
All pins on J1 except J1-1	Chassis	≥ 100
J6-B, D	E10	≥ 100
Between all pins on J1 except J1-2 to J1-3, J1-4 to J1-5, J1-6 to J1-7, J1-8 to J1-9, J1-27 to J1-28, J1-51 to J1-52, J1-53 to J1-54, J1-55 to J1-56, J1-57 to J1-58, J1-2 to J1-19, J1-3 to J1-19, J1-14 to J1-29, J1-15 to J1-30 J1-16 to J1-26, J1-17 to J1-31 and J1-18 to J1-32.		≥ 100

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17167			
A	REVISED TDRR 18324	4-8-65		
B	REVISED TDRR 18902	5-18-65		wk
C	REVISED TDRR 19270	5-18-65		wk


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SEE NOTE 7
TYP
P4
PIN A
.335
MAX
.130
MAX
SECTION F-F
2 PLACES
PIN A
9.625
9.375
P4
5
E
E
1.75
1.50
18
TYP
12 16
SEE NOTE 3C
3 PLACES
D
D
10
SEE NOTE 3B
3 PLACES
J6
4
17
TYP
2.00
1.75
E10
30
2.185
1.875
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
.375 MAX
SR1
2
P3
5
SEE DETAIL A
15
SEE NOTE 3A
2 PLACES
PIN A
P3
4.25
4.00
2 PLACES
F
F
A7
3
C
C
1
G
G
17
TYP
18
TYP
SEE NOTE 6
2 PLACES
PIN A
J5
4
J1
6
J5
SEE NOTE 7
TYP

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	1000223	WASHER, CABLE CLAMP	35
1	1000220 SEE NOTE 15	CLAMP, CABLE	34
1	1010717-3	TERMINAL, LUG	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1010717-1	TERMINAL, LUG	31
1	1000020-4	SHIELD & GROUND ASSY	30
2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
1	1010416-7	WIRE AWG 28F BLU 18" LONG	25
1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1010416-3	WIRE AWG 28E RED 18" LONG	23
1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1010416-1	WIRE AWG 28E BLK 40" LONG	21
2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
11	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
4	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	2018799	CLAMP, WIRE	11
1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	1010862	BUSHING, SLEEVE	8
61	1010781-1	CONTACT ELEC	7
1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	1011757-000	CONNECTOR, ELEC, RECP, 7 PINS	5
2	1000122	CONNECTOR, ELEC, RECP, 26 PINS	4
1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
011	LIST OF MATERIALS		

MASTER

NEXT ASSY	USED ON
2018601	DL2018601
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DTB DATE 1/8/65
CHECKED G. Quinn 3/8/65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

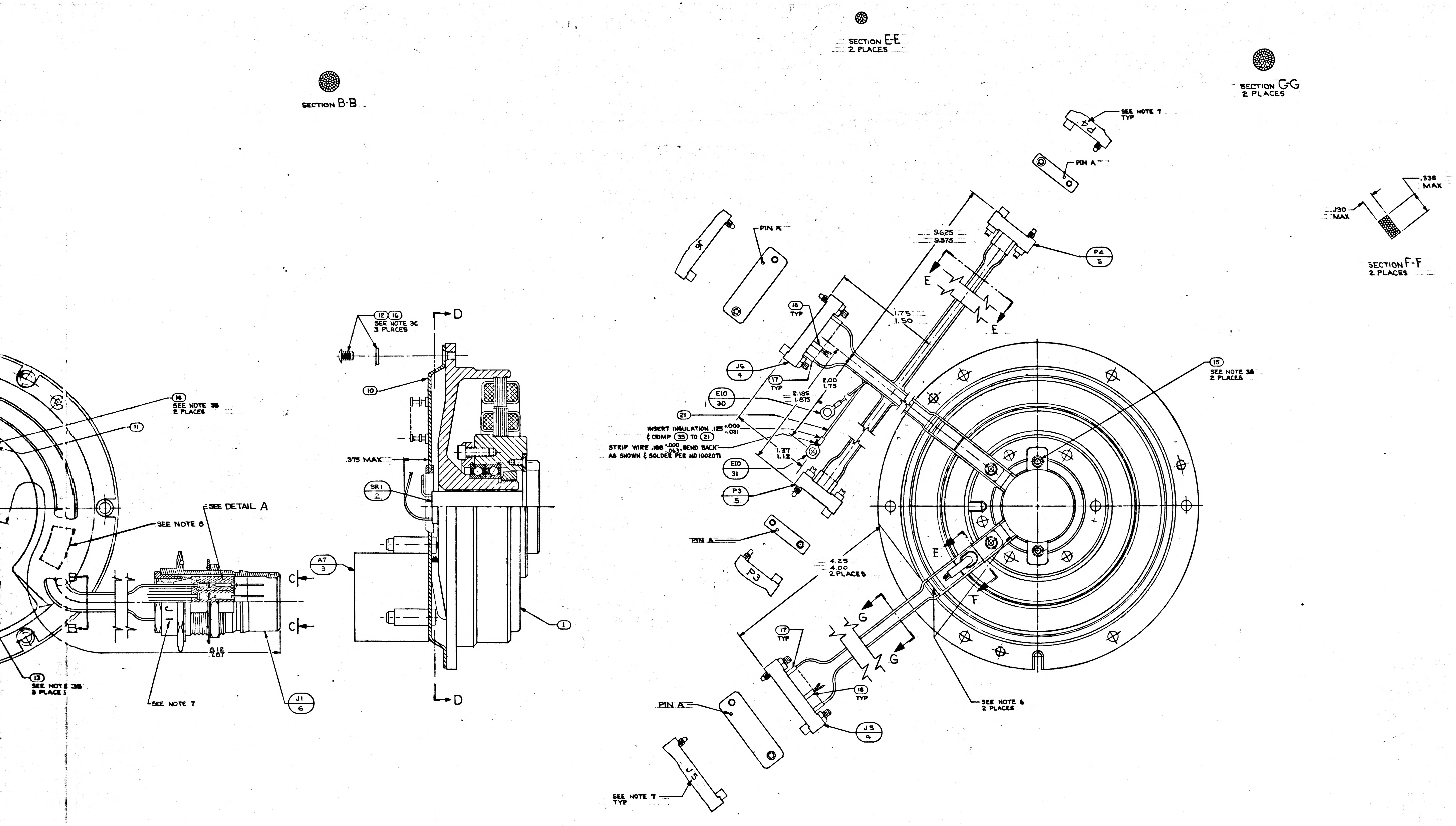
INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO. SIZE J NASA DRAWING NO. 2018612
SCALE 2/1 WT SHEET 1 OF 11

2018612 C

2018612 REV C SHT 1

SYM	DESCRIPT		
A	REVISED TDRR	3324	
B	REVISED TDRR	8902	
C	REVISED TDRR	9270	



SECTION E-E
2 PLACES
SECTION B-B
SECTION G-G
2 PLACES
SEE NOTE 7
TYP
PIN A
P4
.335
MAX
.130
MAX
SECTION F-F
2 PLACES
9.625
9.375
P4
5
E
E
J6
18
TYP
1.75
1.50
J6
4
17
TYP
2.00
1.75
E10
30
2.185
1.875
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
15
SEE NOTE 3A
2 PLACES
12 16
SEE NOTE 3C
3 PLACES
D
D
10
14
SEE NOTE 3B
2 PLACES
11
.375 MAX
SR1
2
SEE DETAIL A
SEE NOTE 8
B
B
C
C
A7
3
1
.812
.787
13
SEE NOTE 3B
3 PLACES
SEE NOTE 7
J1
6
PIN A
P3
4.25
4.00
2 PLACES
F
F
17
TYP
G
G
SEE NOTE 6
2 PLACES
PIN A
18
TYP
J5
4
J5
SEE NOTE 7
TYP

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
	1000223	WASHER, CABL E CLAMP
1	1000220 SEE NOTE 15	CLAMP CABL
1	1010717-3	TERMINAL, UG
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON AXED
1	1010717-1	TERMINAL, LUG
1	1000020-4	SHIELD & GROU ASSY
2	1010778-2	WIRE, SHIELDED, EFLON, MULTICOND 11" L
1	1010416-10	WIRE AWG 28E WHT 16" LONG
1	1010416-9	WIRE AWG 28E GY 30" LONG
1	1010416-8	WIRE AWG 28E VIO 15" LONG
1	1010416-7	WIRE AWG 28E BLU 18" LONG
1	1010416-6	WIRE AWG 28E GRN 15" LONG
1	1010416-3	WIRE AWG 28E RED 16" LONG
1	1010416-2	WIRE AWG 28 BRN 20" LONG
1	1010416-1	WIRE AWG 28 BLK 40" LONG
2	1010490-112	INSULATION SL VING ELEC HEAT SHR
2	1010490-052	INSULATION SL EVING ELEC HEAT SHR
11	1006776-14	INSULATION SL EVING ELEC ¼ LONG
36	1006776-18	INSULATION SL EVING ELEC ¼ LONG
3	MS15795-705	WASHER, FLAT, METAL, ROUND
2	1010367-2	SCREW, SELF-L KG. FLAT HD, SOC SP
4	1001488-1	SCREW, HEX SC HD, SELF-LKG
3	1001488-8	SCREW, HEX SC HD, SELF-LKG
3	1010891-23	SCREW, BUTTON D, SELF-LKG, SOC SPL
1	2018799	CLAMP, WIRE
1	2018792	GUIDE, WIRE SSEMBLY
1	1010353-10	RELAY, ELEC TRO MAG, SENSITIVE
61	1010862	BUSHING, SLE EVE
61	1010781-1	CONTACT EL EC
1	1010783-1	CONNECTOR ELEC, RECP, 61 PIN
2	1011757-000	CONNECTOR, LEC, RECP, 7 PINS
2	1000122	CONNECTOR, ELEC, RECP, 26 PINS
1	2007204-011	PRECISION RE LVER ALIGNMENT ASSY
1	2018625	SLIP RING AS SEMBLY, 50 CONTA
1	2018606-011	RESOLVER A SEMBLY, OUTER AX

011 — LIST OF MATERIALS

MASTER

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

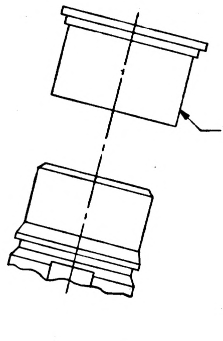
DRAWN DTB DATE 1/8/65
CHECKED G. Quinn 3/8/65
APPROVAL
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

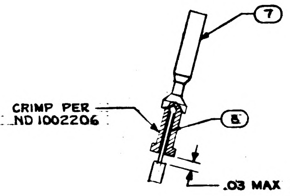
INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 2018612
SCALE 2/1 | WT | SHEET

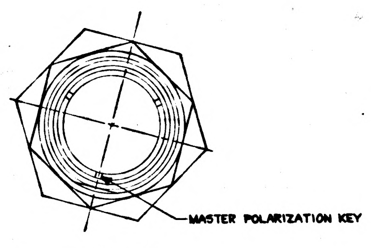
2018612 REV C SHT 1



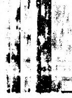
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

DETAIL A
SCALE 4/1

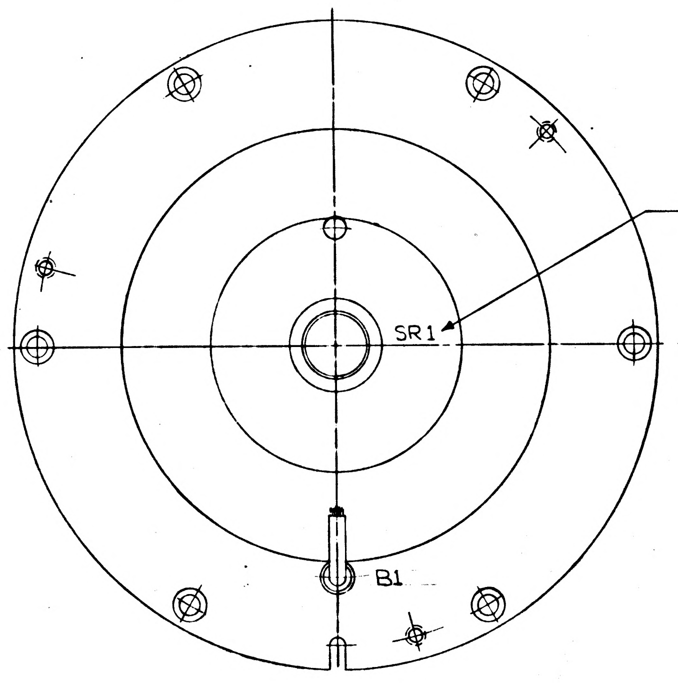

MASTER POLARIZATION KEY

VIEW C-C

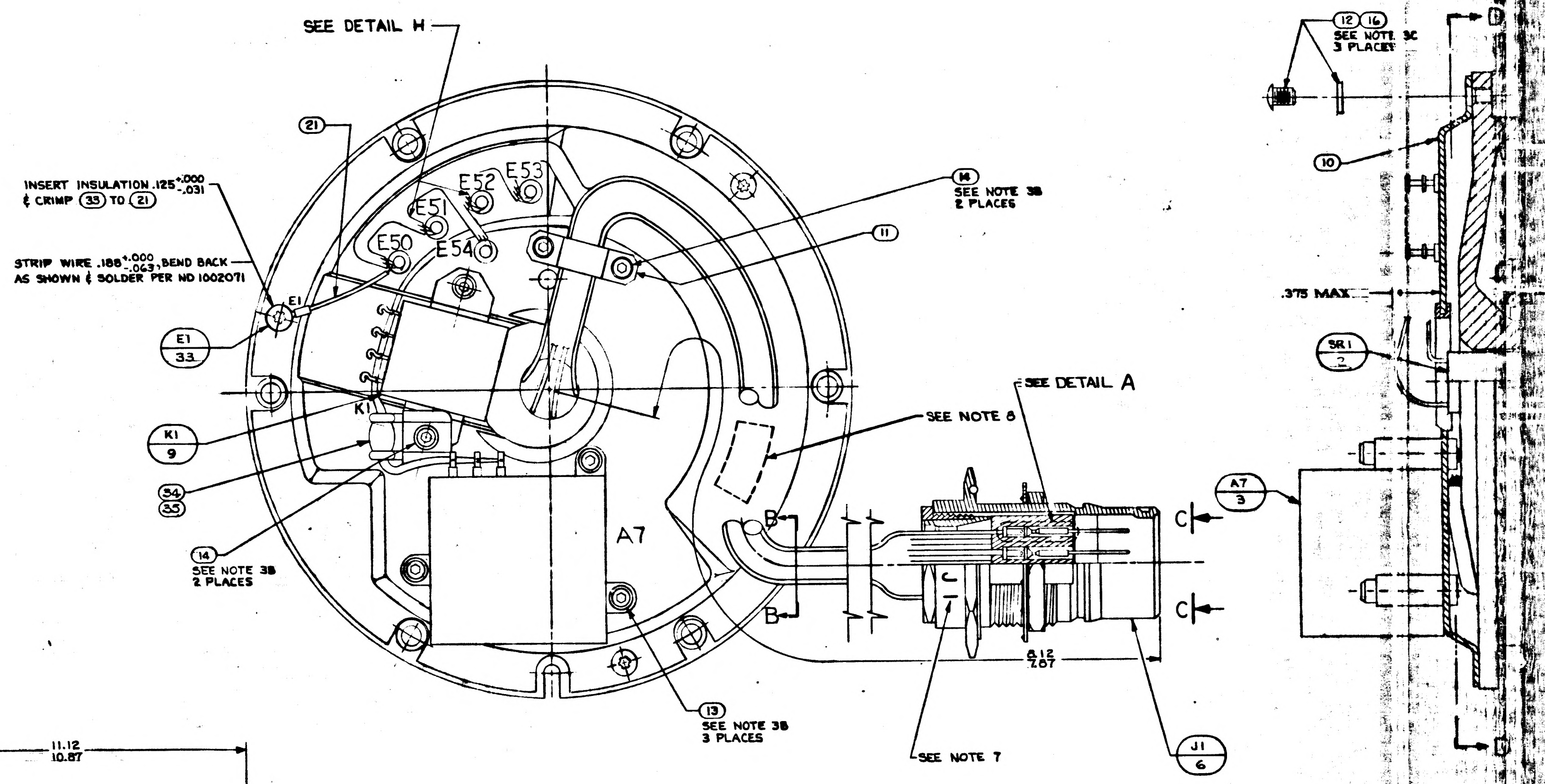


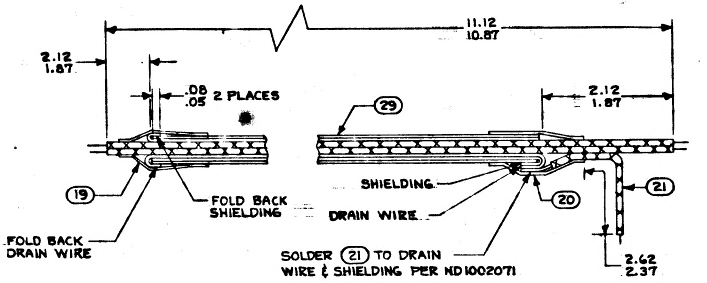
SECTION B-B

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4


SEE NOTE 7 TYP
SR1
B1

VIEW D-D


SEE DETAIL H
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1 33
E1
E50
E51
E52
E53
E54
K1
K1 9
34 35
14 SEE NOTE 3B 2 PLACES
A7
13 SEE NOTE 3B 3 PLACES
14 SEE NOTE 3B 2 PLACES
11
SEE DETAIL A
SEE NOTE 8
B
B
C
C
8.12 7.87
SEE NOTE 7
J1 6
A7 3
12 16 SEE NOTE 3C 3 PLACES
10
.375 MAX
SR1 2
D
D


11.12 10.87
2.12 1.87
.08 .05 2 PLACES
29
2.12 1.87
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND 1002071
2.62 2.37

DETAIL H
SCALE: NONE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018612
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO ③, ④, ⑤, ⑨ & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
    - A. = SHIELD GROUND ON "FROM END"
    - B. = SHIELD GROUND ON "TO END"
    - K. = BLACK
    - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.

	REV	SHT
2018612	C	1

F-1

TDRR 17167 MAR 9 1965

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REVISION —
NASA DRAWING NO. 2018612
SHEET 2 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	NO.
1	21		J1-1	13	N			E50	16	Y		
2	21		E1	19	Y	31		E50	16	Y		
3			SR1-1					E50	16	Y		
4	29			1 50 1 25		19			1 25 1 00		20	
4B	21		E50	16	Y			SHLD 4	16	Y		
4L			J1-2	13	N			E51	16	Y		
4K			J1-4	13	N			E52	16	Y		
5	29			1 50 1 25		19			1 25 1 00		20	
5B	21		E50	16	Y			SHLD 5	16	Y		
5L			J1-3	13	N			E51	16	Y		
5K			J1-5	13	N			E52	16	Y		
6-1			SR1-2					E51	16	Y		
6-2			SR1-3					E51	16	Y		
6-3			SR1-4					E52	16	Y		
6-4			SR1-5					E52	16	Y		
7	25		K1-1	13	Y			E51	16	Y		

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REVISION —
NASA DRAWING NO. 2018612
SHEET 3 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	NO.
8-1	24		J1-6	13	N			E53	16	Y		
8-2	26		J1-8	13	N			E54	16	Y		
8-3	25		J1-7	13	N			E53	16	Y		
8-4	27		J1-9	13	N			E54	16	Y		
9-1			SR1-6					E53	16	Y		
9-2			SR1-7					E53	16	Y		
9-3			SR1-8					E54	16	Y		
9-4			SR1-9					E54	16	Y		
10-1	28		J1-10	13	N			K1-4	13	Y		
10-2	21		J1-11	13	N			K1-8	13	Y		
11			J1-12	13	N			SR1-12				

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REVISION —
NASA DRAWING NO. 2018612
SHEET 4 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	NO.
12			J1-13	13	N			SR1-13				
13-1			J1-14	13	N			SR1-14				
13-2			J1-15	13	N			SR1-15				
14			J1-16	13	N			SR1-16				
15-1			J1-17	13	N			SR1-17				
15-2			J1-18	13	N			SR1-18				
16			K1-5	13	Y			SR1-19				
17			J1-20	13	N			SR1-20				
18-1			J1-21	13	N			SR1-21				
18-2			J1-22	13	N			SR1-22				
18-3			J1-23	13	N			SR1-23				
18-4			J1-24	13	N			SR1-24				
18-5			J1-25	13	N			SR1-25				
19			J1-26	13	N			SR1-26				
20-1	27		J1-27	13	N			A7-3	13	Y		
20-2	23		J1-28	13	N			A7-2	13	Y		

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REVISION —
NASA DRAWING NO. 2018612
SHEET 5 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	NO.
21-1			J1-33	13	N			SR1-33				
21-2			J1-34	13	N			SR1-34				
22-1			J1-35	13	N			SR1-35				
22-2			J1-36	13	N			SR1-36				
23-1			J1-37	13	N			SR1-37				
23-2			J1-38	13	N			SR1-38				
24-1			J1-39	13	N			SR1-39				
24-2			J1-40	13	N			SR1-40				
25-1			J1-41	13	N			SR1-41				
25-2			J1-42	13	N			SR1-42				
26-1			J1-43	13	N			SR1-43				
26-2			J1-44	13	N			SR1-44				
27-1			J1-45	13	N			SR1-45				
27-2			J1-46	13	N			SR1-46				

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REVISION —

NASA DRAWING NO. 2018612

SHEET 6 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
28-1		J1-47	13	N			SR1-47				
28-2		J1-48	13	N			SR1-48				
29-1		J1-51	13	N			B1A-S3				
29-2		J1-52	13	N			B1A-S1				
30-1		J1-53	13	N			B1A-S2				
30-2		J1-54	13	N			B1A-S4				
31-1		J1-55	13	N			B1B-S3				
31-2		J1-56	13	N			B1B-S1				
32-1		J1-57	13	N			B1B-S2				
32-2		J1-58	13	N			B1B-S4				
33-1		SR1-27					A7-3	13	Y		
33-2		SR1-28					A7-2	13	Y		
34-1		SR1-10					K1-6	13	Y		
34-2		SR1-11					K1-2	13	Y		

TDRR 17167 MAR 9 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612

SHEET 7 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
35-1		SR1-29					A7-6	13	Y		
35-2		SR1-30					A7-1	13	Y		
36-1		SR1-31					A7-6	13	Y		
36-2		SR1-32					A7-5	13	Y		
37-1		SR1-49					A7-6	13	Y		
37-2		SR1-50					A7-4	13	Y		
38		J5-A	13	Y	17		SR1-26				
38-1		J5-B	13	Y	18		SR1-27				
39-2		J5-C	13	Y	18		SR1-28				
40-1		J5-B	13	Y			B1A-P3				
40-2		J5-C	13	Y			B1A-P1				
41-1		J5-D	13	Y	17		SR1-29				
41-2		J5-E	13	Y	17		SR1-30				
42-1		J5-F	13	Y	17		SR1-31				
42-2		J5-H	13	Y	17		SR1-32				
43-1		J5-J	13	Y	17		SR1-33				
43-2		J5-K	13	Y	17		SR1-34				

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612

SHEET 8 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
44-1		J5-L	13	Y	17		SR1-35				
44-2		J5-M	13	Y	17		SR1-36				
45-1		J5-N	13	Y	17		SR1-37				
45-2		J5-P	13	Y	17		SR1-38				
46-1		J5-R	13	Y	17		SR1-39				
46-2		J5-S	13	Y	17		SR1-40				
47-1		J5-T	13	Y	17		SR1-41				
47-2		J5-U	13	Y	17		SR1-42				
48-1		J5-V	13	Y	17		SR1-43				
48-2		J5-W	13	Y	17		SR1-44				
49-1		J5-X	13	Y	17		SR1-45				
49-2		J5-Y	13	Y	17		SR1-46				
50-1		J5-Z	13	Y	17		SR1-47				
50-2		J5-a	13	Y	17		SR1-48				
51-1		J5-b	13	Y	18		SR1-49				
51-2		J5-c	13	Y	18		SR1-50				
52-1		J5-b	13	Y			B1A-P2				
52-2		J5-c	13	Y			B1A-P4				

TDRR 17167 MAR 9 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612

SHEET 9 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
53		J6-A	13	Y	18		SR1-1				
54		J6-A	13	Y			E10	19	Y	31	
55					30						
55-A		SHLD-55					E10				
55-1		J6-B	13	Y	18		SR1-2				
55-2		J6-B	13	Y			SR1-3				
55-3		J6-D	13	Y	18		SR1-4				
55-4		J6-D	13	Y			SR1-5				
56-1		J6-F	13	Y	18		SR1-6				
56-2		J6-F	13	Y			SR1-7				
56-3		J6-J	13	Y	18		SR1-8				
56-4		J6-J	13	Y			SR1-9				

TDRR 17167 MAR 9 1965

O.A.
RESOLV.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

REVISION
—

NASA DRAWING NO.
2018612
SHEET
10 of 11

CONDUCTOR			FROM					TO				
FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.
57			J6-N	13	Y	18		SR1-12				
58	22		J6-N	13	Y			P3-C	13	Y	18	
59	22		P3-C	13	Y			P4-C	13	Y		
60			P3-D	13	Y	17		SR1-10				
61			P4-D	13	Y	17		SR1-11				
62			J6-P	13	Y	17		SR1-13				
63-1			J6-R	13	Y	17		SR1-14				
63-2			J6-S	13	Y	17		SR1-15				
64			J6-T	13	Y	17		SR1-16				
65-1			J6-U	13	Y	17		SR1-17				
65-2			J6-V	13	Y	17		SR1-18				
66			J6-W	13	Y	17		SR1-19				
67			J6-X	13	Y	17		SR1-20				

TDRR 17167 MAR 9 1965

O.A.
RESOLV.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

REVISION
—

NASA DRAWING NO.
2018612
SHEET
11 of 11

CONDUCTOR			FROM					TO				
FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.
68-1			J6-Y	13	Y	17		SR1-21				
68-2			J6-Z	13	Y	17		SR1-22				
68-3			J6-a	13	Y	17		SR1-23				
68-4			J6-b	13	Y	17		SR1-24				
68-5			J6-d	13	Y	17		SR1-25				

APOLLO G&N Specification
PS2018612 Rev C
Original Issue Date: 6/28/65
Release Authority: TDRR 20443
Class A **Release**

PROCUREMENT SPECIFICATION
PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS
INTERGIMBAL SUBASSEMBLY, RESOLVER, OUTER AXIS

Drawing No. 2018612

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
7/15/65	A	20744	4 & 5	WK.	ACM
11/23/65	B	24305	4 & 5	WK	TM
1/11/66	C	25178	4 & 5	WK	ACM

This specification consists of page 1 to 7 inclusive.

APPROVALS	NASA/MSC	28 June 65 MIT/IL	ACSP

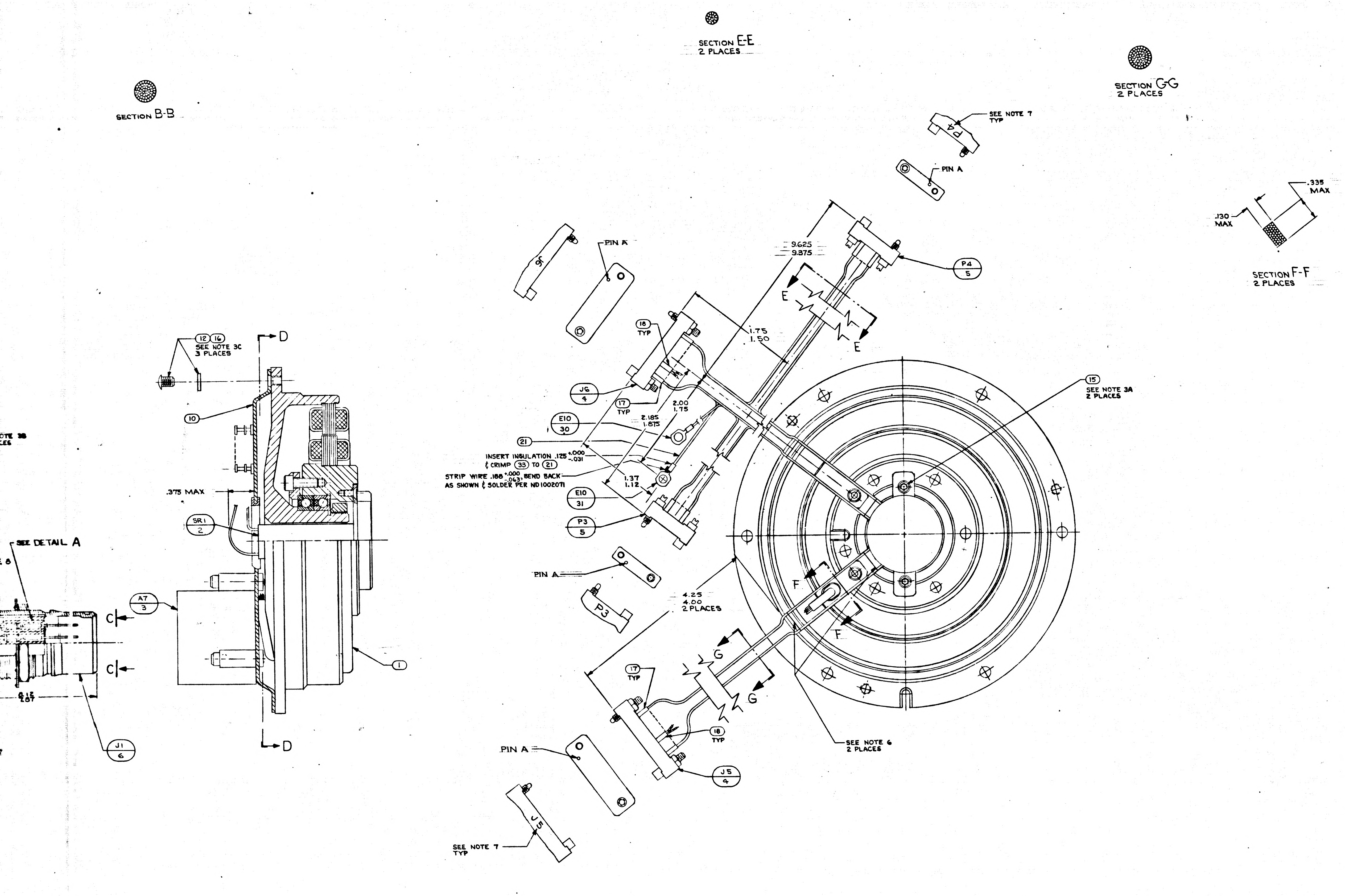
TABLE II

CONTINUITY AND DC RESISTANCE

FROM	TO	RESISTANCE (ohms)	FROM	TO	RESISTANCE (ohms)
J1-1	E50	<0.2	J1-33	J5-J	<0.4
↕	E1	<0.2	J1-34	J5-K	<0.4
↕	J6-A	<0.4	J1-35	J5-L	<0.4
J1-1	E10	<0.5	J1-36	J5-M	<0.4
J1-2	E51	<0.2	J1-37	J5-N	<0.4
↕	J6-B	<0.2	J1-38	J5-P	<0.4
↕	K1-1	<0.1	J1-39	J5-R	<0.4
↕	J6-W	<0.6	J1-40	J5-S	<0.4
J1-2	J1-3	<0.2	J1-41	J5-T	<0.4
J1-3	J6-B	<0.2	J1-42	J5-U	<0.4
J1-4	E52	<0.2	J1-43	J5-V	<0.4
J1-4	J6-D	<0.2	J1-44	J5-W	<0.4
J1-4	J1-5	<0.2	J1-45	J5-X	<0.4
J1-5	J6-D	<0.2	J1-46	J5-Y	<0.4
J1-6	E53	<0.2	J1-47	J5-Z	<0.4
J1-6	J6-F	<0.2	J1-48	J5-a	<0.4
J1-6	J1-7	<0.2	J1-51	J1-52	39 to 65
J1-7	J6-F	<0.2	J1-53	J1-54	39 to 65
J1-8	E54	<0.2	J1-55	J1-56	60 to 100
J1-8	J6-J	<0.2	J1-57	J1-58	60 to 100
J1-8	J1-9	<0.2	A7-1	J5-E	<0.4
J1-9	J6-J	<0.2	A7-6	J5-b	<0.4
J1-10	K1-4	<0.1	A7-6	J5-D	<0.4
J1-10	P3-D	<0.5	A7-6	J5-F	<0.4
J1-11	K1-8	<0.1	A7-5	J5-H	<0.4
J1-11	P4-D	<0.5	A7-4	J5-c	<0.4
J1-12	J6-N	<0.4	* J5-b	J5-c	0.15 to 1.0
J1-12	P3-C	<0.5	SHLD on J1-2,4 & J1-3, 5		
J1-12	P4-C	<0.5			
J1-13	J6-P	<0.4		E1	<0.2
J1-14	J6-R	<0.4	J1-23	J6-a	<0.4
J1-14	E55	<0.4			
J1-15	J6-S	<0.4	J1-24	J6-b	<0.4
J1-15	E56	<0.4			
J1-16	J6-T	<0.4	J1- 25	J6-c	<0.4
J1-16	E57	<0.4			
J1-17	J6-U	<0.4			
J1-17	E58	<0.4			
J1-18	J6-V	<0.4	J1-27	A7-3	<0.2
J1-18	E59	<0.4			
			J1-27	J5-B	<0.4
J1-21	J6-Y	<0.4			
J1-22	J6-Z	<0.4	J1-28	A7-2	<0.2
J1-28	J5-C	<0.4	SHLD on J6-B, D C,E,W,X	E10	<0.2
J1-27	J1-28	6 to 22	J6-D	J6-E	<0.2
			J1-20	J1-11	4949 to 5051
J1-2	J6-C	<0.2	J1-29	E55	<0.2
J6-B	J6-C	<0.2			
J1-2	J1-19	4949 to 5051	J1-30	E56	<0.2
J1-4	J6-X	<0.2	J1-26	E57	<0.2
J1-4	J6-E	<0.2	J1-31	E58	<0.2
			J1-32	E59	<0.2
			J1-2	J5-A	2790 to 3410

*Take measurements with Potentiometers in A7 at extreme ccw position.

SYM	REVISIONS TDRR 17167 DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 18324	4-4-65		WK
B	REVISED TDRR 18902	5-18-65		WK
C	REVISED TDRR 19270	5-18-65		WK
D	REVISED TDRR 21320	9-20-65		WK


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335
MAX
.130
MAX
SEE NOTE 7
TYP
PIN A
9.625
9.375
P4
5
E
1.75
1.50
18
TYP
J6
4
17
TYP
2.00
1.75
2.185
1.875
E10
30
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
15
SEE NOTE 3A
2 PLACES
4.25
4.00
2 PLACES
F
G
SEE NOTE 6
2 PLACES
J5
4
SEE NOTE 7
TYP
12 16
SEE NOTE 3C
3 PLACES
D
10
.375 MAX
SR1
2
SEE DETAIL A
A7
3
C
J1
6
1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	2021504-44	RESISTOR	38
1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	~~1000223~~	~~WASHER, CABLE CLAMP~~	35
1	1000220 SEE NOTE 15	CLAMP CABLE	34
1	1010717-3	TERMINAL, LUG	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1010717-1	TERMINAL, LUG	31
1	1000020-11	SHIELD & GROUND ASSY	30
2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC, SPLINE	15
4	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	2018799	CLAMP, WIRE	11
1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	1010862	BUSHING, SLEEVE	8
61	1010781-1	CONTACT ELEC	7
1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	1011757-000	CONNECTOR, ELEC, RECP, 7 PINS	5
2	1000122	CONNECTOR, ELEC, RECP, 26 PINS	4
1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
011	LIST OF MATERIALS		

MASTER

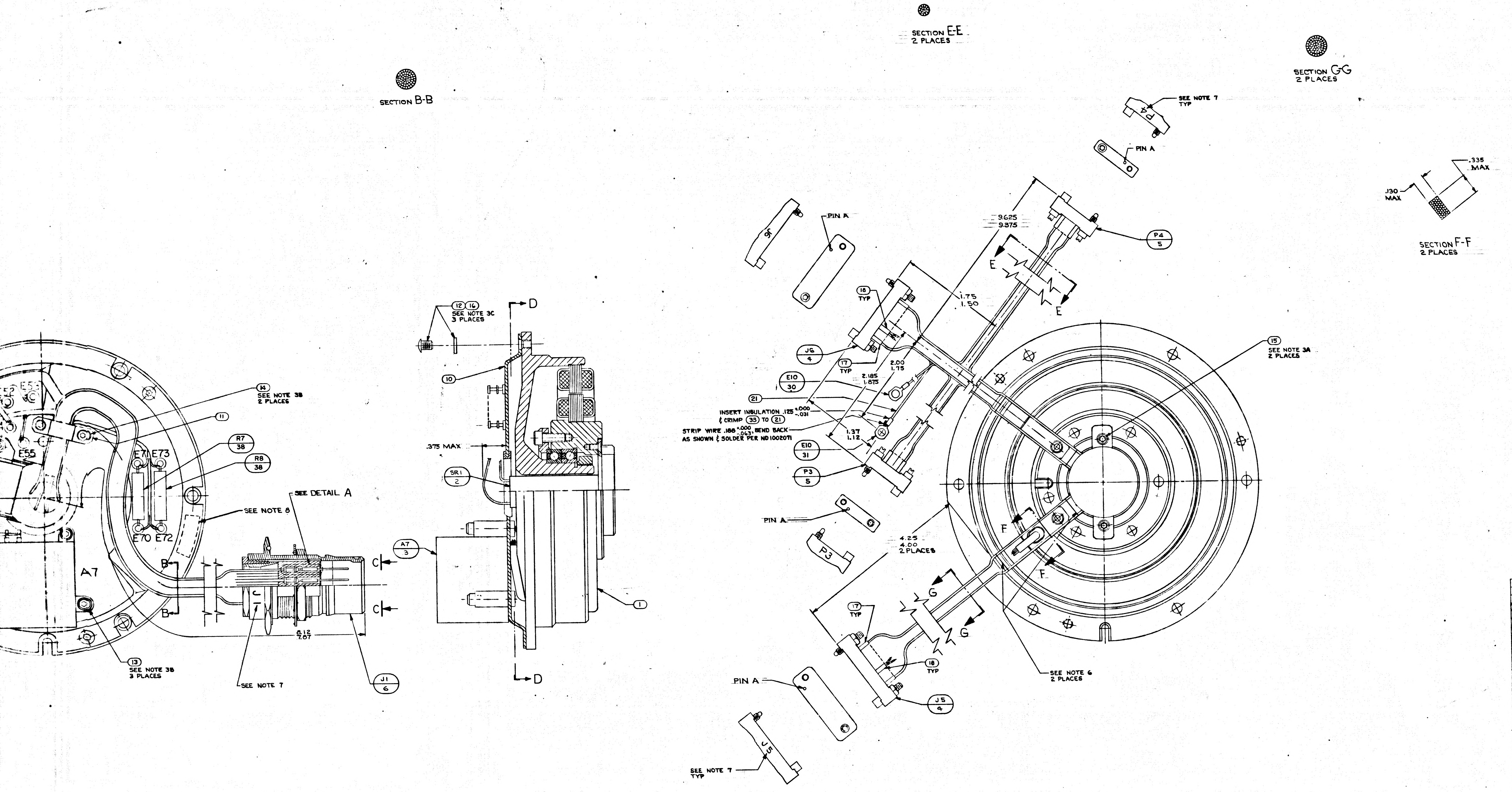
2018601	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DWG NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	MATERIAL	DRAWN DTB DATE 1/8/65 CHECKED G QUINN 3/8/65 APPROVAL 8 Mar 65 APPROVAL	INTERGIMBAL SUB-ASSEMBLY RESOLVER OUTER AXIS
APPLICATION		HEAT TREATMENT FINAL FINISH	NASA APPROVAL 3-9-65 MIT APPROVAL	CODE IDENT NO. SIZE J NASA DRAWING NO. 2018612 SCALE 2/1 WT SHEET 1 OF 11

2018612 D

2018612 REV D SHT 1

F3

A	REVISED
B	REVISED
C	REVISED
D	REVISED


5
4
3
2
1
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION B-B
SEE NOTE 7
TYP
P4
PIN A
.335
MAX
.130
MAX
SECTION F-F
2 PLACES
J6
PIN A
9.625
9.375
P4
5
E
E
18
TYP
1.75
1.50
J6
4
17
TYP
2.00
1.75
E10
30
2.185
1.815
21
INSERT INSULATION .125 +.000 -.031
℄ CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063 BEND BACK
AS SHOWN ℄ SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
15
SEE NOTE 3A
2 PLACES
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
A7
3
1
14
SEE NOTE 3B
2 PLACES
11
R7
38
R8
38
E55
E7 E73
E70 E72
SEE DETAIL A
SEE NOTE 8
A7
B
B
C
C
8.12
7.87
J1
6
13
SEE NOTE 3B
3 PLACES
SEE NOTE 7
PIN A
P3
4.25
4.00
2 PLACES
F
F
G
G
17
TYP
18
TYP
SEE NOTE 6
2 PLACES
PIN A
J5
4
J5
SEE NOTE 7
TYP

QTY REQD	PART OR IDENTIFYING NO.		
2	2021504-44		RESISTO
1	1010416-4		WIRE AW
1	1010416-5		WIRE
1	1000223		WASHER
1	1000220	SEE NOTE 15	CLAMP
1	1010717-3		TERM
A/R	MIL-T-713	TYPE P CLASS 2	TAPE
1	1010717-1		TERMI
1	1000020-11		SHIELD
2	1010778-2		WIRE, SH
1	1010416-10		WIRE AW
1	1010416-9		WIRE AW
1	1010416-8		WIRE AW
1	1010416-7		WIRE A
1	1010416-6		WIRE AW
1	1010416-3		WIRE AW
1	1010416-2		WIRE A
1	1010416-1		WIRE A
2	1010490-11		INSUL
2	1010490-012		INSULA
13	1006776-14		INSULA
36	1006776-1		INSULAT
3	MS15795-705		WASHE
2	1010867-2		SCREW
4	1001488-1		SCREW
3	1001488-8		SCREW
3	1010891-27		SCREW
1	2018790		CLAMP
1	2018792		[illegible]
1	1010353-11		RELAY
61	1010862		BUSHI
61	1010781-1		CONTA
1	1010783-1		CONN
2	1011757-002		CONN
2	1000122		CONN
1	2007204-011		PREC
1	2018625		SLIP
1	2018606-011		RESOL

LIST OF MA

MASTER

2018G01	DL2018G01
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
–
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

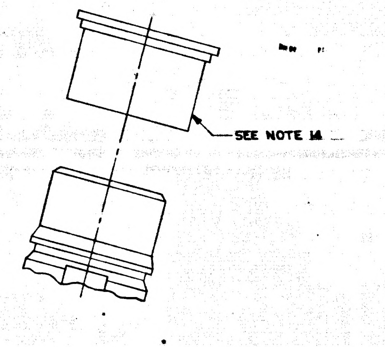
DRAWN DTB DATE 1/8/65
CHECKED 3/9/65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

INTER

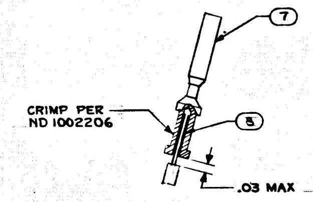
CODE IDENT NO.
SCALE 2/1

2018612 REV D SHT 1

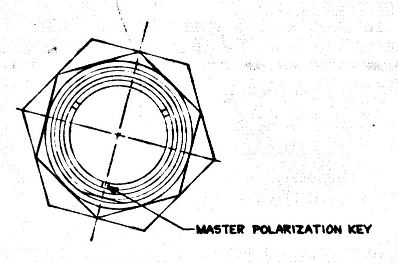
F-2



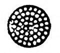
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

DETAIL A
SCALE 4/1

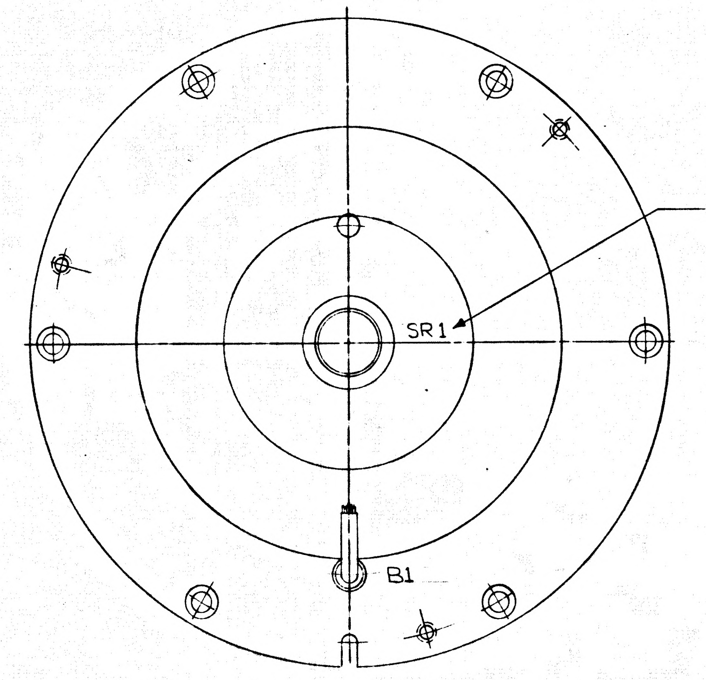

MASTER POLARIZATION KEY

VIEW C-C

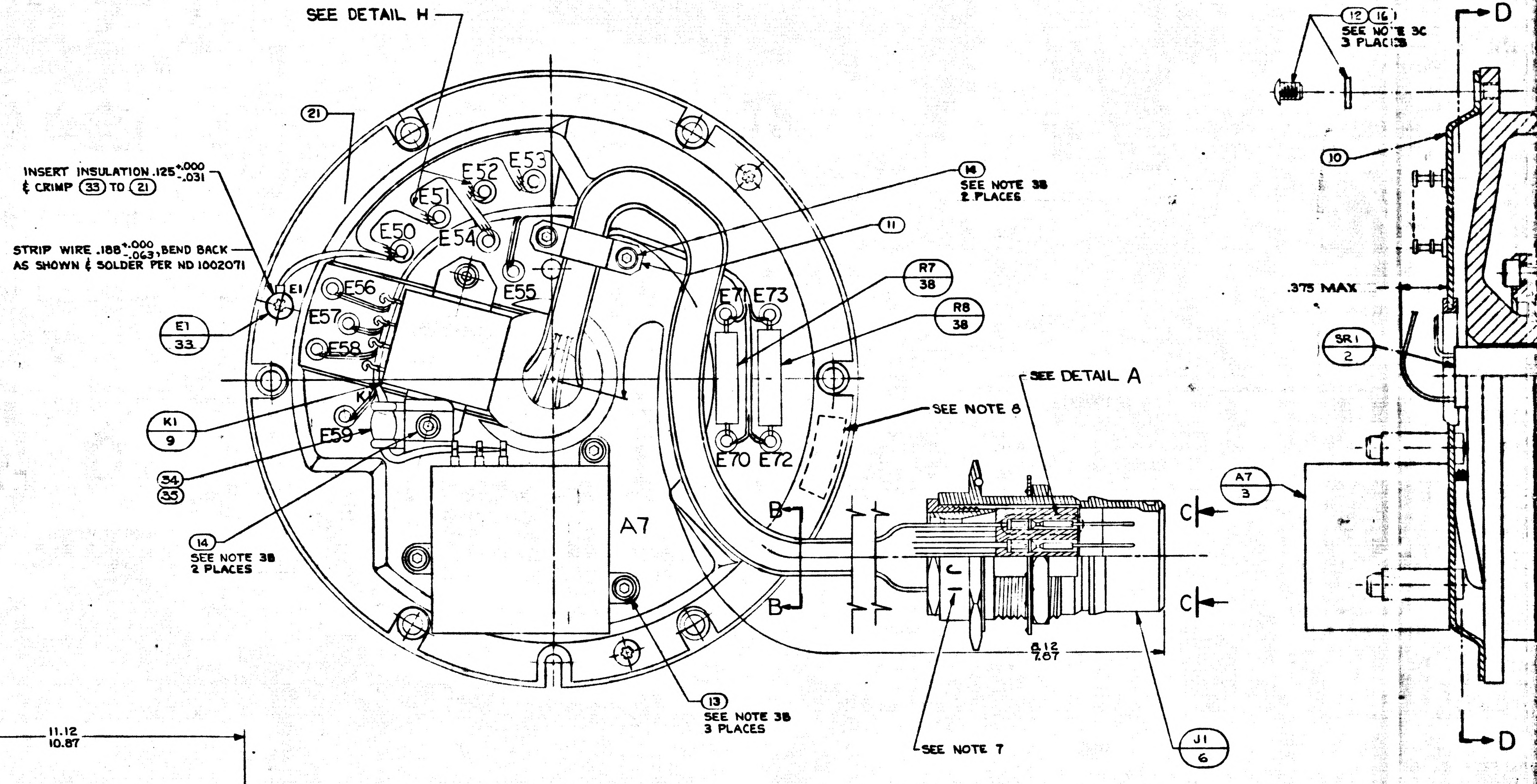


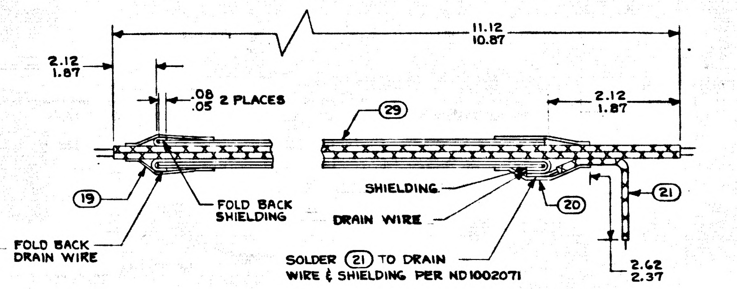
SECTION B-B

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4


SEE NOTE 7 TYP
SR1
B1

VIEW D-D


SEE DETAIL H
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1
E1 / 33
K1 / 9
34
35
14 SEE NOTE 3B 2 PLACES
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
K1
A7
E71
E73
E70
E72
14 SEE NOTE 3B 2 PLACES
11
R7 / 38
R8 / 38
SEE DETAIL A
SEE NOTE 8
B
B
13 SEE NOTE 3B 3 PLACES
SEE NOTE 7
8.12
7.87
J1 / 6
C
C
A7 / 3
12
16
SEE NOTE 3C 3 PLACES
D
D
10
.375 MAX
SR1 / 2


11.12
10.87
2.12
1.87
.08
.05 2 PLACES
2.12
1.87
29
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND1002071
2.62
2.37

DETAIL H
SCALE: NONE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ~~COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF~~ PS 2018612
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 3.5 IN-LB
   B. 5.0 IN-LB
   C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
   A. = SHIELD GROUND ON "FROM END"
   B. = SHIELD GROUND ON "TO END"
   K. = BLACK
   L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.

O.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018612 SHEET 5 of 11

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION FIND NO.
20-1	27	J1-27	13N		A7-3	13Y	
20-2	23	J1-28	13N		A7-2	13Y	
21-1		J1-33	13N		SR1-33		
21-2		J1-34	13N		SR1-34		
22-1		J1-35	13N		SR1-35		
22-2		J1-36	13N		SR1-36		
23-1		J1-37	13N		SR1-37		
23-2		J1-38	13N		SR1-38		
24-1		J1-39	13N		SR1-39		
24-2		J1-40	13N		SR1-40		
25-1		J1-41	13N		SR1-41		
25-2		J1-42	13N		SR1-42		
26-1		J1-43	13N		SR1-43		
26-2		J1-44	13N		SR1-44		
27-1		J1-45	13N		SR1-45		
27-2		J1-46	13N		SR1-46		

O.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018612 SHEET 4 of 11

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION FIND NO.
12		J1-13	13N		SR1-13		
13-1	37	J1-14	13N		E55	19Y	
13-2	36	J1-15	13N		E56	19Y	
13-3	37	J1-29	13N		E55	19Y	
13-4	36	J1-30	13N		E56	19Y	
14	24	J1-16	13N		E57	19Y	
15-1	25	J1-17	13N		E58	19Y	
15-2	26	J1-18	13N		E59	19Y	
15-3	25	J1-31	13N		E58	19Y	
15-4	26	J1-32	13N		E59	19Y	
16		K1-5	13Y		SR1-26		
17	21	J1-20	13N		E70	19Y	
18-1		J1-21	13N		SR1-21		
18-2		J1-22	13N		SR1-22		
18-3		J1-23	13N		SR1-23		
18-4		J1-24	13N		SR1-24		
18-5		J1-25	13N		SR1-25		
19	24	J1-26	13N		E57	19Y	

TDRR 17167 MAR 9 1965

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O.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018612 SHEET 2 of 11

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION FIND NO.
1	21	J1-1	13N		E50	16Y	
2	21	E1	19Y	31	E50	16Y	
3		SR1-1			E50	16Y	
4	29		1 50 1 25	19		1 25 1 00	20
4B	21	E50	16Y		SHLD 4	16Y	
4L		J1-2	13N		E51	16Y	
4K		J1-4	13N		E52	16Y	
5	29		1 50 1 25	19		1 25 1 00	20
5B	21	E50	16Y		SHLD 5	16Y	
5L		J1-3	13N		E51	16Y	
5K		J1-5	13N		E52	16Y	
6-1		SR1-2			E51	16Y	
6-2		SR1-3			E51	16Y	
6-3		SR1-4			E52	16Y	
6-4		SR1-5			E52	16Y	
6-5	[illegible]	SR1-19	[illegible]		K1-1	16Y	
6-6		SR1-20			E52	16Y	
7	25	K1-1	13Y		E51	16Y	

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018612 SHEET 3 of 11

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION FIND NO.
8-1	24	J1-6	13N		E53	16Y	
8-2	26	J1-8	13N		E54	16Y	
8-3	25	J1-7	13N		E53	16Y	
8-4	27	J1-9	13N		E54	16Y	
9-1		SR1-6			E53	16Y	
9-2		SR1-7			E53	16Y	
9-3		SR1-8			E54	16Y	
9-4		SR1-9			E54	16Y	
10-1	28	J1-10	13N		K1-4	13Y	
10-2	21	J1-11	13N		K1-8	13Y	
11		J1-12	13N		SR1-12		
71	25	J1-19	13N		E72	19Y	
72-1		SR1-14			E55	19Y	
72-2		SR1-15			E56	19Y	
73		SR1-16			E57	19Y	
74-1		SR1-17			E58	19Y	
74-2		SR1-18			E59	19Y	

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	NO.	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.
28-1		J1-47	13	N		SR1-47			
28-2		J1-48	13	N		SR1-48			
29-1		J1-51	13	N		B1A-S3			
29-2		J1-52	13	N		B1A-S1			
30-1		J1-53	13	N		B1A-S2			
30-2		J1-54	13	N		B1A-S4			
31-1		J1-55	13	N		B1B-S3			
31-2		J1-56	13	N		B1B-S1			
32-1		J1-57	13	N		B1B-S2			
32-2		J1-58	13	N		B1B-S4			
33-1		SR1-27				A7-3	13	Y	
33-2		SR1-28				A7-2	13	Y	
34-1		SR1-10				K1-6	13	Y	
34-2		SR1-11				K1-2	13	Y	

O. A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018612
SHEET 6 of 11

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	NO.	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.
35-1		SR1-29				A7-6	13	Y	
35-2		SR1-30				A7-1	13	Y	
36-1		SR1-31				A7-6	13	Y	
36-2		SR1-32				A7-5	13	Y	
37-1		SR1-49				A7-6	13	Y	
37-2		SR1-50				A7-4	13	Y	
38		J5-A	13	Y	17	SR1-26			
38-1		J5-B	13	Y	18	SR1-27			
39-2		J5-C	13	Y	18	SR1-28			
40-1		J5-B	13	Y		B1A-P3			
40-2		J5-C	13	Y		B1A-P1			
41-1		J5-D	13	Y	17	SR1-29			
41-2		J5-E	13	Y	17	SR1-30			
42-1		J5-F	13	Y	17	SR1-31			
42-2		J5-H	13	Y	17	SR1-32			
43-1		J5-J	13	Y	17	SR1-33			
43-2		J5-K	13	Y	17	SR1-34			

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018612
SHEET 7 of 11

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	NO.	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.
44-1		J5-L	13	Y	17	SR1-35			
44-2		J5-M	13	Y	17	SR1-36			
45-1		J5-N	13	Y	17	SR1-37			
45-2		J5-P	13	Y	17	SR1-38			
46-1		J5-R	13	Y	17	SR1-39			
46-2		J5-S	13	Y	17	SR1-40			
47-1		J5-T	13	Y	17	SR1-41			
47-2		J5-U	13	Y	17	SR1-42			
48-1		J5-V	13	Y	17	SR1-43			
48-2		J5-W	13	Y	17	SR1-44			
49-1		J5-X	13	Y	17	SR1-45			
49-2		J5-Y	13	Y	17	SR1-46			
50-1		J5-Z	13	Y	17	SR1-47			
50-2		J5-a	13	Y	17	SR1-48			
51-1		J5-b	13	Y	18	SR1-49			
51-2		J5-c	13	Y	18	SR1-50			
52-1		J5-b	13	Y		B1A-P2			
52-2		J5-c	13	Y		B1A-P4			

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018612
SHEET 8 of 11

CONDUCTOR FIND NUMBER	NO.	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.
53		J6-A	13	Y	18	SR1-1			
54		J6-A	13	Y		E10	19	Y	31
55					30				
55-A		SHLD-55				E10			
55-1		J6-B	13	Y	18	SR1-2			
55-2		J6-C	13	Y	18	SR1-3			
55-3		J6-D	13	Y	18	SR1-4			
55-4		J6-E	13	Y	18	SR1-5			
55-5		J6-W	13	Y	17	SR1-19			
55-6		J6-X	13	Y	17	SR1-20			
56-1		J6-F	13	Y	18	SR1-6			
56-2		J6-F	13	Y		SR1-7			
56-3		J6-J	13	Y	18	SR1-8			
56-4		J6-J	13	Y		SR1-9			

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018612
SHEET 9 of 11

TDRR 17167 MAR 9 1965

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018612
SHEET 10 of 11

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/I/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO T/I/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
57		J6-N	13Y	18		SR1-12			
58	22	J6-N	13Y			P3-C	13Y	18	
59	22	P3-C	13Y			P4-C	13Y		
60		P3-D	13Y	17		SR1-10			
61		P4-D	13Y	17		SR1-11			
62		J6-P	13Y	17		SR1-13			
63-1		J6-R	13Y	17		SR1-14			
63-2		J6-S	13Y	17		SR1-15			
64		J6-T	13Y	17		SR1-16			
65-1		J6-U	13Y	17		SR1-17			
65-2		J6-V	13Y	17		SR1-18			
66	23	J6-B	13Y	[illegible]		J6-C	13Y		
67	21	J6-D	13Y	1		J6-E	13Y		

TDRR 17167 MAR 9 1965

O.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION - D

NASA DRAWING NO. 2018612
SHEET 11 of 11

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/I/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO T/I/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
68-1		J6-Y	13Y	17		SR1-21			
68-2		J6-Z	13Y	17		SR1-22			
68-3		J6-a	13Y	17		SR1-23			
68-4		J6-b	13Y	17		SR1-24			
68-5		J6-d	13Y	17		SR1-25			
69	25	E73	19Y			K1-1	19Y		
70	21	K1-3	19Y			E71	19Y		

APOLLO G&N Specification
PS2018612 Rev D
Original Issue Date: 6/28/65
Release Authority: TDRR 20443
Class A Release

PROCUREMENT SPECIFICATION
PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS
INTERGIMBAL SUBASSEMBLY, RESOLVER, OUTER AXIS

Drawing No. 2018612

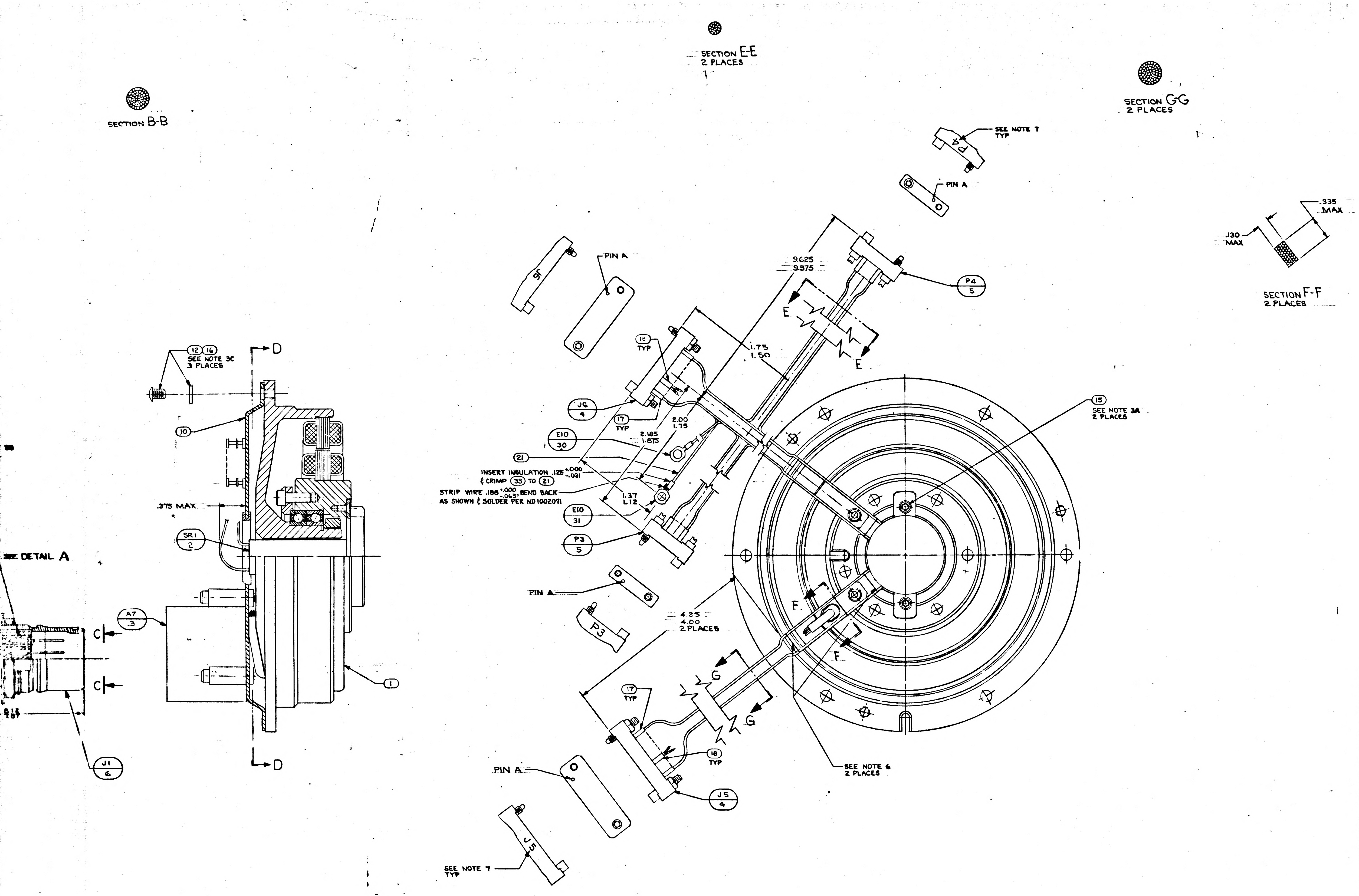
Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA
7/15/65	A	20744	4 & 5	WK	ACM
11/23/65	B	24305	4 & 5	WK	TM
1/11/66	C	25178	4 & 5	WK	ACM
2/23/66	D	26576	2, 6, 7	WK	----

This specification consists of page 1 to 7 inclusive.

APPROVALS	NASA/MSC	28 June 65 MIT/IL	ACSP

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17167			
A	REVISED TDRR 18324	7-7-65		WK
B	REVISED TDRR 18902	5-18-65		WK
C	REVISED TDRR 19270	5-18-65		WK
D	REVISED TDRR 21320	7-26-65		WK
E	REVISED TDRR 21676	8-31-65		WK
F	REVISED TDRR 22014	8-31-65		WK


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.130 MAX
.335 MAX
SEE NOTE 7 TYP
P4
PIN A
9.625
9.375
P4 / 5
E
E
1.75
1.50
18 TYP
J6 / 4
17 TYP
2.00
1.75
2.185
1.875
E10 / 30
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10 / 31
P3 / 5
15
SEE NOTE 3A
2 PLACES
PIN A
P3
4.25
4.00
2 PLACES
F
F
G
G
17 TYP
18 TYP
J5 / 4
PIN A
J5
SEE NOTE 7 TYP
SEE NOTE 6
2 PLACES
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1 / 2
SEE DETAIL A
A7 / 3
C
C
1
J1 / 6

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	2021504-44	RESISTOR	38
1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1000223	WASHER, CABLE CLAMP	35
1	1000220 SEE NOTE 15	CLAMP, CABLE	34
1	1010717-3	TERMINAL, LUG	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1010717-1	TERMINAL, LUG	31
1	1000020-11	SHIELD & GROUND ASSY	30
2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	1006776-14	INSULATION SLEEVING ELEC 3/16 LONG	18
36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC, SPLINE	15
4	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	2018799	CLAMP, WIRE	11
1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	1010862	BUSHING, SLEEVE	8
61	1010781-1	CONTACT ELEC	7
1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	2013625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
011	LIST OF MATERIALS		

MASTER

NEXT ASSY	USED ON
2018601	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN DTB DATE 1/8/65
CHECKED G QUINN 3/8/65
APPROVAL
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

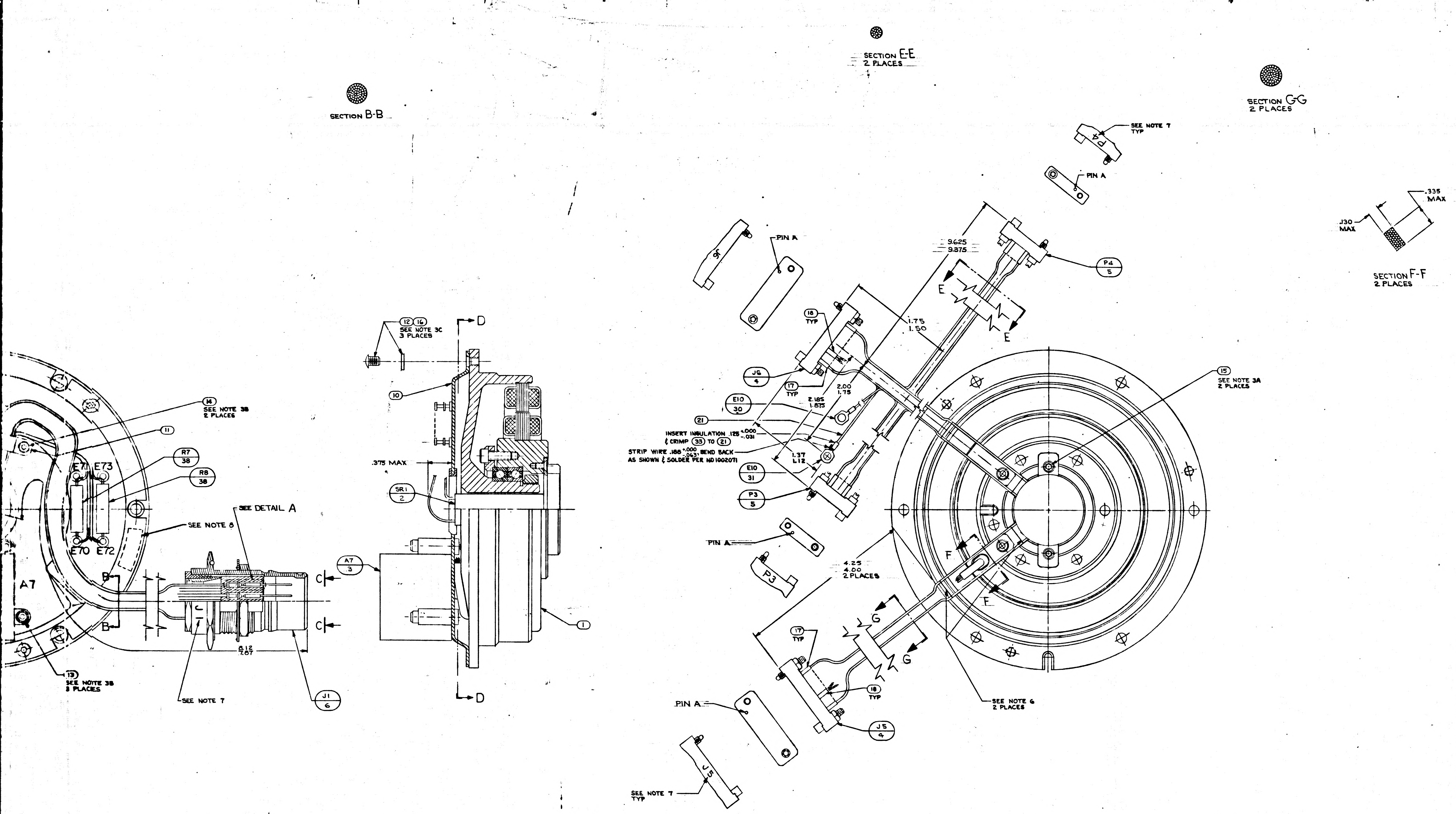
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 1 OF 11

2018612 | REV F | SHT 1

		REVISIONS
	SYM	DESCRIPTION
	A	REVISED TDRR 18326
	B	REVISED TDRR 18902
	C	REVISED TDRR 19270
	D	REVISED TDRR 21320
	E	REVISED TDRR 21676
	F	REVISED TDRR 22014


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
SEE NOTE 7
TYP
PIN A
.335
MAX
.130
MAX
9.625
9.375
P4
5
E
E
1.75
1.50
18
TYP
J6
4
17
TYP
2.125
1.875
2.00
1.75
E10
30
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
PIN A
P3
4.25
4.00
2 PLACES
F
F
G
G
17
TYP
18
TYP
J5
4
PIN A
J5
SEE NOTE 7
TYP
SEE NOTE 6
2 PLACES
15
SEE NOTE 3A
2 PLACES
12
16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
A7
3
1
14
SEE NOTE 3B
2 PLACES
11
R7
38
R8
38
E71
E73
E70
E72
A7
SEE DETAIL A
SEE NOTE 8
B
B
C
C
6.12
7.87
SEE NOTE 7
J1
6
13
SEE NOTE 3B
8 PLACES

2	2021504-44	RESISTOR
1	1010416-4	WIRE AWG 28E ORN 10" LO
1	1010416-5	WIRE AWG 28E YEL 10" LO
1	1000223	WASHER CABLE CLAMP
1	1000220 SEE NOTE 15	CLAMP CABLE
1	1010717-3	TERMINAL, LUG
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED
1	1010717-1	TERMINAL, LUG
1	1000020-11	SHIELD & GROUND ASSY
2	1010778-2	WIRE SHIELDED, TEFLON, MULT
1	1010416-10	WIRE AWG 28E WHT 16" LON
1	1010416-9	WIRE AWG 28E GY 30" LO
1	1010416-8	WIRE AWG 28E VIO 15"
1	1010416-7	WIRE AWG 28E BLU 18" L
1	1010416-6	WIRE AWG 28E GRN 15" L
1	1010416-3	WIRE AWG 28E RED 2" L
1	1010416-2	WIRE AWG 28E BRN 20" L
1	1010416-1	WIRE AWG 28E BLK 4" L
2	1010490-112	INSULATION SLEEVING ELEC
2	1010490-052	INSULATION SLEEVING ELEC
13	1006776-14	INSULATION SLEEVING ELEC
36	1006776-18	INSULATION SLEEVING ELEC
3	MS15795-705	WASHER, FLAT, METAL, RD
2	1010867-2	SCREW, SELF-LKG, FLAT HD,
4	1001488-1	SCREW, HEX SOC HD, SELF-
3	1001488-8	SCREW, HEX SOC HD, SELF-
3	1010891-23	SCREW BUTTON HD, SELF-LKG,
1	2018799	CLAMP, WIRE
1	2018792	GUIDE, WIRE ASSEMBLY
1	1010353-10	RELAY, ELECTRO MAG,
61	1010862	BUSHING, SLEEVE
61	1010781-1	CONTACT ELEC
1	1010783-1	CONNECTOR, ELEC, REC
2	1010917-301	CONNECTOR, ELEC, REC
2	1010917-106	CONNECTOR, ELEC, REC
1	2007204-011	PRECISION RESOLVER ALIGN
1	2018625	SLIP RING ASSEMBLY,
1	2018606-011	RESOLVER ASSEMBLY,
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
011	LIST OF MATERIALS	

MASTER

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
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FINAL FINISH

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DRAWN DTB DATE 1/8/65
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APPROVAL
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

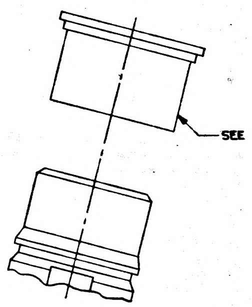
MANNED SPACECRAFT
HOUSTON, TEXAS

INTERGIMBAL SUB-
RESOLVER
OUTER AXIS

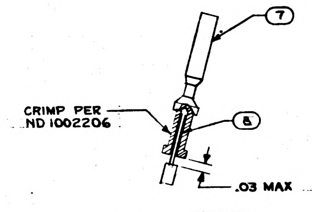
CODE IDENT 80230
SIZE J
2018G
SCALE 2/1
WT

2018612 F 1

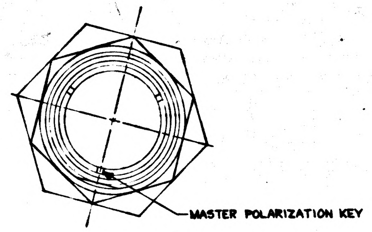
E-2



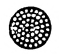
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

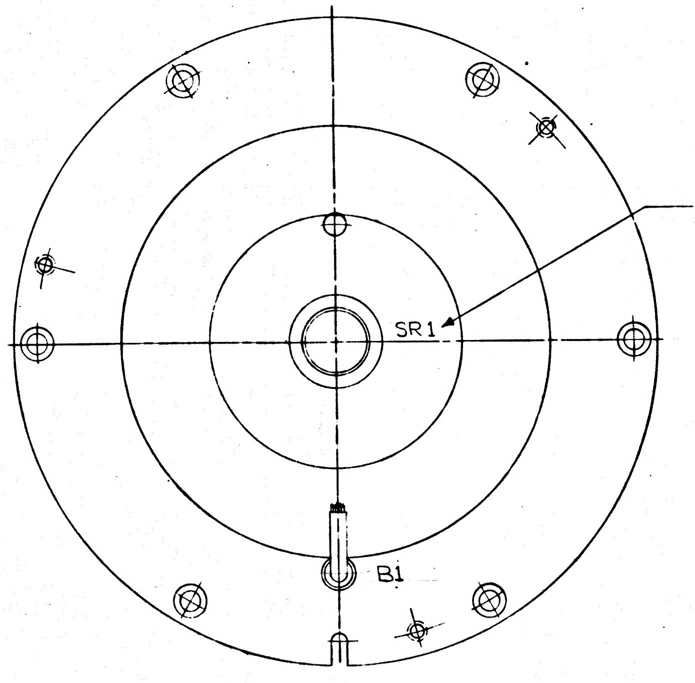
DETAIL A
SCALE 4/1


MASTER POLARIZATION KEY

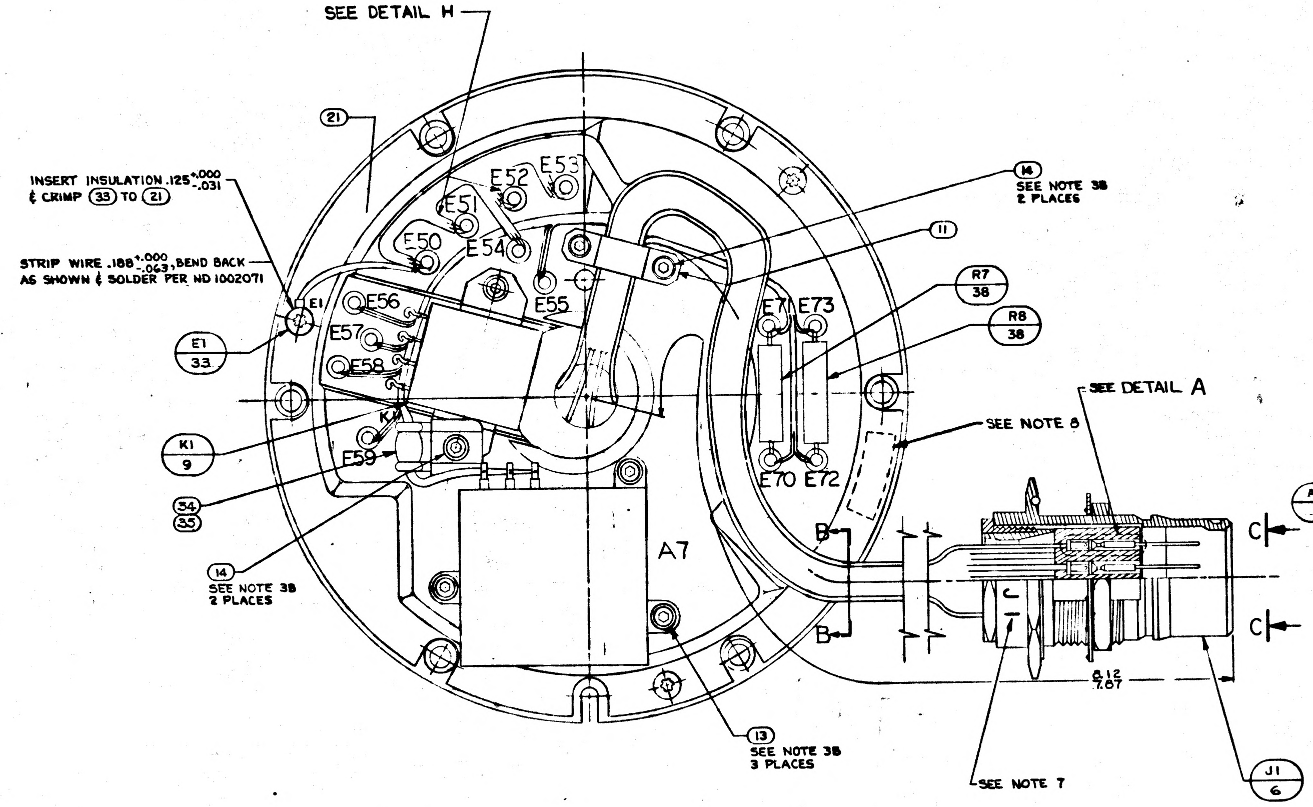
VIEW C-C

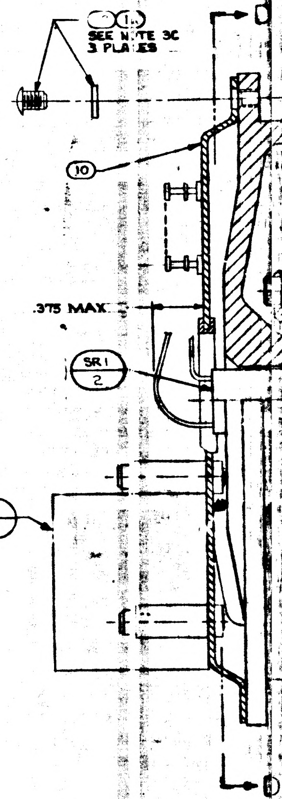


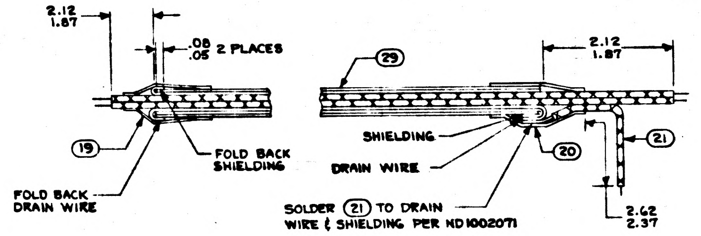
SECTION B-B


SEE NOTE 7 TYP
SR1
B1

VIEW D-D


SEE DETAIL H
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1
E1 33
K1 9
34 35
14 SEE NOTE 3B 2 PLACES
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
K1
E70
E71
E72
E73
A7
14 SEE NOTE 3B 2 PLACES
11
R7 38
R8 38
SEE DETAIL A
SEE NOTE 8
B
B
C
C
13 SEE NOTE 3B 3 PLACES
SEE NOTE 7
8.12 7.87
J1 6


1 SEE NOTE 3C 3 PLACES
10
.375 MAX
SR1 2
A7 3
D
D


2.12 1.87
.08 .05 2 PLACES
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
29
2.12 1.87
SHIELDING
DRAIN WIRE
20
21
2.62 2.37
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND 1002071

DETAIL H
SCALE: NONE

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018612
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 3.5 IN-LB
   B. 5.0 IN-LB
   C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
   A. = SHIELD GROUND ON "FROM END"
   B. = SHIELD GROUND ON "TO END"
   K. = BLACK
   L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.

34

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REVISION F

NASA DRAWING NO. 201862
SHEET 2 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION FIND NO.	SPEC NO.
1	21	J1-1	13	N			E50	16	Y		
2	21	E1	19	Y	31		E50	16	Y		
3		SR1-1					E50	16	Y		
4	29		1 50 1 25		19			1 25 1 00		20	
4B	21	E50	16	Y			SHLD 4	16	Y		
4L		J1-2	13	N			E51	16	Y		
4K		J1-4	13	N			E52	16	Y		
5	29		1 50 1 25		19			1 25 1 00		20	
5B	21	E50	16	Y			SHLD 5	16	Y		
5L		J1-3	13	N			E51	16	Y		
5K		J1-5	13	N			E52	16	Y		
6-1		SR1-2					E51	16	Y		
6-2		SR1-3					E51	16	Y		
6-3		SR1-4					E52	16	Y		
6-4		SR1-5					E52	16	Y		
6-5	[illegible]	SR1-19	[illegible]				K1-1	16	Y		
6-6		SR1-20					E52	16	Y		
7	25	K1-1	13	Y			E51	16	Y		

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NASA DRAWING NO. 201862
SHEET 3 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION FIND NO.	SPEC NO.
8-1	24	J1-6	13	N			E53	16	Y		
8-2	26	J1-8	13	N			E54	16	Y		
8-3	25	J1-7	13	N			E53	16	Y		
8-4	27	J1-9	13	N			E54	16	Y		
9-1		SR1-6					E53	16	Y		
9-2		SR1-7					E53	16	Y		
9-3		SR1-8					E54	16	Y		
9-4		SR1-9					E54	16	Y		
10-1	28	J1-10	13	N			K1-4	13	Y		
10-2	21	J1-11	13	N			K1-8	13	Y		
11		J1-12	13	N			SR1-12				
71	25	J1-19	13	N			E72	19	Y		
72-1		SR1-14					E55	19	Y		
72-2		SR1-15					E56	19	Y		
73		SR1-16					E57	19	Y		
74-1		SR1-17					E58	19	Y		
74-2		SR1-18					E59	19	Y		

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NASA DRAWING NO. 201862
SHEET 4 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION FIND NO.	SPEC NO.
12		J1-13	13	N			SR1-13				
13-1	37	J1-14	13	N			E55	19	Y		
13-2	36	J1-15	13	N			E56	19	Y		
13-3	37	J1-29	13	N			E55	19	Y		
13-4	36	J1-30	13	N			E56	19	Y		
14	24	J1-16	13	N			E57	19	Y		
15-1	25	J1-17	13	N			E58	19	Y		
15-2	26	J1-18	13	N			E59	19	Y		
15-3	25	J1-31	13	N			E58	19	Y		
15-4	26	J1-32	13	N			E59	19	Y		
16		K1-5	13	Y			SR1-26				
17	21	J1-20	13	N			E70	19	Y		
18-1		J1-21	13	N			SR1-21				
18-2		J1-22	13	N			SR1-22				
18-3		J1-23	13	N			SR1-23				
18-4		J1-24	13	N			SR1-24				
18-5		J1 25	13	N			SR1-25				
19	24	26	13	N			E57	19	Y		

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NASA DRAWING NO. 201862
SHEET 5 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T I N	TERMINATION FIND NO.	SPEC NO.
20-1	27	J1-27	13	N			A7-3	13	Y		
20-2	23	J1-28	13	N			A7-2	13	Y		
21-1		J1-33	13	N			SR1-33				
21-2		J1-34	13	N			SR1-34				
22-1		J1-35	13	N			SR1-35				
22-2		J1-36	13	N			SR1-36				
23-1		J1-37	13	N			SR1-37				
23-2		J1-38	13	N			SR1-38				
24-1		J1-39	13	N			SR1-39				
24-2		J1-40	13	N			SR1-40				
25-1		J1-41	13	N			SR1-41				
25-2		J1-42	13	N			SR1-42				
26-1		J1-43	13	N			SR1-43				
26-2		J1-44	13	N			SR1-44				
27-1		J1-45	13	N			SR1-45				
27-2		J1-46	13	N			SR1-46				

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SHEET 6 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
28-1			J1-47	13	N				SR1-47					
28-2			J1-48	13	N				SR1-48					
29-1			J1-51	13	N				B1A-S3					
29-2			J1-52	13	N				B1A-S1					
30-1			J1-53	13	N				B1A-S2					
30-2			J1-54	13	N				B1A-S4					
31-1			J1-55	13	N				B1B-S3					
31-2			J1-56	13	N				B1B-S1					
32-1			J1-57	13	N				B1B-S2					
32-2			J1-58	13	N				B1B-S4					
33-1			SR1-27						A7-3	13	Y			
33-2			SR1-28						A7-2	13	Y			
34-1			SR1-10						K1-6	13	Y			
34-2			SR1-11						K1-2	13	Y			

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SHEET 7 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
35-1			SR1-29						A7-6	13	Y			
35-2			SR1-30						A7-1	13	Y			
36-1			SR1-31						A7-6	13	Y			
36-2			SR1-32						A7-5	13	Y			
37-1			SR1-49						A7-6	13	Y			
37-2			SR1-50						A7-4	13	Y			
38			J5-A	13	Y	17			SR1-26					
38-1			J5-B	13	Y	18			SR1-27					
39-2			J5-C	13	Y	18			SR1-28					
40-1			J5-B	13	Y				B1A-P3					
40-2			J5-C	13	Y				B1A-P1					
41-1			J5-D	13	Y	17			SR1-29					
41-2			J5-E	13	Y	17			SR1-30					
42-1			J5-F	13	Y	17			SR1-31					
42-2			J5-H	13	Y	17			SR1-32					
43-1			J5-J	13	Y	17			SR1-33					
43-2			J5-K	13	Y	17			SR1-34					

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SHEET 8 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
44-1			J5-L	13	Y	17			SR1-35					
44-2			J5-M	13	Y	17			SR1-36					
45-1			J5-N	13	Y	17			SR1-37					
45-2			J5-P	13	Y	17			SR1-38					
46-1			J5-R	13	Y	17			SR1-39					
46-2			J5-S	13	Y	17			SR1-40					
47-1			J5-T	13	Y	17			SR1-41					
47-2			J5-U	13	Y	17			SR1-42					
48-1			J5-V	13	Y	17			SR1-43					
48-2			J5-W	13	Y	17			SR1-44					
49-1			J5-X	13	Y	17			SR1-45					
49-2			J5-Y	13	Y	17			SR1-46					
50-1			J5-Z	13	Y	17			SR1-47					
50-2			J5-a	13	Y	17			SR1-48					
51-1			J5-b	13	Y	18			SR1-49					
51-2			J5-c	13	Y	18			SR1-50					
52-1			J5-b	13	Y				B1A-P2					
52-2			J5-c	13	Y				B1A-P4					

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SHEET 9 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
53			J6-A	13	Y	18			SR1-1					
54			J6-A	13	Y				E10	19	Y	31		
55						30								
55-A			SHLD-55						E10					
55-1			J6-B	13	Y	18			SR1-2					
55-2			J6-C	13	Y	18			SR1-3					
55-3			J6-D	13	Y	18			SR1-4					
55-4			J6-E	13	Y	18			SR1-5					
55-5			J6-W	13	Y	17			SR1-19					
55-6			J6-X	13	Y	17			SR1-20					
56-1			J6-F	13	Y	18			SR1-6					
56-2			J6-F	13	Y				SR1-7					
56-3			J6-J	13	Y	18			SR1-8					
56-4			J6-J	13	Y				SR1-9					

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SHEET 10 of 11

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	TO NO.
57		J6-N	13	Y	18		SR1-12				
58	22	J6-N	13	Y			P3-C	13	Y	18	
59	22	P3-C	13	Y			P4-C	13	Y		
60		P3-D	13	Y	17		SR1-10				
61		P4-D	13	Y	17		SR1-11				
62		J6-P	13	Y	17		SR1-13				
63-1		J6-R	13	Y	17		SR1-14				
63-2		J6-S	13	Y	17		SR1-15				
64		J6-T	13	Y	17		SR1-16				
65-1		J6-U	13	Y	17		SR1-17				
65-2		J6-V	13	Y	17		SR1-18				
66	23	J6-B	13	Y			J6-C	13	Y		
67	21	J6-D	13	Y			J6-E	13	Y		

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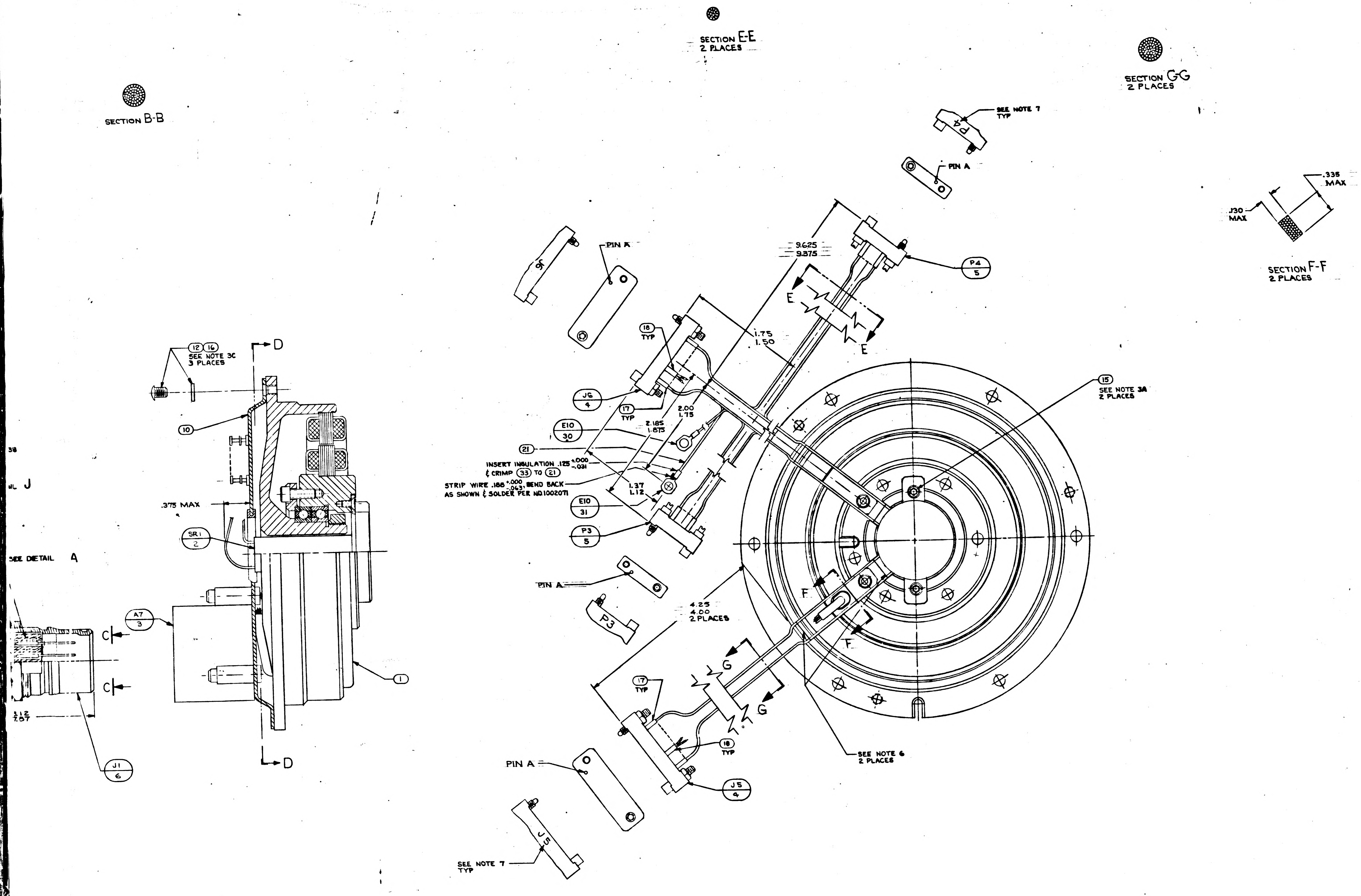
SHEET 11 of 11

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	TO NO.
68-1		J6-Y	13	Y	17		SR1-21				
68-2		J6-Z	13	Y	17		SR1-22				
68-3		J6-a	13	Y	17		SR1-23				
68-4		J6-b	13	Y	17		SR1-24				
68-5		J6-d	13	Y	17		SR1-25				
69	25	E73	19	Y			K1-1	19	Y		
70	21	K1-3	19	Y			E71	19	Y		

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 17167		
A	REVISED TDRR 18324	4-4-65	WK
B	REVISED TDRR 18902	5-18-65	WK
C	REVISED TDRR 19270	5-18-65	WK
D	REVISED TDRR 21320	7-26-65	WK
E	REVISED TDRR 21676	8-31-65	WK
F	REVISED TDRR 22014	8-31-65	WK
G	REVISED TDRR 22332	9-21-65	WK


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SEE NOTE 7
TYP
P4
PIN A
.335
MAX
.130
MAX
SECTION F-F
2 PLACES
9.625
9.375
P4
5
E
E
J6
PIN A
1.75
1.50
18
TYP
J6
4
17
TYP
2.00
1.75
E10
30
2.185
1.875
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
PIN A
P3
4.25
4.00
2 PLACES
15
SEE NOTE 3A
2 PLACES
F
F
G
G
17
TYP
18
TYP
SEE NOTE 6
2 PLACES
PIN A
J5
4
J5
SEE NOTE 7
TYP
D
12 16
SEE NOTE 3C
3 PLACES
10
.375 MAX
SR1
2
SEE DETAIL A
A7
3
C
C
1
3.12
7.87
J1
6
D
J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
A/R	1006835	CURING AGENT	40
A/R	1006834	RESIN	39
2	202504-44	RESISTOR	38
1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1010416-5	WIRE AWG 26E YEL 10" LONG	36
1	1000223	WASHER, CABLE CLAMP	35
1	1000220 SEE NOTE 15	CLAMP CABLE	34
1	1010717-3	TERMINAL LUG	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1010717-1	TERMINAL, LUG	31
1	1000020-11	SHIELD & GROUND ASSY	30
2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
4	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	2018799	CLAMP, WIRE	11
1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	1010862	BUSHING, SLEEVE	8
61	1010781-1	CONTACT ELEC	7
1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
011	LIST OF MATERIALS		

MASTER

NEXT ASSY	USED ON
2018601	DL2018601
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DTB DATE 1/8/65
CHECKED G QUINN 3/8/65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	J	2018612

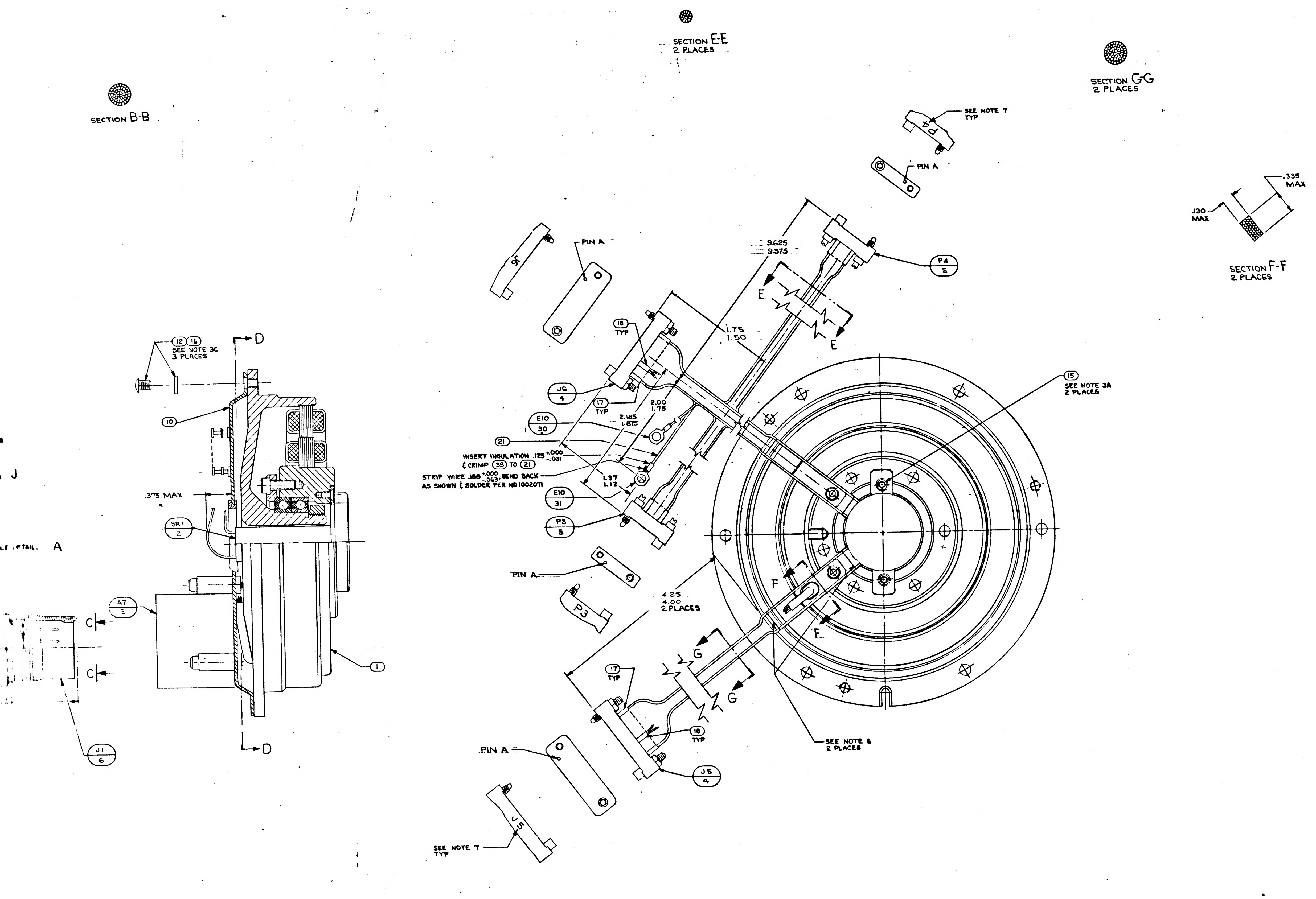
SCALE 2/1 WT SHEET 1 OF 11

2018612 G

2018612 G 1

E3

SYM	DESCRIPTION REVISIONS TDRR 17167	DATE	APPROVAL
A	REVISED TDRR 18324	8-4-65	
B	REVISED TDRR 18902	5-18-65	
C	REVISED TDRR 19270	5-18-65	
D	REVISED TDRR 21320	7-26-65	
E	REVISED TDRR 21676	8-31-65	
F	REVISED TDRR 22014	8-31-65	
G	REVISED TDRR 22332	9-21-65	



SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX
.130 MAX
SEE NOTE 7 TYP
PIN A
9.625
9.375
P4
5
E
E
1.75
1.50
18
TYP
J6
4
17
TYP
E10
30
2.00
1.75
2.185
1.875
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
15
SEE NOTE 3A
2 PLACES
PIN A
P3
4.25
4.00
2 PLACES
F
F
17
TYP
G
G
18
TYP
SEE NOTE 6
2 PLACES
PIN A
J5
4
J5
SEE NOTE 7 TYP
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
DETAIL A
J
A7
3
C
C
1
J1
6

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	1006835	CURING AGENT	40
A/R	1006834	RESIN	39
2	2021504-44	RESISTOR	38
1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1000223	WASHER, CABLE CLAMP	35
1	1000220 SEE NOTE 15	CLAMP CABLE	34
1	1010717-3	TERMINAL, LUG	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1010717-1	TERMINAL, LUG	31
1	1000020-11	SHIELD & GROUND ASSY	30
2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
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3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	2018799	CLAMP, WIRE	11
1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	1010862	BUSHING, SLEEVE	8
61	1010781-1	CONTACT ELEC	7
1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	1010917-301	CONNECTOR, ELEC, RECP, 7 PINS	5
2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
011	LIST OF MATERIALS		

MASTER

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

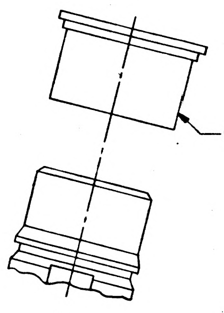
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DTB DATE 1/8/65
CHECKED J QUINN 3/8/65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

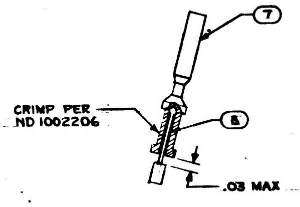
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

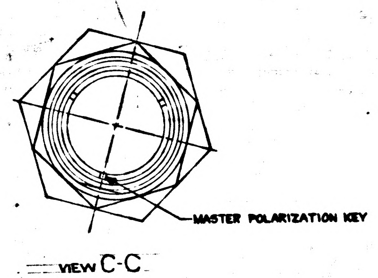
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 1 OF 1



DETAIL J

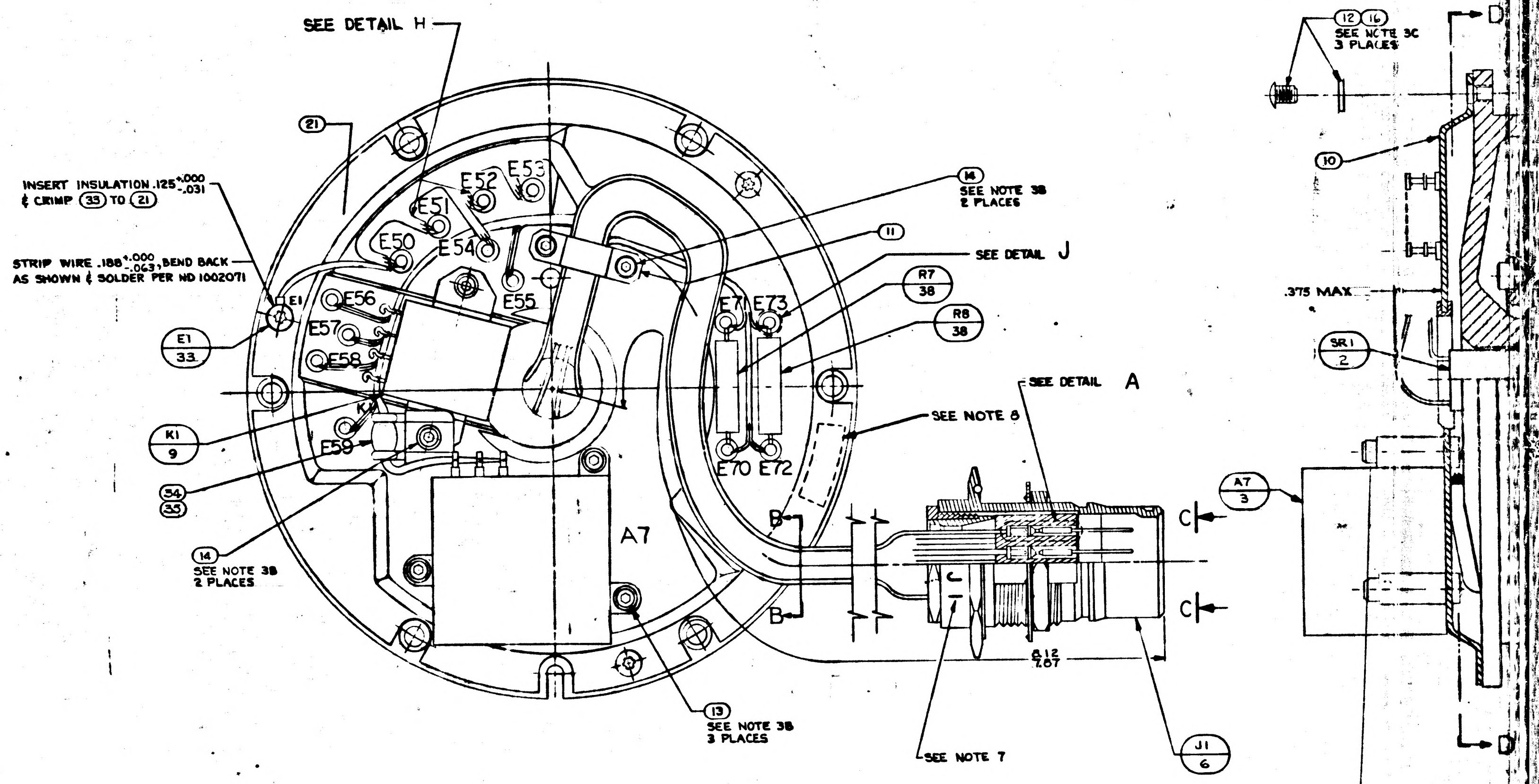

7
CRIMP PER
ND 1002206
8
.03 MAX

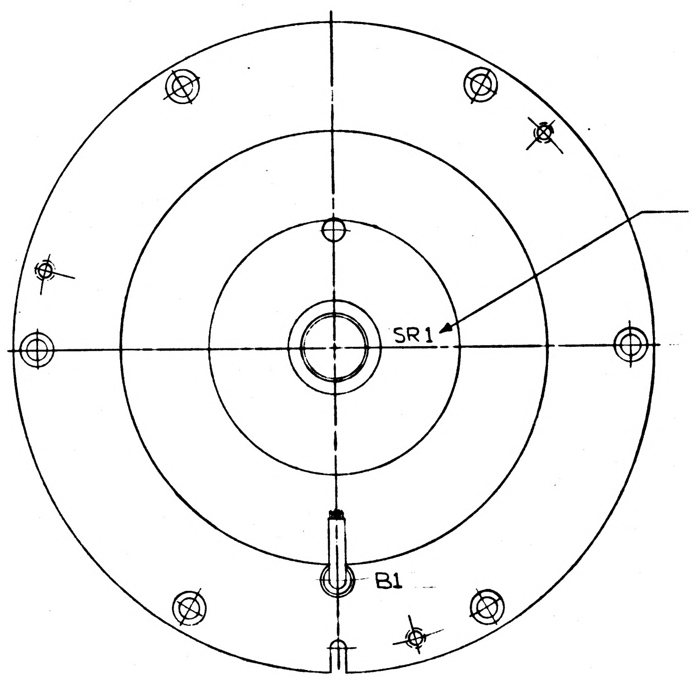
DETAIL A
SCALE 4/1


MASTER POLARIZATION KEY

VIEW C-C

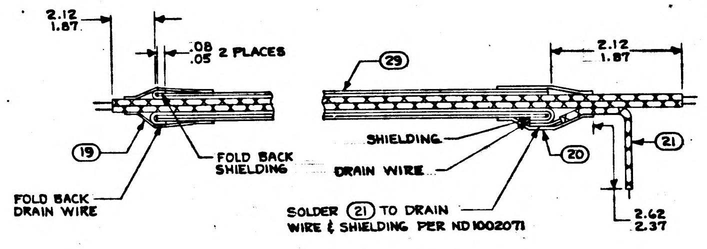
SECTION B-B


SEE DETAIL H
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND 1002071
E1
E1 33
K1 9
34
35
14
SEE NOTE 3B
2 PLACES
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
K1
A7
E71
E73
E70
E72
B
B
14
SEE NOTE 3B
2 PLACES
11
SEE DETAIL J
R7 38
R8 38
SEE DETAIL A
SEE NOTE 8
13
SEE NOTE 3B
3 PLACES
SEE NOTE 7
8.12
7.87
C
C
J1 6
A7 3
12 16
SEE NOTE 3C
3 PLACES
10
.375 MAX
SR1 2
D
D

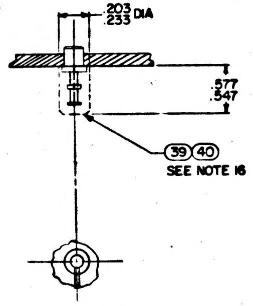

SEE NOTE 7
TYP
SR1
B1

VIEW D-D

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4


2.12
1.87
.08
.05 2 PLACES
19
FOLD BACK
SHIELDING
FOLD BACK
DRAIN WIRE
29
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN
WIRE & SHIELDING PER ND 1002071
2.62
2.37

DETAIL H
SCALE: NONE


.203
.233 DIA
.577
.547
39 40
SEE NOTE 16

DETAIL J
4 PLACES

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ~~COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF~~ PS 2018612
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
   - A. = SHIELD GROUND ON "FROM END"
   - B. = SHIELD GROUND ON "TO END"
   - K. = BLACK
   - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS (39) & (40) PER ND 1002009 METHOD B

3H

TDRR 17167 MAR 9 1965

22014 F

O.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018612 SHEET 2 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CIRCUIT POINT	FROM CUT WIRE OR SHIELD	T/N	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CIRCUIT POINT	TO CUT WIRE OR SHIELD	T/N	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC FIND NO.	TO NO.
1	21	J1-1	13	N				E50	16	Y			
2	21	E1	19	Y		31		E50	16	Y			
3		SR1-1						E50	16	Y			
4	29		1 50		1 25	19			1 25		1 00	20	
4B	21	E50	16	Y				SHLD 4	16	Y			
4L		J1-2	13	N				E51	16	Y			
4K		J1-4	13	N				E52	16	Y			
5	29		1 50		1 25	19			1 25		1 00	20	
5B	21	E50	16	Y				SHLD 5	16	Y			
5L		J1-3	13	N				E51	16	Y			
5K		J1-5	13	N				E52	16	Y			
6-1		SR1-2						E51	16	Y			
6-2		SR1-3						E51	16	Y			
6-3		SR1-4						E52	16	Y			
6-4		SR1-5						E52	16	Y			
6-5	[illegible]	SR1-19	13	[illegible]				K1-1	16	Y			
6-6		SR1-20						E52	16	Y			
7	25	K1-1	13	Y				E51	16	Y			

TDRR 17167 MAR 9 1965

O.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018612 SHEET 3 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CIRCUIT POINT	FROM CUT WIRE OR SHIELD	T/N	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CIRCUIT POINT	TO CUT WIRE OR SHIELD	T/N	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC FIND NO.	TO NO.
8-1	24	J1-6	13	N				E53	16	Y			
8-2	26	J1-8	13	N				E54	16	Y			
8-3	25	J1-7	13	N				E53	16	Y			
8-4	27	J1-9	13	N				E54	16	Y			
9-1		SR1-6						E53	16	Y			
9-2		SR1-7						E53	16	Y			
9-3		SR1-8						E54	16	Y			
9-4		SR1-9						E54	16	Y			
10-1	28	J1-10	13	N				K1-4	13	Y			
10-2	21	J1-11	13	N				K1-8	13	Y			
11		J1-12	13	N				SR1-12					
71	25	J1-19	13	N				E72	19	Y			
72-1		SR1-14						E55	19	Y			
72-2		SR1-15						E56	19	Y			
73		SR1-16						E57	19	Y			
74-1		SR1-17						E58	19	Y			
74-2		SR1-18						E59	19	Y			

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018612 SHEET 4 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CIRCUIT POINT	FROM CUT WIRE OR SHIELD	T/N	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CIRCUIT POINT	TO CUT WIRE OR SHIELD	T/N	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC FIND NO.	TO NO.
12		J1-13	13	N				SR1-13					
13-1	37	J1-14	13	N				E55	19	Y			
13-2	36	J1-15	13	N				E56	19	Y			
13-3	37	J1-29	13	N				E55	19	Y			
13-4	36	J1-30	13	N				E56	19	Y			
14	24	J1-16	13	N				E57	19	Y			
15-1	25	J1-17	13	N				E58	19	Y			
15-2	26	J1-18	13	N				E59	19	Y			
15-3	25	J1-31	13	N				E58	19	Y			
15-4	26	J1-32	13	N				E59	19	Y			
16		K1-5	13	Y				SR1-26					
17	21	J1-20	13	N				E70	19	Y			
18-1		J1-21	13	N				SR1-21					
18-2		J1-22	13	N				SR1-22					
18-3		J1-23	13	N				SR1-23					
18-4		J1-24	13	N				SR1-24					
18-5		J1-25	13	N				SR1-25					
19	24	J1-26	13	N				E57	19	Y			

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018612 SHEET 5 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CIRCUIT POINT	FROM CUT WIRE OR SHIELD	T/N	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CIRCUIT POINT	TO CUT WIRE OR SHIELD	T/N	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC FIND NO.	TO NO.
20-1	27	J1-27	13	N				A7-3	13	Y			
20-2	23	J1-28	13	N				A7-2	13	Y			
21-1		J1-33	13	N				SR1-33					
21-2		J1-34	13	N				SR1-34					
22-1		J1-35	13	N				SR1-35					
22-2		J1-36	13	N				SR1-36					
23-1		J1-37	13	N				SR1-37					
23-2		J1-38	13	N				SR1-38					
24-1		J1-39	13	N				SR1-39					
24-2		J1-40	13	N				SR1-40					
25-1		J1-41	13	N				SR1-41					
25-2		J1-42	13	N				SR1-42					
26-1		J1-43	13	N				SR1-43					
26-2		J1-44	13	N				SR1-44					
27-1		J1-45	13	N				SR1-45					
27-2		J1-46	13	N				SR1-46					

O. A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018612

SHEET 6 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
28-1			J1-47	13	N			SR1-47				
28-2			J1-48	13	N			SR1-48				
29-1			J1-51	13	N			B1A-S3				
29-2			J1-52	13	N			B1A-S1				
30-1			J1-53	13	N			B1A-S2				
30-2			J1-54	13	N			B1A-S4				
31-1			J1-55	13	N			B1B-S3				
31-2			J1-56	13	N			B1B-S1				
32-1			J1-57	13	N			B1B-S2				
32-2			J1-58	13	N			B1B-S4				
33-1			SR1-27					A7-3	13	Y		
33-2			SR1-28					A7-2	13	Y		
34-1			SR1-10					K1-6	13	Y		
34-2			SR1-11					K1-2	13	Y		

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018612

SHEET 7 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
35-1			SR1-29					A7-6	13	Y		
35-2			SR1-30					A7-1	13	Y		
36-1			SR1-31					A7-6	13	Y		
36-2			SR1-32					A7-5	13	Y		
37-1			SR1-49					A7-6	13	Y		
37-2			SR1-50					A7-4	13	Y		
38			J5-A	13	Y	17		SR1-26				
38-1			J5-B	13	Y	18		SR1-27				
39-2			J5-C	13	Y	18		SR1-28				
40-1			J5-B	13	Y			B1A-P3				
40-2			J5-C	13	Y			B1A-P1				
41-1			J5-D	13	Y	17		SR1-29				
41-2			J5-E	13	Y	17		SR1-30				
42-1			J5-F	13	Y	17		SR1-31				
42-2			J5-H	13	Y	17		SR1-32				
43-1			J5-J	13	Y	17		SR1-33				
43-2			J5-K	13	Y	17		SR1-34				

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018612

SHEET 8 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
44-1			J5-L	13	Y	17		SR1-35				
44-2			J5-M	13	Y	17		SR1-36				
45-1			J5-N	13	Y	17		SR1-37				
45-2			J5-P	13	Y	17		SR1-38				
46-1			J5-R	13	Y	17		SR1-39				
46-2			J5-S	13	Y	17		SR1-40				
47-1			J5-T	13	Y	17		SR1-41				
47-2			J5-U	13	Y	17		SR1-42				
48-1			J5-V	13	Y	17		SR1-43				
48-2			J5-W	13	Y	17		SR1-44				
49-1			J5-X	13	Y	17		SR1-45				
49-2			J5-Y	13	Y	17		SR1-46				
50-1			J5-Z	13	Y	17		SR1-47				
50-2			J5-a	13	Y	17		SR1-48				
51-1			J5-b	13	Y	18		SR1-49				
51-2			J5-c	13	Y	18		SR1-50				
52-1			J5-b	13	Y			B1A-P2				
52-2			J5-c	13	Y			B1A-P4				

O. A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018612

SHEET 9 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
53			J6-A	13	Y	18		SR1-1				
54			J6-A	13	Y			E10	19	Y	31	
55						30						
55-A			SHLD-55					E10				
55-1			J6-B	13	Y	18		SR1-2				
55-2			J6-C	13	Y	18		SR1-3				
55-3			J6-D	13	Y	18		SR1-4				
55-4			J6-E	13	Y	18		SR1-5				
55-5			J6-W	13	Y	17		SR1-19				
55-6			J6-X	13	Y	17		SR1-20				
56-1			J6-F	13	Y	18		SR1-6				
56-2			J6-F	13	Y			SR1-7				
56-3			J6-J	13	Y	18		SR1-8				
56-4			J6-J	13	Y			SR1-9				

TDRR 17167 MAR 9 1965

O.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018612

SHEET 10 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
57		J6-N	13Y	18		SR1-12			
58	22	J6-N	13Y			P3-C	13Y	18	
59	22	P3-C	13Y			P4-C	13Y		
60		P3-D	13Y	17		SR1-10			
61		P4-D	13Y	17		SR1-11			
62		J6-P	13Y	17		SR1-13			
63-1		J6-R	13Y	17		SR1-14			
63-2		J6-S	13Y	17		SR1-15			
64		J6-T	13Y	17		SR1-16			
65-1		J6-U	13Y	17		SR1-17			
65-2		J6-V	13Y	17		SR1-18			
66	23	J6-B	13Y	[illegible]		J6-C	13Y		
67	21	J6-D	13Y	[illegible]		J6-E	13Y		

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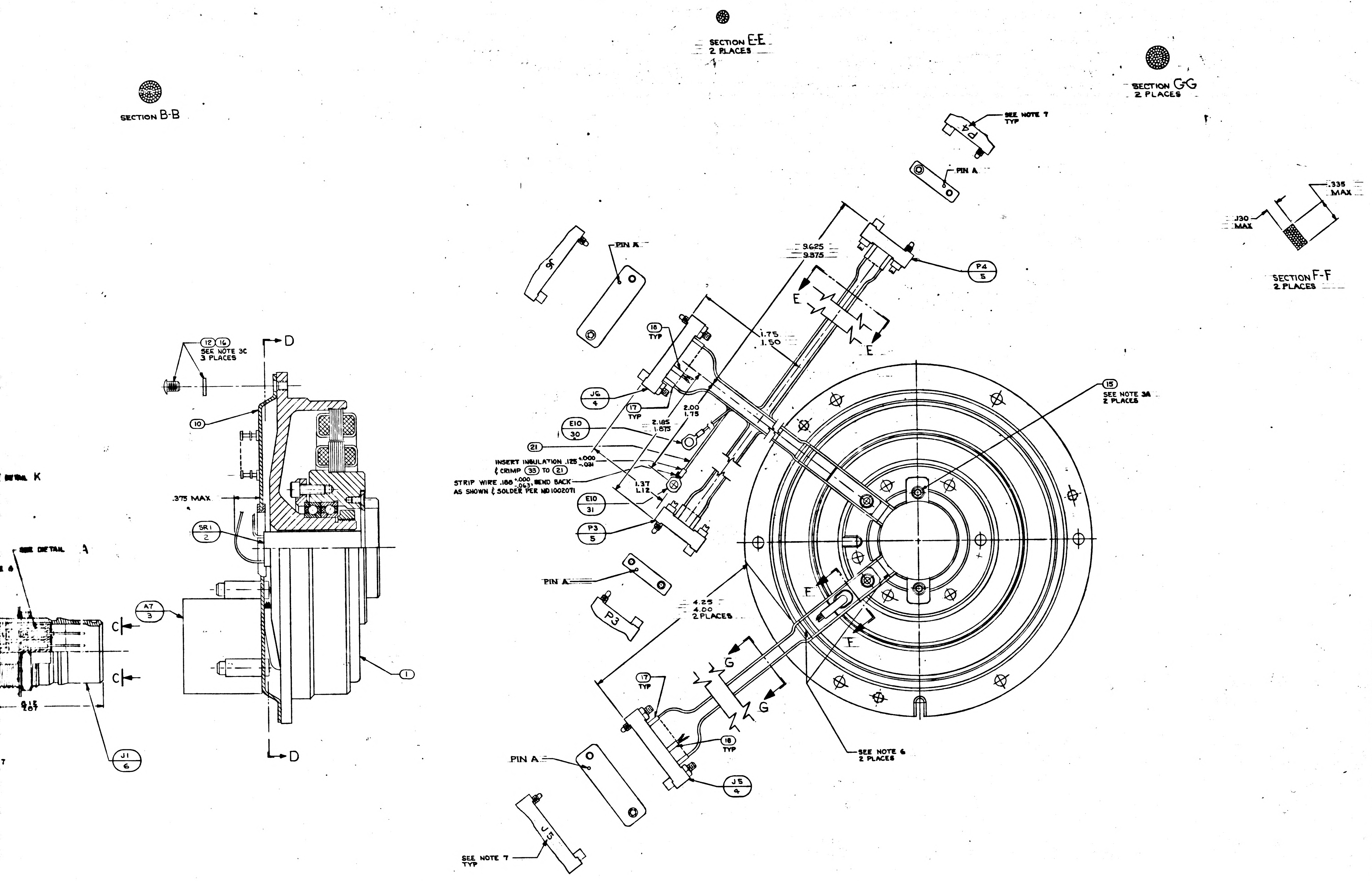
REVISION G

NASA DRAWING NO. 20.612

SHEET 11 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
68-1		J6-Y	13Y	17		SR1-21			
68-2		J6-Z	13Y	17		SR1-22			
68-3		J6-a	13Y	17		SR1-23			
68-4		J6-b	13Y	17		SR1-24			
68-5		J6-d	13Y	17		SR1-25			
69	25	E73	19Y			K1-1	19Y		
70	21	K1-3	19Y			E71	19Y		

		REVISIONS TDRR 17167		
SYM	DESCRIPTION	DATE		
A	REVISED TDRR 18324	[illegible]		
B	REVISED TDRR 18902	5-18-65		
C	REVISED TDRR 19270	5-18-65		
D	REVISED TDRR 21320	7-26-65		
E	REVISED TDRR 21676	8-31-65		
F	REVISED TDRR 22014	8-31-65		
G	REVISED TDRR 22332	9-21-65		
H	REVISED TDRR 23045	10-13-65		



SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335
MAX
.130
MAX
SEE NOTE 7
TYP
PIN A
9.625
9.375
P4
5
E
E
1.75
1.50
15
SEE NOTE 3A
2 PLACES
18
TYP
J6
4
17
TYP
E10
30
2.00
1.75
2.185
1.875
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
12 16
SEE NOTE 3C
3 PLACES
D
10
.375 MAX
SR1
2
SEE DETAIL A
A7
3
C
C
1
J1
6
D
F
F
4.25
4.00
2 PLACES
P3
G
G
17
TYP
18
TYP
J5
4
SEE NOTE 6
2 PLACES
SEE NOTE 7
TYP
J5

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	MS15795-303	WASHER, FLAT METAL ROUND	41
A/R	1006835	CURING AGENT	40
A/R	1006834	RESIN	39
2	2021504-44	RESISTOR	38
1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1000223	WASHER, CABLE CLAMP	35
2	1000220 SEE NOTE 15	CLAMP CABLE	34
1	1010717-3	TERMINAL, LUG	33
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1010717-1	TERMINAL, LUG	31
1	1000020-11	SHIELD & GROUND ASSY	30
2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	1006776-14	INSULATION SLEEVING ELEC 3/16 LONG	18
36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
1	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
2	1001488-2	SCREW, HEX SOC HD, SELF-LKG	11
1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	1010862	BUSHING, SLEEVE	8
61	1010781-1	CONTACT ELEC	7
1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1

011 LIST OF MATERIALS

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DTB DATE 1/8/65
CHECKED G Quinn 3/8/65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

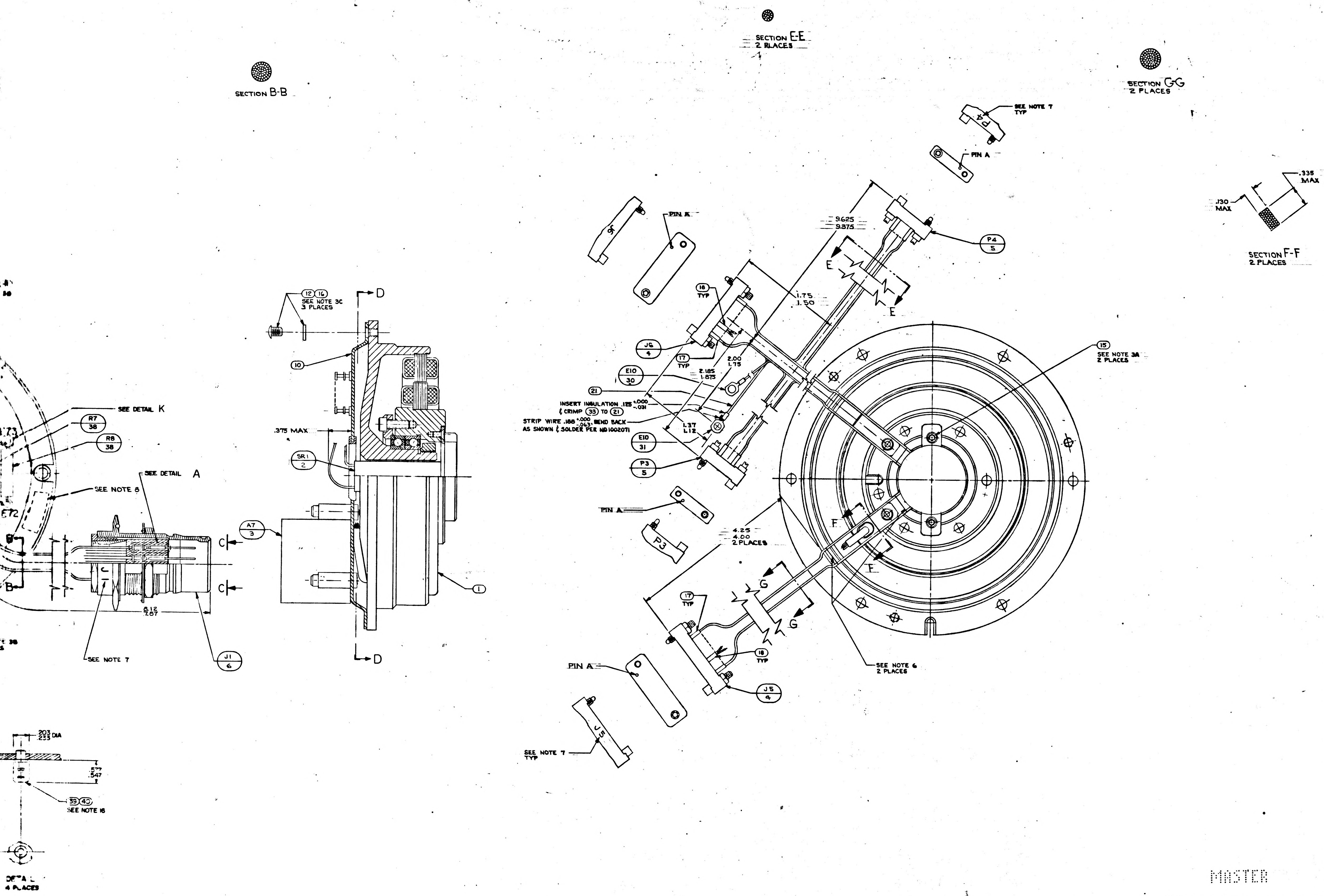
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY RESOLVER OUTER AXIS

CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018612
SCALE 2/1 WT SHEET 1 OF 17

2018612 H

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17?57			
A	REVISED TDRR 18324	[illegible]	[illegible]	WK
B	REVISED TDRR 18902	5-16-5	[illegible]	WK
C	REVISED TDRR 19270	5-18-5	[illegible]	WK
D	REVISED TDRR 21320	7-26-5	[illegible]	WK
E	REVISED TDRR 21676	8-31-5	[illegible]	WK
F	REVISED TDRR 22014	8-3-5	[illegible]	WK
G	REVISED TDRR 22332	9-2-5	[illegible]	WK
H	REVISED TDRR 23045	10-13-5	[illegible]	[illegible]



5
4
3
2
1
SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX
.130 MAX
SEE NOTE 7 TYP
PIN A
P4
5
9.625
9.375
PIN K
E
E
1.75
1.50
18 TYP
J6
4
17 TYP
E10
30
2.185
1.875
2.00
1.75
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
15
SEE NOTE 3A
2 PLACES
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
A7
3
C
C
1
SEE DETAIL K
R7
38
R8
38
SEE DETAIL A
SEE NOTE 8
E72
B
6.12
7.07
J1
6
SEE NOTE 7
PIN A
P3
F
F
4.25
4.00
2 PLACES
G
G
17 TYP
18 TYP
J5
4
PIN A
J5
SEE NOTE 7 TYP
SEE NOTE 6
2 PLACES
.203
.233 DIA
.577
.547
39 43
SEE NOTE 16
DETAIL
4 PLACES

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	MS15795-303	WASHER, FLAT METAL ROUND	41
A/R	1006835	CURING AGENT	40
A/R	1006834	RESIN	39
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A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
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2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 1' LONG	29
1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
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1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
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2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
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3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
2	1001488-2	SCREW, HEX SOC HD, SELF-LKG	11
1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	1010862	BUSHING, SLEEVE	8
61	1010781-1	CONTACT ELEC	7
1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
011	LIST OF MATERIALS		

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DTB DATE 1/8/65
CHECKED G QUINN 3/8/65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

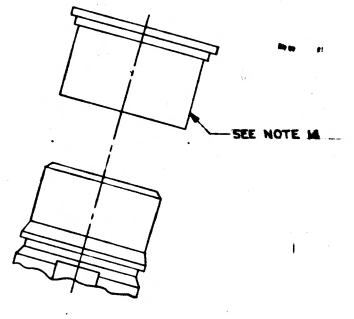
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

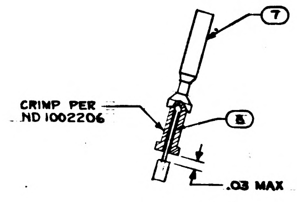
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 1 OF 1

2018612 H

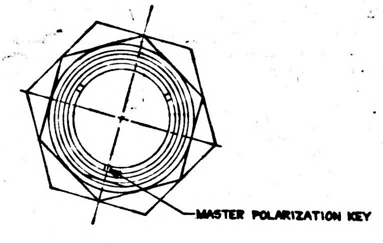
2018612 H 1



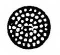
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

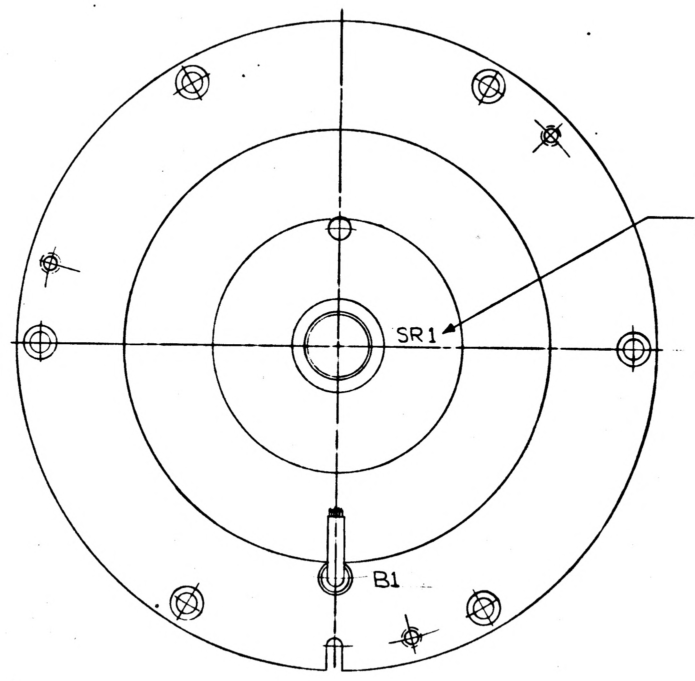
DETAIL A
SCALE 4/1


MASTER POLARIZATION KEY

VIEW C-C

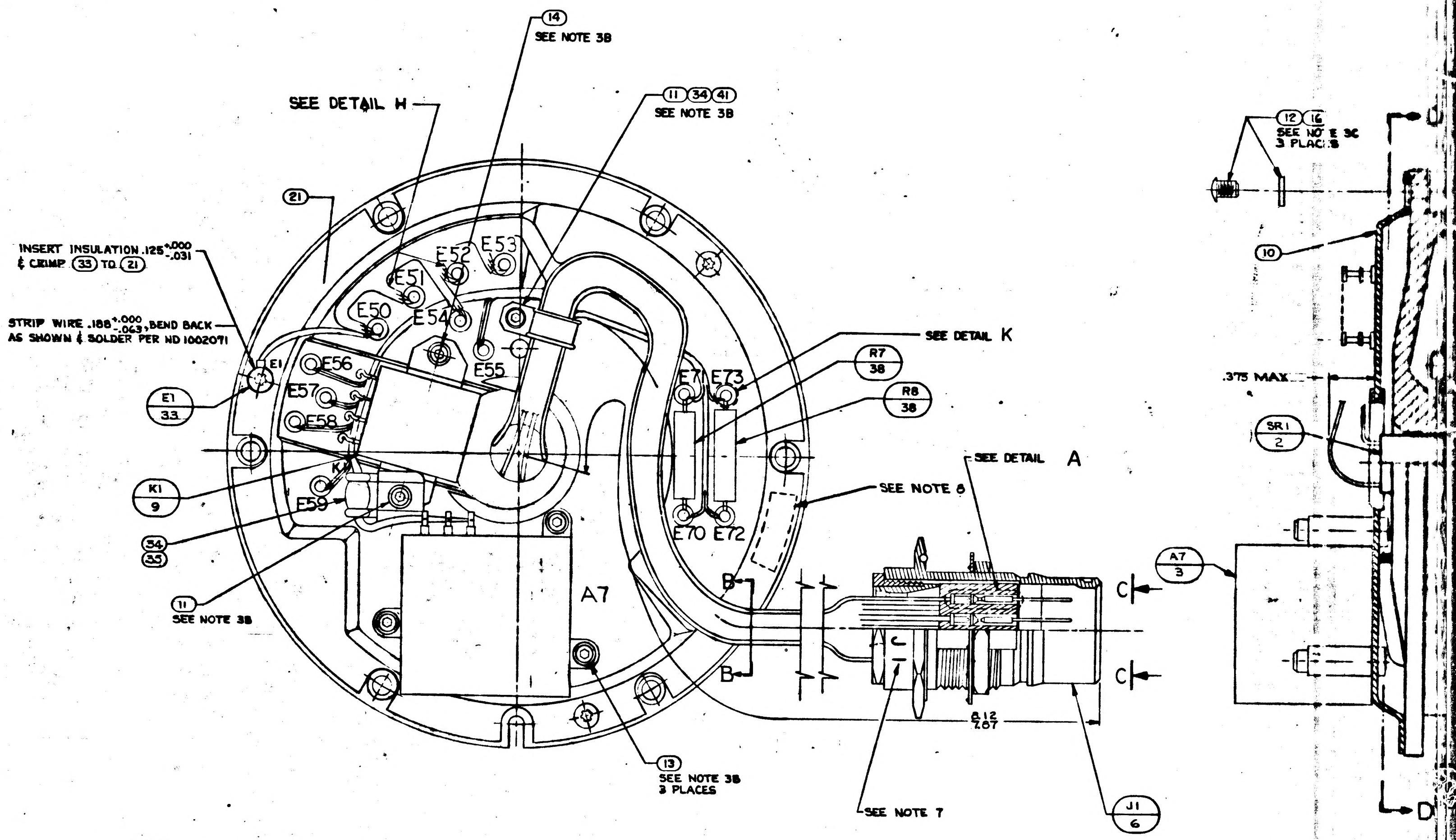


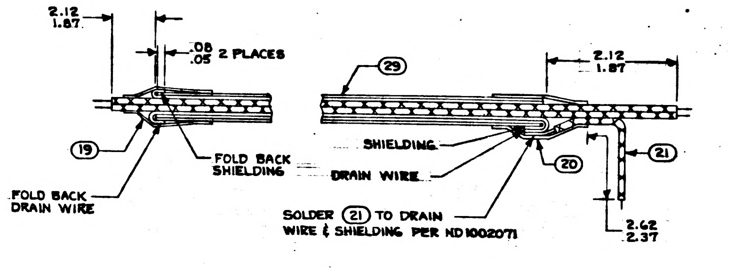
SECTION B-B


SEE NOTE 17
TYP
SR1
B1

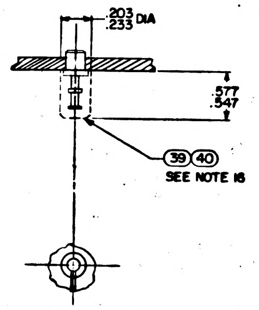
VIEW D-D

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16


14
SEE NOTE 3B
SEE DETAIL H
11 34 41
SEE NOTE 3B
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1
E1 / 33
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
K1
K1 / 9
34
35
11
SEE NOTE 3B
A7
E71
E73
E70
E72
SEE DETAIL K
R7 / 38
R8 / 38
SEE DETAIL A
SEE NOTE 8
B
B
C
C
8.12
7.87
13
SEE NOTE 3B
3 PLACES
SEE NOTE 7
J1 / 6
12 16
SEE NOTE 3C
3 PLACES
10
.375 MAX
SR1 / 2
A7 / 3
D
D


2.12
1.87
.08
.05 2 PLACES
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
29
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND1002071
2.62
2.37

DETAIL H
SCALE: NONE


.203
.233 DIA
.577
.547
39 40
SEE NOTE 16

DETAIL K
4 PLACES

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ~~COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF~~ PS 2018612
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO ③, ④, ⑤, ⑨ & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON ㉚ AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
    - A. = SHIELD GROUND ON "FROM END"
    - B. = SHIELD GROUND ON "TO END"
    - K. = BLACK
    - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM ㉞ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS ㊴ & ㊵ PER ND 1002009 METHOD B

3H

2018612	REV	SHT
	H	1

TDRR 17167 MAR 9 1965

2204 F

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.
1	21	J1-1	13	N			E50	16	Y		
2	21	E1	19	Y	31		E50	16	Y		
3		SR1-1					E50	16	Y		
4	29		1 50 1 25		19			1 25 1 00		20	
4B	21	E50	16	Y			SHLD 4	16	Y		
4L		J1-2	13	N			E51	16	Y		
4K		J1-4	13	N			E52	16	Y		
5	29		1 50 1 25		19			1 25 1 00		20	
5B	21	E50	16	Y			SHLD 5	16	Y		
5L		J1-3	13	N			E51	16	Y		
5K		J1-5	13	N			E52	16	Y		
6-1		SR1-2					E51	16	Y		
6-2		SR1-3					E51	16	Y		
6-3		SR1-4					E52	16	Y		
6-4		SR1-5					E52	16	Y		
6-5		SR1-19	13				K1-1	16	Y		
6-6		SR1-20					E52	16	Y		
7	25	K1-1	13	Y			E51	16	Y		

O.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018612
SHEET 2 of 11

TDRR 17167 MAR 9 1965

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.
8-1	24	J1-6	13	N			E53	16	Y		
8-2	26	J1-8	13	N			E54	16	Y		
8-3	25	J1-7	13	N			E53	16	Y		
8-4	27	J1-9	13	N			E54	16	Y		
9-1		SR1-6					E53	16	Y		
9-2		SR1-7					E53	16	Y		
9-3		SR1-8					E54	16	Y		
9-4		SR1-9					E54	16	Y		
10-1	28	J1-10	13	N			K1-4	13	Y		
10-2	21	J1-11	13	N			K1-8	13	Y		
11		J1-12	13	N			SR1-12				
71	25	J1-19	13	N			E72	19	Y		
72-1		SR1-14					E55	19	Y		
72-2		SR1-15					E56	19	Y		
73		SR1-16					E57	19	Y		
74-1		SR1-17					E58	19	Y		
74-2		SR1-18					E59	19	Y		

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HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018612
SHEET 3 of 11

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.
12		J1-13	13	N			SR1-13				
13-1	37	J1-14	13	N			E55	19	Y		
13-2	36	J1-15	13	N			E56	19	Y		
13-3	37	J1-29	13	N			E55	19	Y		
13-4	36	J1-30	13	N			E56	19	Y		
14	24	J1-16	13	N			E57	19	Y		
15-1	25	J1-17	13	N			E58	19	Y		
15-2	26	J1-18	13	N			E59	19	Y		
15-3	25	J1-31	13	N			E58	19	Y		
15-4	26	J1-32	13	N			E59	19	Y		
16		K1-5	13	Y			SR1-26				
17	21	J1-20	13	N			E70	19	Y		
18-1		J1-21	13	N			SR1-21				
18-2		J1-22	13	N			SR1-22				
18-3		J1-23	13	N			SR1-23				
18-4		J1-24	13	N			SR1-24				
18-5		J1-25	13	N			SR1-25				
19	24	J1-26	13	N			E57	19	Y		

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REVISION H

NASA DRAWING NO. 2018612
SHEET 4 of 11

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/I/N	TERMINATION SPEC FIND NO.	NO.
20-1	27	J1-27	13	N			A7-3	13	Y		
20-2	23	J1-28	13	N			A7-2	13	Y		
21-1		J1-33	13	N			SR1-33				
21-2		J1-34	13	N			SR1-34				
22-1		J1-35	13	N			SR1-35				
22-2		J1-36	13	N			SR1-36				
23-1		J1-37	13	N			SR1-37				
23-2		J1-38	13	N			SR1-38				
24-1		J1-39	13	N			SR1-39				
24-2		J1-40	13	N			SR1-40				
25-1		J1-41	13	N			SR1-41				
25-2		J1-42	13	N			SR1-42				
26-1		J1-43	13	N			SR1-43				
26-2		J1-44	13	N			SR1-44				
27-1		J1-45	13	N			SR1-45				
27-2		J1-46	13	N			SR1-46				

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NASA DRAWING NO. 2018612
SHEET 5 of 11

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REVISION H

NASA DRAWING NO. 2018612

SHEET 6 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
28-1			J1-47	13	N				SR1-47					
28-2			J1-48	13	N				SR1-48					
29-1			J1-51	13	N				B1A-S3					
29-2			J1-52	13	N				B1A-S1					
30-1			J1-53	13	N				B1A-S2					
30-2			J1-54	13	N				B1A-S4					
31-1			J1-55	13	N				B1B-S3					
31-2			J1-56	13	N				B1B-S1					
32-1			J1-57	13	N				B1B-S2					
32-2			J1-58	13	N				B1B-S4					
33-1			SR1-27						A7-3	13	Y			
33-2			SR1-28						A7-2	13	Y			
34-1			SR1-10						K1-6	13	Y			
34-2			SR1-11						K1-2	13	Y			

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REVISION H

NASA DRAWING NO. 2018612

SHEET 7 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
35-1			SR1-29						A7-6	13	Y			
35-2			SR1-30						A7-1	13	Y			
36-1			SR1-31						A7-6	13	Y			
36-2			SR1-32						A7-5	13	Y			
37-1			SR1-49						A7-6	13	Y			
37-2			SR1-50						A7-4	13	Y			
38			J5-A	13	Y	17			SR1-26					
38-1			J5-B	13	Y	18			SR1-27					
39-2			J5-C	13	Y	18			SR1-28					
40-1			J5-B	13	Y				B1A-P3					
40-2			J5-C	13	Y				B1A-P1					
41-1			J5-D	13	Y	17			SR1-29					
41-2			J5-E	13	Y	17			SR1-30					
42-1			J5-F	13	Y	17			SR1-31					
42-2			J5-H	13	Y	17			SR1-32					
43-1			J5-J	13	Y	17			SR1-33					
43-2			J5-K	13	Y	17			SR1-34					

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SHEET 8 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
44-1			J5-L	13	Y	17			SR1-35					
44-2			J5-M	13	Y	17			SR1-36					
45-1			J5-N	13	Y	17			SR1-37					
45-2			J5-P	13	Y	17			SR1-38					
46-1			J5-R	13	Y	17			SR1-39					
46-2			J5-S	13	Y	17			SR1-40					
47-1			J5-T	13	Y	17			SR1-41					
47-2			J5-U	13	Y	17			SR1-42					
48-1			J5-V	13	Y	17			SR1-43					
48-2			J5-W	13	Y	17			SR1-44					
49-1			J5-X	13	Y	17			SR1-45					
49-2			J5-Y	13	Y	17			SR1-46					
50-1			J5-Z	13	Y	17			SR1-47					
50-2			J5-a	13	Y	17			SR1-48					
51-1			J5-b	13	Y	18			SR1-49					
51-2			J5-c	13	Y	18			SR1-50					
52-1			J5-b	13	Y				B1A-P2					
52-2			J5-c	13	Y				B1A-P4					

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NASA DRAWING NO. 2018612

SHEET 9 of 11

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
53			J6-A	13	Y	18			SR1-1					
54			J6-A	13	Y				E10	19	Y	31		
55						30								
55-A			SHLD-55						E10					
55-1			J6-B	13	Y	18			SR1-2					
55-2			J6-C	13	Y	18			SR1-3					
55-3			J6-D	13	Y	18			SR1-4					
55-4			J6-E	13	Y	18			SR1-5					
55-5			J6-W	13	Y	17			SR1-19					
55-6			J6-X	13	Y	17			SR1-20					
56-1			J6-F	13	Y	18			SR1-6					
56-2			J6-F	13	Y				SR1-7					
56-3			J6-J	13	Y	18			SR1-8					
56-4			J6-J	13	Y				SR1-9					

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NASA DRAWING NO. 2018612
SHEET 10 of 11

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T I N	FROM: TERMINATION SPEC FIND NO.	FROM: NO.	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T I N	TO: TERMINATION SPEC FIND NO.	TO: NO.
57		J6-N	13Y	18		SR1-12			
58	22	J6-N	13Y			P3-C	13Y	18	
59	22	P3-C	13Y			P4-C	13Y		
60		P3-D	13Y	17		SR1-10			
61		P4-D	13Y	17		SR1-11			
62		J6-P	13Y	17		SR1-13			
63-1		J6-R	13Y	17		SR1-14			
63-2		J6-S	13Y	17		SR1-15			
64		J6-T	13Y	17		SR1-16			
65-1		J6-U	13Y	17		SR1-17			
65-2		J6-V	13Y	17		SR1-18			
66	23	J6-B	13Y	[illegible]		J6-C	13Y		
67	21	J6-D	13Y	1		J6-E	13Y		

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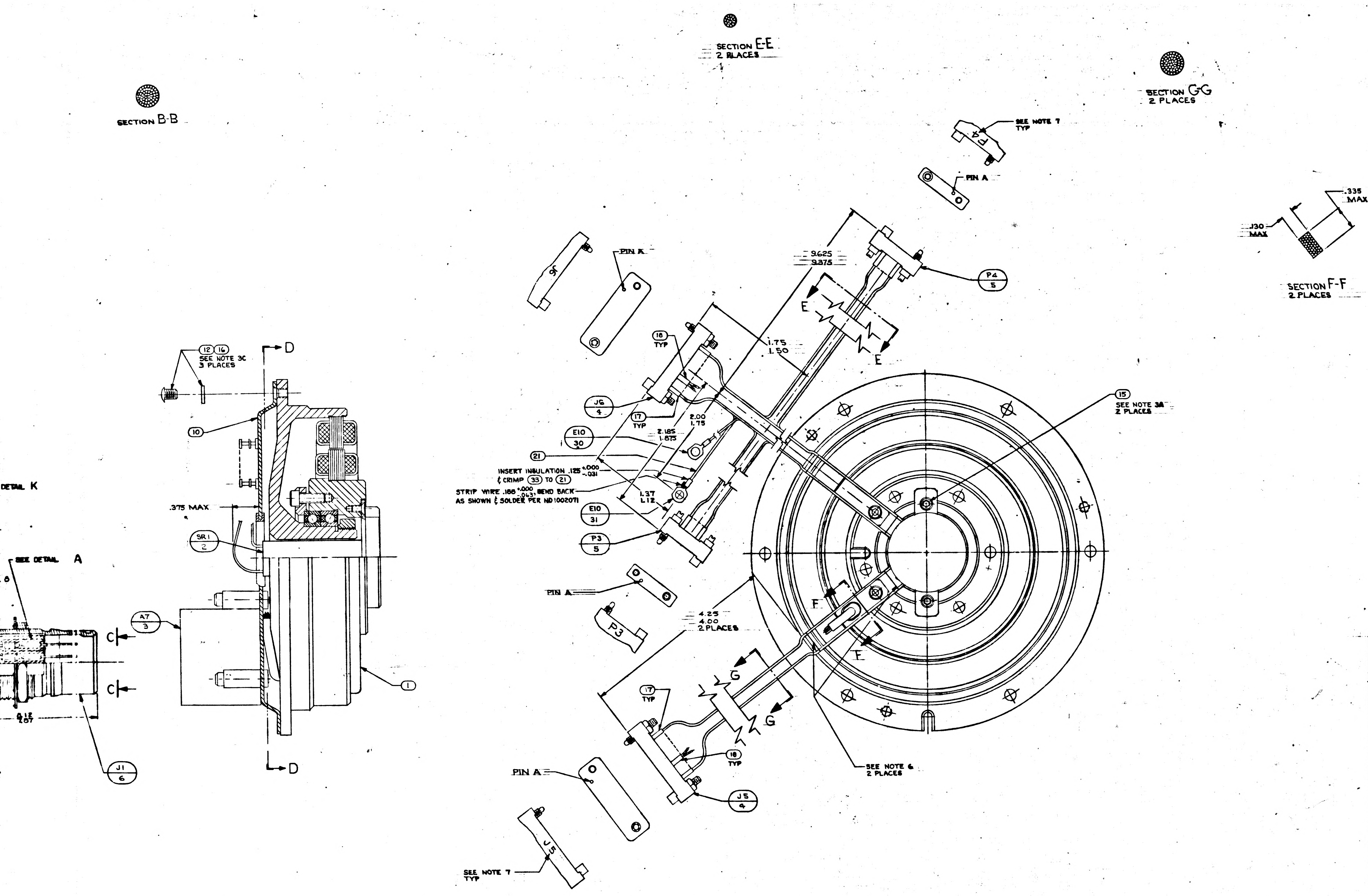
NASA DRAWING NO. 2018612
SHEET 11 of 11

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T I N	FROM: TERMINATION SPEC FIND NO.	FROM: NO.	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T I N	TO: TERMINATION SPEC FIND NO.	TO: NO.
68-1		J6-Y	13Y	17		SR1-21			
68-2		J6-Z	13Y	17		SR1-22			
68-3		J6-a	13Y	17		SR1-23			
68-4		J6-b	13Y	17		SR1-24			
68-5		J6-c	13Y	17		SR1-25			
69	25	E73	19Y			K1-1	19Y		
70	21	K1-3	19Y			E71	19Y		


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX
.130 MAX
SEE NOTE 7 TYP
PIN A
PIN K
9.625
9.375
P4
5
E
E
1.75
1.50
18 TYP
J6
4
17 TYP
E10
30
2.00
1.75
2.185
1.875
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
15
SEE NOTE 3A
2 PLACES
PIN A
P3
4.25
4.00
2 PLACES
F
F
G
G
17 TYP
18 TYP
SEE NOTE 6
2 PLACES
PIN A
J5
4
J5
SEE NOTE 7 TYP
J6
12 16
SEE NOTE 3C
3 PLACES
D
D
10
DETAIL K
.375 MAX
SR1
2
SEE DETAIL A
A7
3
C
C
1
J1
6
.812
.807

SYM	REVISIONS TDRR 17167 DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 18324	2-8-65		
B	REVISED TDRR 18902	5-18-65		
C	REVISED TDRR 19270	5-18-65		
D	REVISED TDRR 21320	7-26-65		
E	REVISED TDRR 21676	8-31-65		
F	REVISED TDRR 22014	8-31-65		
G	REVISED TDRR 22332	9-21-65		
H	REVISED TDRR 23045	10-13-65		
J	REVISED TDRR 23702	2 Nov 65		

1	1	MS15795-303	WASHER, FLAT METAL ROUND	41
A/R	A/R	1006835	CURING AGENT	40
A/R	A/R	1006834	RESIN	39
2	2	2021504-44	RESISTOR	38
1	1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1	1000223	WASHER, CABLE CLAMP	35
2	2	1000220 SEE NOTE 5	CLAMP CABLE	34
1	1	1010717-3	TERMINAL, LUG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1	1010717-1	TERMINAL, LUG	31
1	1	1000020-11	SHIELD & GROUND ASSY	30
2	2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
1	1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	13	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
1	1	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
2	2	1001488-2	SCREW, HEX SOC HD, SELF-LKG	11
1	1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	61	1010862	BUSHING, SLEEVE	8
61	61	1010781-1	CONTACT ELEC	7
1	1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
	QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
021	011	LIST OF MATERIALS		

MASTER

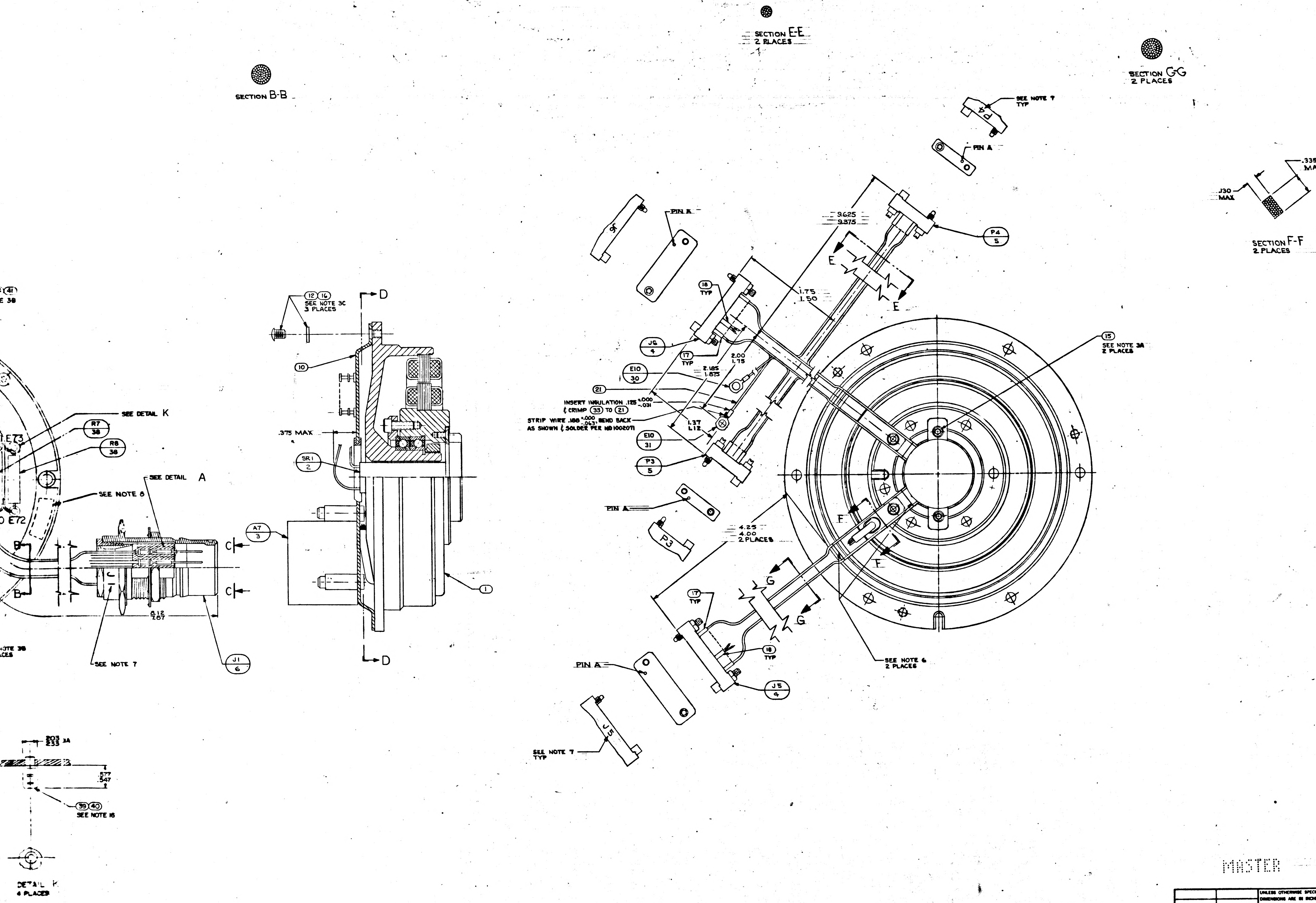
2018601	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DRAWN DTB DATE 1/8/65 CHECKED G Quinn 3/8/65 APPROVAL APPROVAL NASA APPROVAL MIT APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS INTERGIMBAL SUB-ASSEMBLY RESOLVER OUTER AXIS CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018612 SCALE 2/1 WT SHEET 1 OF 21
NEXT ASSY	USED ON			
APPLICATION				

2018612 J

34

SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 18324	1-65		
B	REVISED TDRR 18902			
C	REVISED TDRR 19270			
D	REVISED TDRR 21320	6-65		
E	REVISED TDRR 21676			
F	REVISED TDRR 22014			
G	REVISED TDRR 22332	1-65		
H	REVISED TDRR 23045			
J	REVISED TDRR 23702			

REVISIONS TDRR 1167


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335
MAX
.130
MAX
SEE NOTE 7
TYP
PIN A
9.625
9.375
P4
5
E
1.75
1.50
18
TYP
J6
4
17
TYP
2.00
1.75
2.185
1.875
E10
30
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
15
SEE NOTE 3A
2 PLACES
F
4.25
4.00
2 PLACES
G
17
TYP
18
TYP
J5
4
SEE NOTE 6
2 PLACES
12 16
SEE NOTE 3C
3 PLACES
D
10
.375 MAX
SR1
2
A7
3
1
C
.612
.587
J1
6
SEE NOTE 7
SEE DETAIL K
R7
38
R8
38
E73
E72
SEE DETAIL A
SEE NOTE 8
B
41
SEE 38
NOTE 38
.203
.233 3A
.577
.547
39 40
SEE NOTE 16
DETAIL K
4 PLACES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1	MS15795-303	WASHER, FLAT METAL ROUND	41
A/R	A/R	1006835	CURING AGENT	40
A/R	A/R	1006834	RESIN	39
2	2	2021504-44	RESISTOR	38
1	1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1	1000223	WASHER, CABLE CLAMP	35
2	2	1000220 SEE NOTE 15	CLAMP CABLE	34
1	1	1010717-3	TERMINAL, LUG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1	1010717-1	TERMINAL, LUG	31
1	1	1000020-11	SHIELD & GROUND ASSY	30
2	2	1010778-2	WIRE, SHIELDED, TEFLON, MULTIC[illegible] 11" LONG	29
1	1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
1	1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	13	1006776-14	INSULATION SLEEVING ELEC [illegible] LONG	18
36	36	1006776-18	INSULATION SLEEVING ELEC [illegible] LONG	17
3	3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, S[illegible] SPLINE	15
1	1	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	3	1010891-23	SCREW, BUTTON HD, SELF-LKG, S[illegible] SPLINE	12
2	2	1001488-2	SCREW, HEX SOC HD, SELF-LKG	11
1	1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	61	1010862	BUSHING, SLEEVE	8
61	61	1010781-1	CONTACT ELEC	7
1	1	1010783-1	CONNECTOR, ELEC, RECP [illegible] 61 PINS	6
2	2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	2	1010917-106	CONNECTOR, ELEC, RECP [illegible] 26 PINS	4
1	1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
021	011	LIST OF MATERIALS		

MASTER

NEXT ASSY	USED ON
2018601	DL2018601

APPLICATION

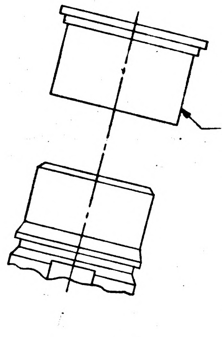
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
Cambridge, Mass
DRAWN DTB DATE 1/8/65
CHECKED G Quinn 3/8/65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

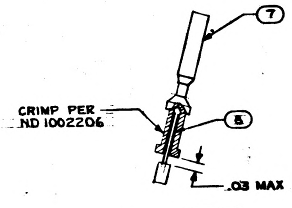
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

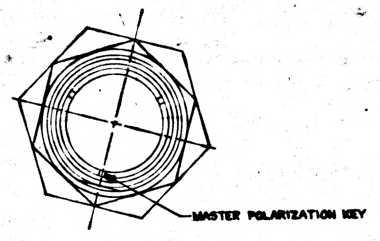
CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 1



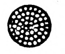
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

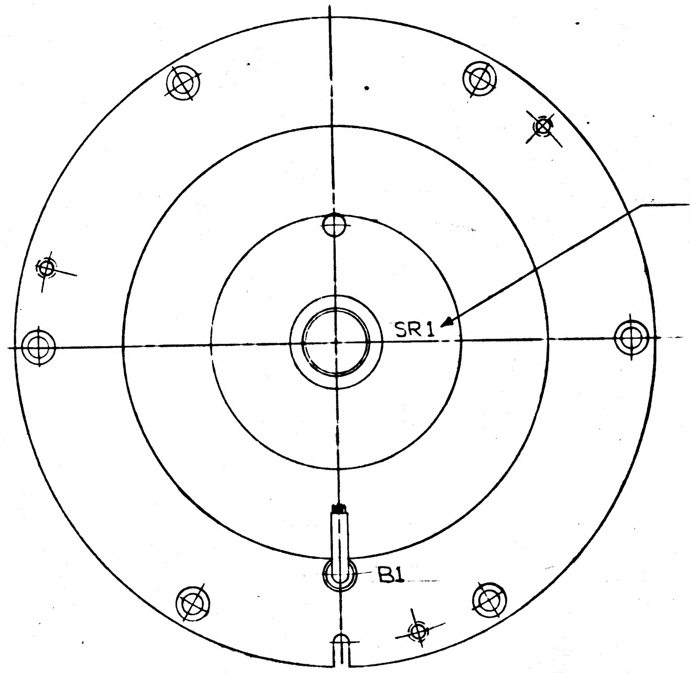
DETAIL A
SCALE 4/1


MASTER POLARIZATION KEY

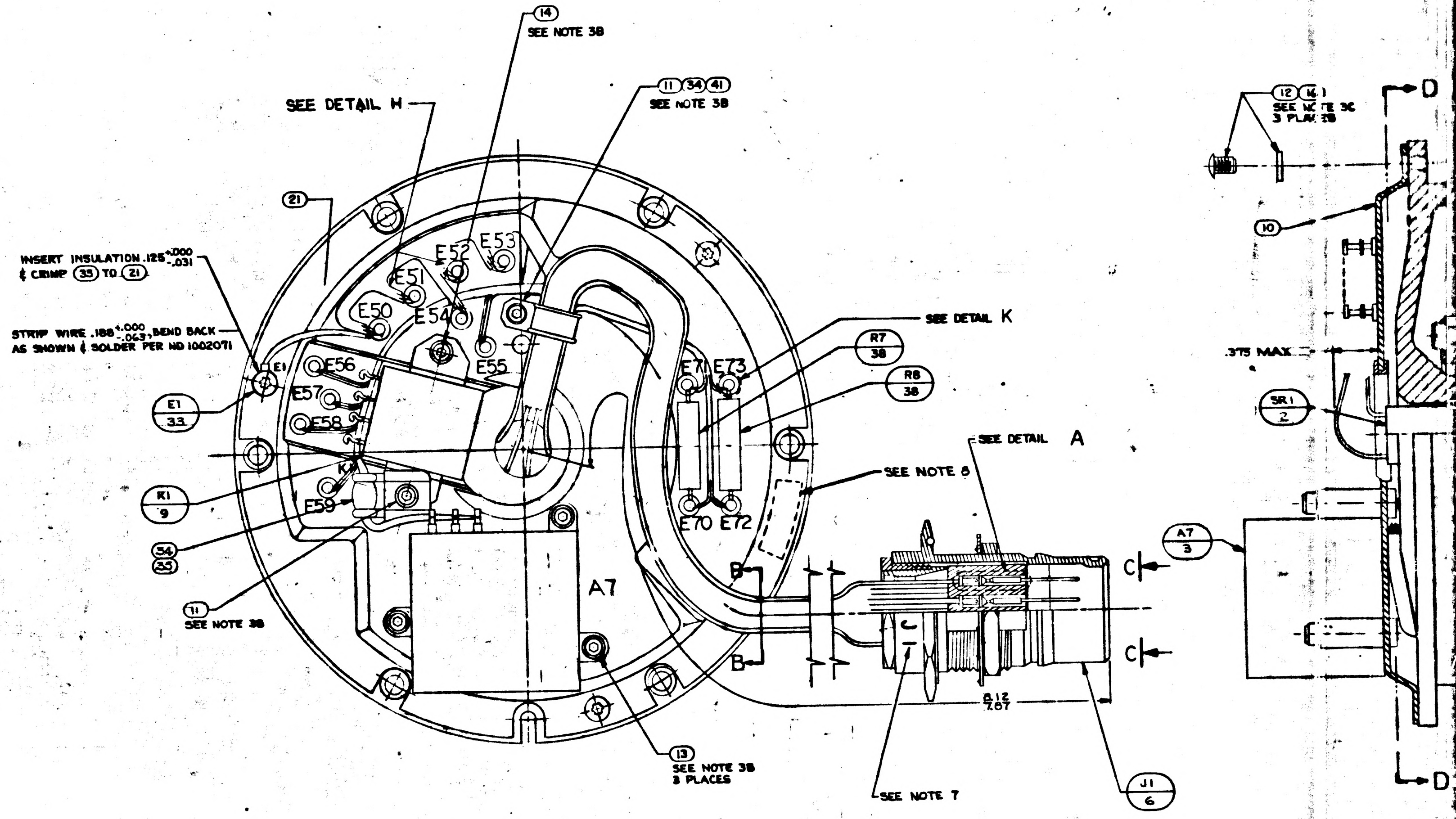
VIEW C-C

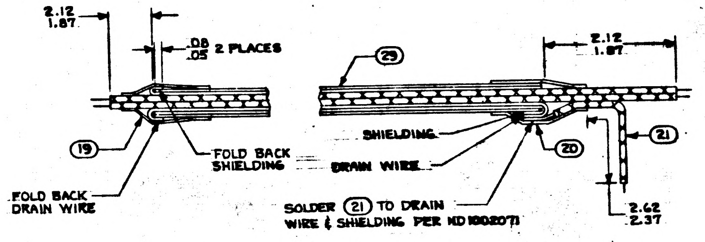


SECTION B-B

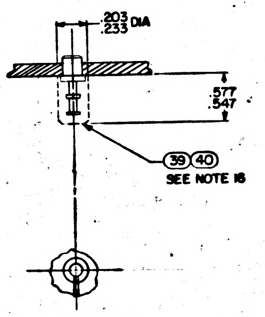

SEE NOTE 17
TYP
SR1
B1

VIEW D-D


SEE DETAIL H
14
SEE NOTE 3B
11 34 41
SEE NOTE 3B
12 16
SEE NOTE 3C
3 PLACES
D
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 35 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1
E1 / 33
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
K1
K1 / 9
34
35
11
SEE NOTE 3B
A7
E71
E73
E70
E72
SEE DETAIL K
R7 / 38
R8 / 38
SEE DETAIL A
SEE NOTE 8
B
B
C
C
8.12 / 7.87
SEE NOTE 7
J1 / 6
13
SEE NOTE 3B
3 PLACES
10
.375 MAX
SR1 / 2
A7 / 3
D


2.12 / 1.87
.08 / .05 2 PLACES
19
FOLD BACK DRAIN WIRE
FOLD BACK SHIELDING
29
SHIELDING
DRAIN WIRE
20
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND 1002071
2.12 / 1.87
21
2.62 / 2.37

DETAIL H
SCALE: NONE


.203 / .233 DIA
.577 / .547
39 40
SEE NOTE 16

DETAIL K
4 PLACES

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ~~COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018612~~
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO ③, ④, ⑤, ⑨ & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON ㉚ AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
    - A. = SHIELD GROUND ON "FROM END"
    - B. = SHIELD GROUND ON "TO END"
    - K. = BLACK
    - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-168, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM ㉞ TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS ㊴ & ㊵ PER ND 1002009 METHOD B

3H

2018612	REV J	SHT 1

TDRR 17167 MAR 9 1965

22014 F

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION J

NASA DRAWING NO. 2018612-011

SHEET 2 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TO TERMINATION SPEC FIND NO.	NO.
1	21	J1-1	13N			E50	16Y		
2	21	E1	19Y	31		E50	16Y		
3		SR1-1				E50	16Y		
4	29		1 50 1 25	19			1 25 1 00	20	
4B	21	E50	16Y			SHLD 4	16Y		
4L		J1-2	13N			E51	16Y		
4K		J1-4	13N			E52	16Y		
5	29		1 50 1 25	19			1 25 1 00	20	
5B	21	E50	16Y			SHLD 5	16Y		
5L		J1-3	13N			E51	16Y		
5K		J1-5	13N			E52	16Y		
6-1		SR1-2				E51	16Y		
6-2		SR1-3				E51	16Y		
6-3		SR1-4				E52	16Y		
6-4		SR1-5				E52	16Y		
6-5	25	SR1-19	13			K1-1	16Y		
6-6		SR1-20				E52	16Y		
7	25	K1-1	13Y			E51	16Y		

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REVISION J

NASA DRAWING NO. 2018612-011

SHEET 3 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TO TERMINATION SPEC FIND NO.	NO.
8-1	24	J1-6	13N			E53	16Y		
8-2	26	J1-8	13N			E54	16Y		
8-3	25	J1-7	13N			E53	16Y		
8-4	27	J1-9	13N			E54	16Y		
9-1		SR1-6				E53	16Y		
9-2		SR1-7				E53	16Y		
9-3		SR1-8				E54	16Y		
9-4		SR1-9				E54	16Y		
10-1	28	J1-10	13N			K1-4	13Y		
10-2	21	J1-11	13N			K1-8	13Y		
11		J1-12	13N			SR1-12			
71	25	J1-19	13N			E72	19Y		
72-1		SR1-14				E55	19Y		
72-2		SR1-15				E56	19Y		
73		SR1-16				E57	19Y		
74-1		SR1-17				E58	19Y		
74-2		SR1-18				E59	19Y		

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REVISION J

NASA DRAWING NO. 2018612-011

SHEET 4 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TO TERMINATION SPEC FIND NO.	NO.
12		J1-13	13N			SR1-13			
13-1	37	J1-14	13N			E55	19 Y		
13-2	36	J1-15	13N			E56	19 Y		
13-3	37	J1-29	13N			E55	19 Y		
13-4	36	J1-30	13N			E56	19 Y		
14	24	J1-16	13N			E57	19 Y		
15-1	25	J1-17	13N			E58	19 Y		
15-2	26	J1-18	13N			E59	19 Y		
15-3	25	J1-31	13N			E58	19 Y		
15-4	26	J1-32	13N			E59	19Y		
16		K1-5	13Y			SR1-26			
17	21	J1-20	13N			E70	19 Y		
18-1		J1-21	13N			SR1-21			
18-2		J1-22	13N			SR1-22			
18-3		J1-23	13N			SR1-23			
18-4		J1-24	13N			SR1-24			
18-5		J1-25	13N			SR1-25			
19	24	J1-26	13N			E57	19 Y		

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REVISION J

NASA DRAWING NO. 2018612-011

SHEET 5 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TO TERMINATION SPEC FIND NO.	NO.
20-1	27	J1-27	13N			A7-3	13Y		
20-2	23	J1-28	13N			A7-2	13Y		
21-1		J1-33	13N			SR1-33			
21-2		J1-34	13N			SR1-34			
22-1		J1-35	13N			SR1-35			
22-2		J1-36	13N			SR1-36			
23-1		J1-37	13N			SR1-37			
23-2		J1-38	13N			SR1-38			
24-1		J1-39	13N			SR1-39			
24-2		J1-40	13N			SR1-40			
25-1		J1-41	13N			SR1-41			
25-2		J1-42	13N			SR1-42			
26-1		J1-43	13N			SR1-43			
26-2		J1-44	13N			SR1-44			
27-1		J1-45	13N			SR1-45			
27-2		J1-46	13N			SR1-46			

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REVISION J
NASA DRAWING NO. 2018612 -011
SHEET 6 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TO TERMINATION FIND NO.	SPEC	NO.
28-1			J1-47	13	N				SR1-47					
28-2			J1-48	13	N				SR1-48					
29-1			J1-51	13	N				B1A-S3					
29-2			J1-52	13	N				B1A-S1					
30-1			J1-53	13	N				B1A-S2					
30-2			J1-54	13	N				B1A-S4					
31-1			J1-55	13	N				B1B-S3					
31-2			J1-56	13	N				B1B-S1					
32-1			J1-57	13	N				B1B-S2					
32-2			J1-58	13	N				B1B-S4					
33-1			SR1-27						A7-3	13	Y			
33-2			SR1-28						A7-2	13	Y			
34-1			SR1-10						K1-6	13	Y			
34-2			SR1-11						K1-2	13	Y			

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REVISION J
NASA DRAWING NO. 2018612 -011
SHEET 7 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TO TERMINATION FIND NO.	SPEC	NO.
35-1			SR1-29						A7-6	13	Y			
35-2			SR1-30						A7-1	13	Y			
36-1			SR1-31						A7-6	13	Y			
36-2			SR1-32						A7-5	13	Y			
37-1			SR1-49						A7-6	13	Y			
37-2			SR1-50						A7-4	13	Y			
38			J5-A	13	Y	17			SR1-26					
38-1			J5-B	13	Y	18			SR1-27					
39-2			J5-C	13	Y	18			SR1-28					
40-1			J5-B	13	Y				B1A-P3					
40-2			J5-C	13	Y				B1A-P1					
41-1			J5-D	13	Y	17			SR1-29					
41-2			J5-E	13	Y	17			SR1-30					
42-1			J5-F	13	Y	17			SR1-31					
42-2			J5-H	13	Y	17			SR1-32					
43-1			J5-J	13	Y	17			SR1-33					
43-2			J5-K	13	Y	17			SR1-34					

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REVISION J
NASA DRAWING NO. 2018612 -011
SHEET 8 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TO TERMINATION FIND NO.	SPEC	NO.
44-1			J5-L	13	Y	17			SR1-35					
44-2			J5-M	13	Y	17			SR1-36					
45-1			J5-N	13	Y	17			SR1-37					
45-2			J5-P	13	Y	17			SR1-38					
46-1			J5-R	13	Y	17			SR1-39					
46-2			J5-S	13	Y	17			SR1-40					
47-1			J5-T	13	Y	17			SR1-41					
47-2			J5-U	13	Y	17			SR1-42					
48-1			J5-V	13	Y	17			SR1-43					
48-2			J5-W	13	Y	17			SR1-44					
49-1			J5-X	13	Y	17			SR1-45					
49-2			J5-Y	13	Y	17			SR1-46					
50-1			J5-Z	13	Y	17			SR1-47					
50-2			J5-a	13	Y	17			SR1-48					
51-1			J5-b	13	Y	18			SR1-49					
51-2			J5-c	13	Y	18			SR1-50					
52-1			J5-b	13	Y				B1A-P2					
52-2			J5-c	13	Y				B1A-P4					

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SHEET 9 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	TO TERMINATION FIND NO.	SPEC	NO.
53			J6-A	13	Y	18			SR1-1					
54			J6-A	13	Y				E10	19	Y	31		
55						30								
55-A			SHLD-55						E10					
55-1			J6-B	13	Y	18			SR1-2					
55-2			J6-C	13	Y	18			SR1-3					
55-3			J6-D	13	Y	18			SR1-4					
55-4			J6-E	13	Y	18			SR1-5					
55-5			J6-W	13	Y	17			SR1-19					
55-6			J6-X	13	Y	17			SR1-20					
56-1			J6-F	13	Y	18			SR1-6					
56-2			J6-F	13	Y				SR1-7					
56-3			J6-J	13	Y	18			SR1-8					
56-4			J6-J	13	Y				SR1-9					

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REVISION J

NASA DRAWING NO. 2018612 -011 SHEET 10 of 21

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.
7		J6-N	13Y	18	SR1-12		
58	22	J6-N	13Y		P3-C	13Y	18
59	22	P3-C	13Y		P4-C	13Y	
60		P3-D	13Y	17	SR1-10		
61		P4-D	13Y	17	SR1-11		
62		J6-P	13Y	17	SR1-13		
63-1		J6-R	13Y	17	SR1-14		
63-2		J6-S	13Y	17	SR1-15		
64		J6-T	13Y	17	SR1-16		
65-1		J6-U	13Y	17	SR1-17		
65-2		J6-V	13Y	17	SR1-18		
66	23	J6-B	13Y		J6-C	13Y	
67	21	J6-D	13Y		J6-E	13Y	

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REVISION J

NASA DRAWING NO. 2018612 -011 SHEET 11 of 21

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.
68-1		J6-Y	13Y	17	SR1-21		
68-2		J6-Z	13Y	17	SR1-22		
68-3		J6-a	13Y	17	SR1-23		
68-4		J6-b	13Y	17	SR1-24		
68-5		J6-d	13Y	17	SR1-25		
69	25	E73	19Y		K1-1	19Y	
70	21	K1-3	19Y		E71	19Y	

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NASA DRAWING NO. 2018612-021 SHEET 12 of 21

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.
1	21	J1-1	13N		E50	16Y	
2	21	E1	19Y	31	E50	16Y	
3		SR1-1			E50	16Y	
4	29		1 50 1 25	19		1 25 1 00	20
4B	21	E50	16Y		SHLD 4	16Y	
4L		J1-2	13N		E51	16Y	
4K		J1-4	13N		E52	16Y	
5	29		150 1 25	19		1 25 1 00	20
5B	21	E50	16Y		SHLD 5	16Y	
5L		J1-3	13N		E51	16Y	
5K		J1-5	13N		E52	16Y	
6-1		SR1-2			E51	16Y	
6-2		SR1-3			E51	16Y	
6-3		SR1-4			E52	16Y	
6-4		SR1-5			E52	16Y	
6-5		SR1-19			E73	16Y	
6-6		SR1-20			E52	16Y	
7	25	E73	16Y		E51	16Y	

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REVISION

NASA DRAWING NO. 2018612-021 SHEET 13 of 21

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.
8-1	24	J1-6	13N		E53	16Y	
8-2	43	J1-8	13N		E54	16Y	
8-3	25	J1-7	13N		E53	16Y	
8-4	27	J1-9	13N		E54	16Y	
9-1		SR1-6			E53	16Y	
9-2		SR1-7			E53	16Y	
9-3		SR1-8			E54	16Y	
9-4		SR1-9			E54	16Y	
10-1	28	J1-10	13N		K1-4	13Y	
10-2	21	J1-11	13N		K1-8	13Y	
11		J1-12	13N		SR1-12		
12	25	J1-19	13N		E72	19Y	
13-1		SR1-14			E55	19Y	
13-2		SR1-15			E56	19Y	
14		SR1-16			E57	19Y	
15-1		SR1-17			E58	19Y	
15-2		SR1-18			E59	19Y	

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
16		J1-13	13N			SR1-13			
17-1	37	J1-14	13N			E55	19Y		
17-2	36	J1-15	13N			E56	19Y		
17-3	37	J1-29	13N			E55	19Y		
17-4	36	J1-30	13N			E56	19Y		
18	24	J1-16	13N			E57	19Y		
19-1	25	J1-17	13N			E58	19Y		
19-2	26	J1-18	13N			E59	19Y		
19-3	25	J1-31	13N			E58	19Y		
19-4	26	J1-32	13N			E59	19Y		
20		K1-5	13Y			SR1-26			
21	21	J1-20	13N			E70	19Y		
22-1		J1-21	13N			SR1-21			
22-2		J1-22	13N			SR1-22			
22-3		J1-23	13N			SR1-23			
22-4		J1-24	13N			SR1-24			
22-5		J1-25	13N			SR1-25			
23	24	J1-26	13N			E57	19Y		

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REVISION

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SHEET 14 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
24-1	27	J1-27	13N			A7-3	13Y		
24-2	23	J1-28	13N			A7-2	13Y		
25-1		J1-33	13N			SR1-33			
25-2		J1-34	13N			SR1-34			
26-1		J1-35	13N			SR1-35			
26-2		J1-36	13N			SR1-36			
27-1		J1-37	13N			SR1-37			
27-2		J1-38	13N			SR1-38			
28-1		J1-39	13N			SR1-39			
28-2		J1-40	13N			SR1-40			
29-1		J1-41	13N			SR1-41			
29-2		J1-42	13N			SR1-42			
30-1		J1-43	13N			SR1-43			
30-2		J1-44	13N			SR1-44			
31-1		J1-45	13N			SR1-45			
31-2		J1-46	13N			SR1-46			

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REVISION

NASA DRAWING NO.
2018612-021
SHEET 15 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
32-1		J1-47	13N			SR1-47			
32-2		J1-48	13N			SR1-48			
33-1		J1-51	13N			B1A-S3			
33-2		J1-52	13N			B1A-S1			
34-1		J1-53	13N			B1A-S2			
34-2		J1-54	13N			B1A-S4			
35-1		J1-55	13N			B1B-S3			
35-2		J1-56	13N			B1B-S1			
36-1		J1-57	13N			B1B-S2			
36-2		J1-58	13N			B1B-S4			
37-1		SR1-27				A7-3	13Y		
37-2		SR1-28				A7-2	13Y		
38-1		SR1-10				K1-6	13Y		
38-2		SR1-11				K1-2	13Y		
39	26	J1-59	13N			K1-1	16Y		

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REVISION

NASA DRAWING NO.
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SHEET 16 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
40-1		SR1-29				A7-6	13Y		
40-2		SR1-30				A7-1	13Y		
41-1		SR1-31				A7-6	13Y		
41-2		SR1-32				A7-5	13Y		
42-1		SR1-49				A7-6	13Y		
42-2		SR1-50				A7-4	13Y		
43		J5-A	13Y	17		SR1-26			
44-1		J5-B	13Y	18		SR1-27			
44-2		J5-C	13Y	18		SR1-28			
45-1		J5-B	13Y			B1A-P3			
45-2		J5-C	13Y			B1A-P1			
46-1		J5-D	13Y	17		SR1-29			
46-2		J5-E	13Y	17		SR1-30			
47-1		J5-F	13Y	17		SR1-31			
47-2		J5-H	13Y	17		SR1-32			
48-1		J5-J	13Y	17		SR1-33			
48-2		J5-K	13Y	17		SR1-34			

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SHEET 18 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION SPEC FIND NO.	NO.
49-1			J5-L	13Y	17		SR1-35			
49-2			J5-M	13Y	17		SR1-36			
50-1			J5-N	13Y	17		SR1-37			
50-2			J5-P	13Y	17		SR1-38			
51-1			J5-R	13Y	17		SR1-39			
51-2			J5-S	13Y	17		SR1-40			
52-1			J5-T	13Y	17		SR1-41			
52-2			J5-U	13Y	17		SR1-42			
53-1			J5-V	13Y	17		SR1-43			
53-2			J5-W	13Y	17		SR1-44			
54-1			J5-X	13Y	17		SR1-45			
54-2			J5-Y	13Y	17		SR1-46			
55-1			J5-Z	13Y	17		SR1-47			
55-2			J5-a	13Y	17		SR1-48			
56-1			J5-b	13Y	18		SR1-49			
56-2			J5-c	13Y	18		SR1-50			
57-1			J5-b	13Y			B1A-P2			
57-2			J5-c	13Y			B1A-P4			

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION SPEC FIND NO.	NO.
58			J6-A	13Y	18		SR1-1			
59			J6-A	13Y			E10	19Y	31	
60					30					
61 A			SHLD-55				E10			
61-1			J6-B	13Y	18		SR1-2			
61-2			J6-C	13Y	18		SR1-3			
61-3			J6-D	13Y	18		SR1-4			
61-4			J6-E	13Y	18		SR1-5			
61-5			J6-W	13Y	17		SR1-19			
61-6			J6-X	13Y	17		SR1-20			
62-1			J6-F	13Y	18		SR1-6			
62-2			J6-F	13Y			SR1-7			
62-3			J6-J	13Y	18		SR1-8			
62-4			J6-H	13Y			SR1-9			

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NASA DRAWING NO.
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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION SPEC FIND NO.	NO.
63			J6-N	13Y	18		SR1-12			
64	22		J6-N	13Y			P3-C	13Y	18	
65	22		P3-C	13Y			P4-C	13Y		
66			P3-D	13Y	17		SR1-10			
67			P4-D	13Y	17		SR1-11			
68			J6-P	13Y	17		SR1-13			
69-1			J6-R	13Y	17		SR1-14			
69-2			J6-S	13Y	17		SR1-15			
70			J6-T	13Y	17		SR1-16			
71-1			J6-U	13Y	17		SR1-17			
71-2			J6-V	13Y	17		SR1-18			
72			J6-B	13Y			J6-C	13Y		
73			J6-D	13Y			J6-E	13Y		

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NASA DRAWING NO.
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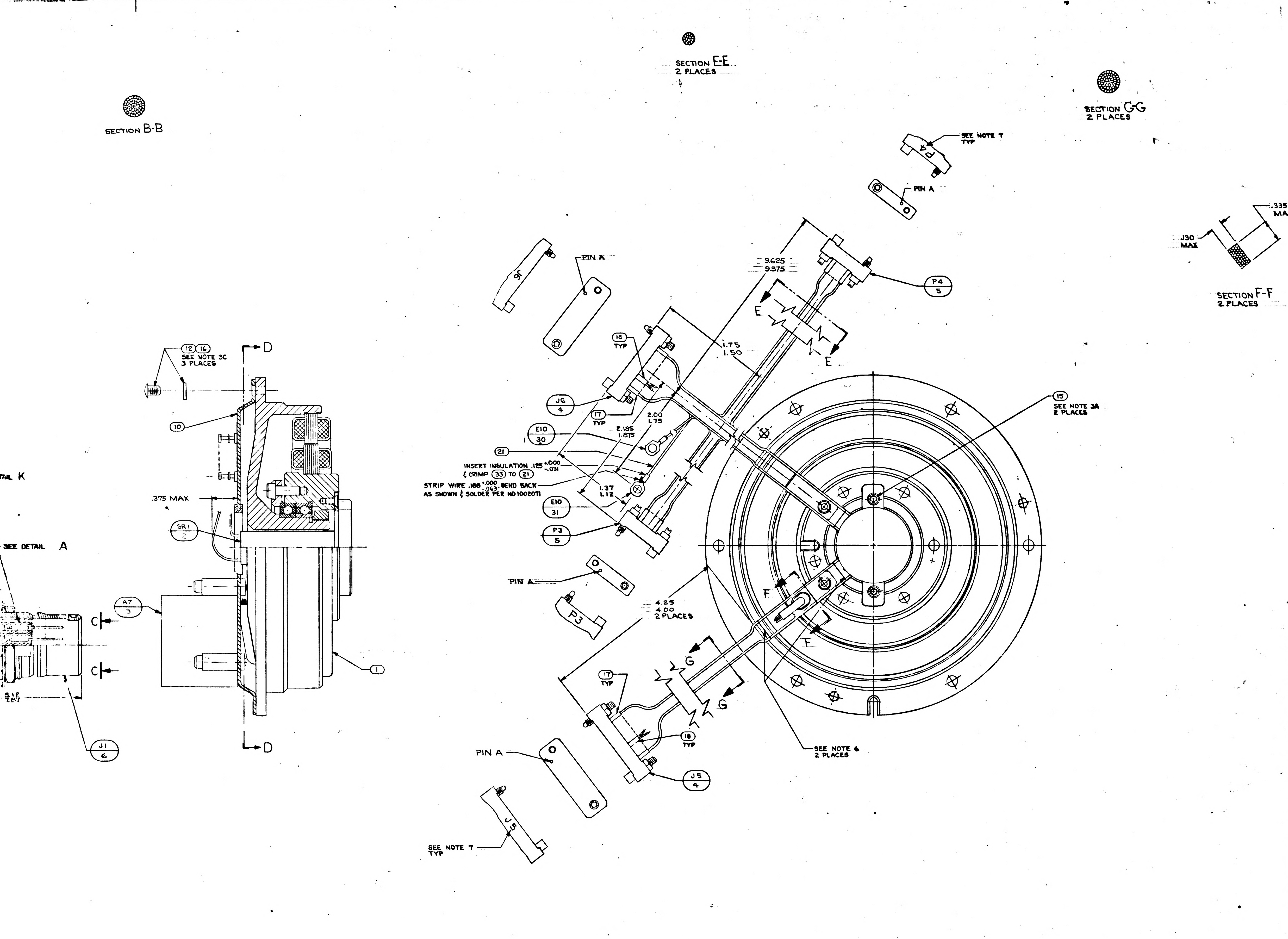
CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION SPEC FIND NO.	NO.
74-1			J6-Y	13Y	17		SR1-21			
74-2			J6-Z	13Y	17		SR1-22			
74-3			J6-a	13Y	17		SR1-23			
74-4			J6-b	13Y	17		SR1-24			
74-5			J6-c	13Y	17		SR1-25			
75	21		K1-3	19Y			E71	19Y		

REVISIONS TDRR 17167			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 18324	4-8-65	WK
B	REVISED TDRR 18902	5-18-65	WK
C	REVISED TDRR 19270	5-18-65	WK
D	REVISED TDRR 21320	7-26-65	WK
E	REVISED TDRR 21676	8-31-65	WK
F	REVISED TDRR 22014	8-31-65	WK
G	REVISED TDRR 22332	9-21-65	WK
H	REVISED TDRR 23045	10-13-65	
J	REVISED TDRR 23702	2 Nov 65	WK
K	REVISED TDRR 24900	4 Jan 66	WK


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX
.130 MAX
SEE NOTE 7 TYP
P4
PIN A
9.625
9.375
P4
5
E
E
1.75
1.50
18 TYP
J6
4
17 TYP
2.00
1.75
2.185
1.875
E10
30
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
PIN A
P3
J6
4.25
4.00
2 PLACES
15
SEE NOTE 3A
2 PLACES
F
F
G
G
17 TYP
18 TYP
SEE NOTE 6
2 PLACES
J5
4
PIN A
J5
SEE NOTE 7 TYP
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
SEE DETAIL A
DETAIL K
A7
3
C
C
1
J1
6

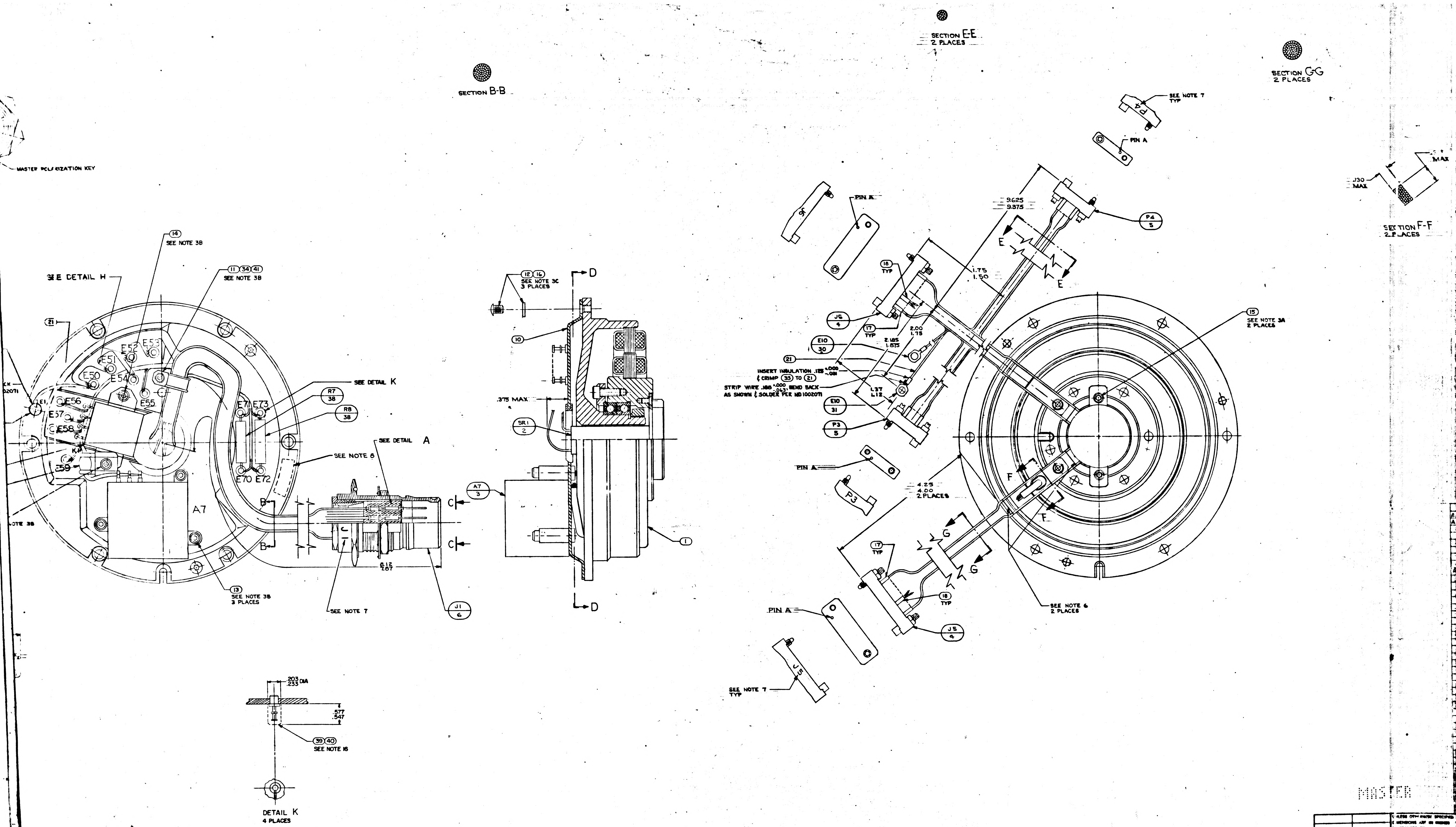
MASTER

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1	MS15795-303	WASHER, FLAT METAL ROUND	41
A/R	A/R	1006835	CURING AGENT	40
A/R	A/R	1006834	RESIN	39
2	2	2021504-44	RESISTOR	38
1	1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1	1000223	WASHER, CABLE CLAMP	35
2	2	1000220 SEE NOTE 15	CLAMP CABLE	34
1	1	1010717-3	TERMINAL, LUG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1	1010717-1	TERMINAL, LUG	31
1	1	1000020-11	SHIELD & GROUND ASSY	30
2	2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1	1010416-8	WIRE AWG 28E VIO 25" LONG	26
1	1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	13	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC, SPLINE	15
1	1	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
2	2	1001488-2	SCREW, HEX SOC HD, SELF-LKG	11
1	1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1	1010353-10	RELAY, ELECTRO MAG, [illegible]SITIVE	9
61	61	1010862	BUSHING, SLEEVE	8
61	61	1010781-1	CONTACT ELEC	7
1	1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
021	011	LIST OF MATERIALS		

2018601	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DRAWN DTB DATE 1/8/65 CHECKED G Quinn 3/8/65 APPROVAL 8 Mar 65 APPROVAL NASA APPROVAL 3-9-65 MIT APPROVAL 9 Mar	MANNED SPACECRAFT CENTER HOUSTON, TEXAS INTERGIMBAL SUB-ASSEMBLY RESOLVER OUTER AXIS	
NEXT ASSY	USED ON		CODE IDENT NO. 80230	SIZE J	NASA DRAWING NO. 2018612
APPLICATION			SCALE 2/1	WT	SHEET 1 OF 21

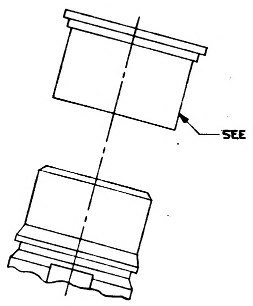
2018612 K

F3

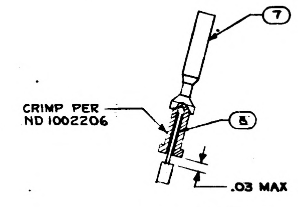

6
5
4
3
2
SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.130 MAX
MAX
MASTER POLARIZATION KEY
SEE DETAIL H
14
SEE NOTE 3B
11 34 41
SEE NOTE 3B
21
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
E71
E73
E70
E72
A7
SEE DETAIL K
R7
38
R8
38
SEE NOTE 8
SEE DETAIL A
B
B
C
C
6.12
2.07
13
SEE NOTE 3B
3 PLACES
SEE NOTE 7
J1
6
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
A7
3
1
SEE NOTE 7
TYP
P4
PIN A
PIN A
9.625
9.375
P4
5
E
E
1.75
1.50
18
TYP
J6
4
17
TYP
2.00
1.75
2.185
1.875
E10
30
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
PIN A
P3
4.25
4.00
2 PLACES
F
F
15
SEE NOTE 3A
2 PLACES
17
TYP
G
G
18
TYP
J5
4
PIN A
SEE NOTE 6
2 PLACES
SEE NOTE 7
TYP
J5
.203
.233 DIA
.577
.547
39 40
SEE NOTE 16
DETAIL K
4 PLACES
MASTER

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINISH

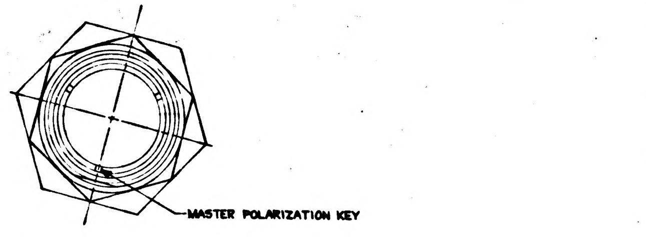
2018G01	DL2018G01
NEXT ASSY	USED ON
APPLICATION	



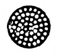
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

DETAIL A
SCALE 4/1

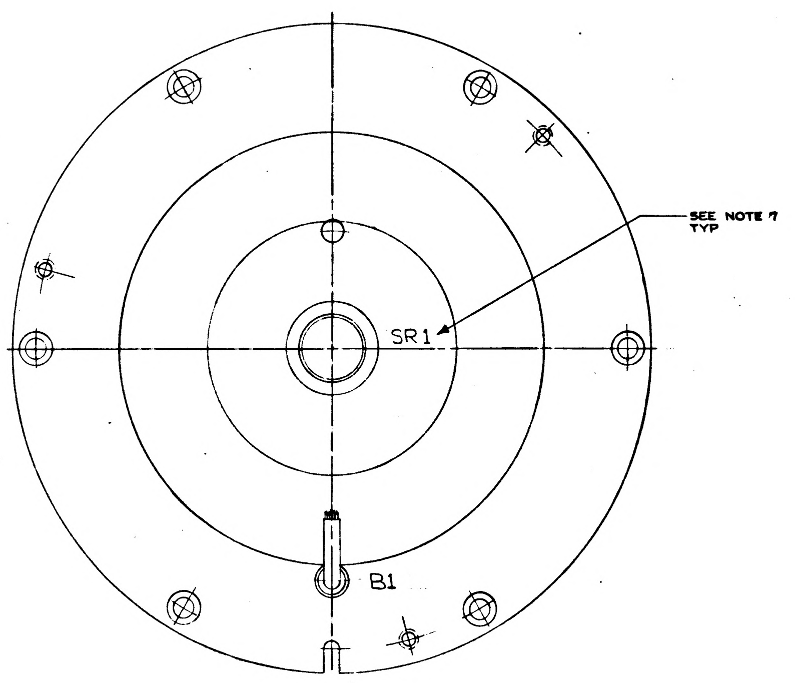

MASTER POLARIZATION KEY

VIEW C-C

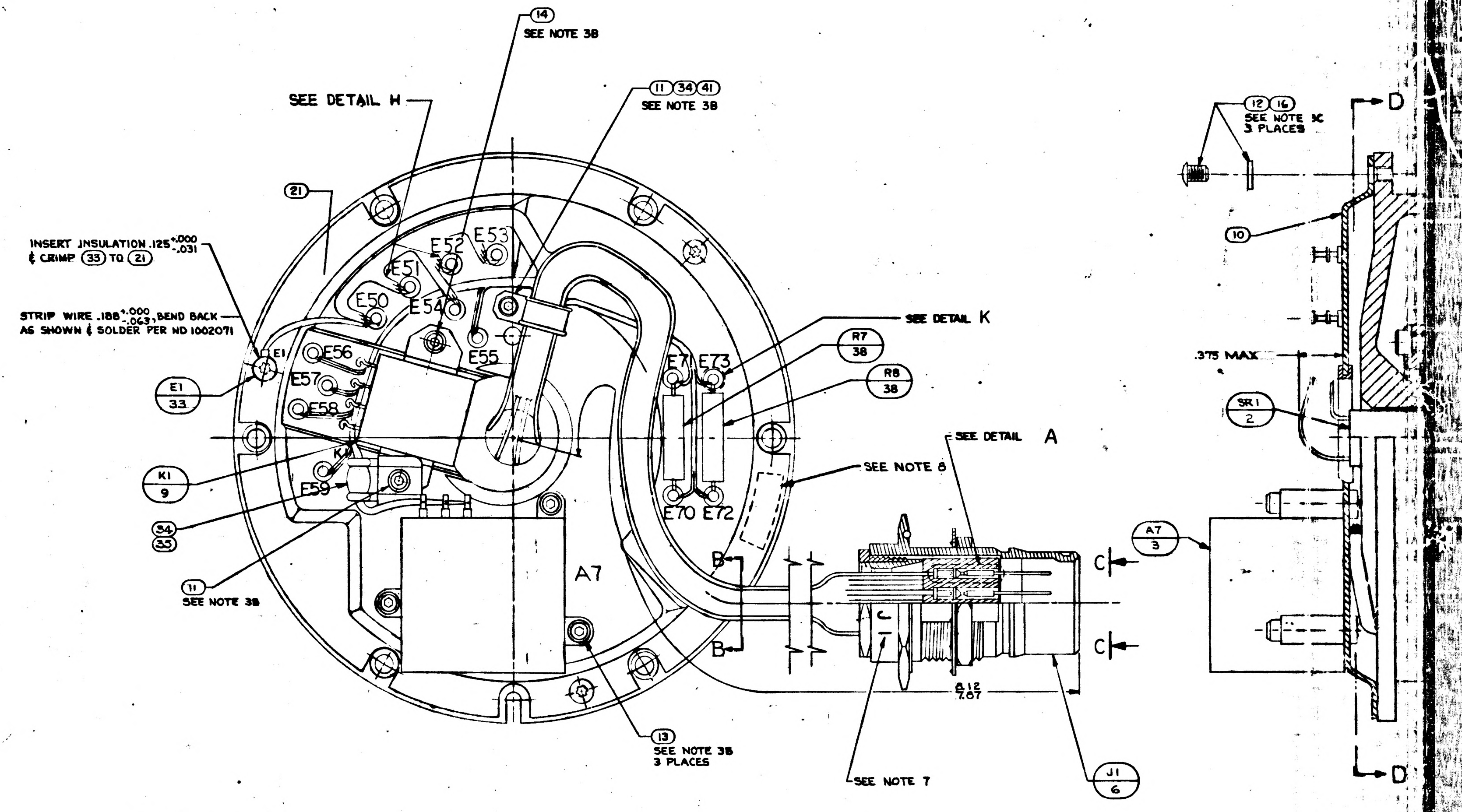


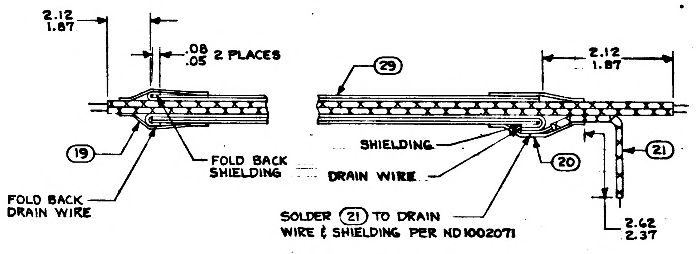
SECTION B-B

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16

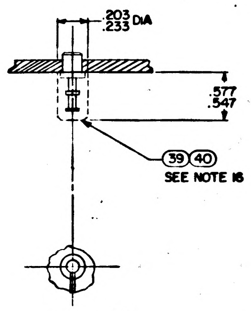

SEE NOTE 7 TYP
SR1
B1

VIEW D-D


14
SEE NOTE 3B
SEE DETAIL H
11 34 41
SEE NOTE 3B
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1
E1 / 33
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
K1
K1 / 9
34 / 35
11
SEE NOTE 3B
A7
E71
E73
E70
E72
SEE DETAIL K
R7 / 38
R8 / 38
SEE DETAIL A
SEE NOTE 8
B
B
C
C
8.12
7.87
13
SEE NOTE 3B 3 PLACES
SEE NOTE 7
J1 / 6
12 16
SEE NOTE 3C 3 PLACES
D
D
10
.375 MAX
SR1 / 2
A7 / 3


2.12
1.87
.08
.05 2 PLACES
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
29
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND 1002071
2.62
2.37

DETAIL H
SCALE: NONE


.203
.233 DIA
.577
.547
39 40
SEE NOTE 16

DETAIL K
4 PLACES

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018612
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
    - A. = SHIELD GROUND ON "FROM END"
    - B. = SHIELD GROUND ON "TO END"
    - K. = BLACK
    - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS (39) & (40) PER ND 1002009 METHOD B

3H

2018612 REV K SHT 1

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NASA DRAWING NO. 2018612-011

SHEET 2 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.
1	21	J1-1	13	N		E50	16	Y	
2	21	E1	19	Y	31	E50	16	Y	
3		SR1-1				E50	16	Y	
4	29		1 50 1 25		19		1 25 1 00		20
4B	21	E50	16	Y		SHLD 4	16	Y	
4L		J1-2	13	N		E51	16	Y	
4K		J1-4	13	N		E52	16	Y	
5	29		1 50 1 25		19		1 25 1 00		20
5B	21	E50	16	Y		SHLD 5	16	Y	
5L		J1-3	13	N		E51	16	Y	
5K		J1-5	13	N		E52	16	Y	
6-1		SR1-2				E51	16	Y	
6-2		SR1-3				E51	16	Y	
6-3		SR1-4				E52	16	Y	
6-4		SR1-5				E52	16	Y	
6-5	[illegible]	SR1-19	[illegible]			K1-1	16	Y	
6-6		SR1-20				E52	16	Y	
7	25	K1-[illegible]	13	Y		E51	16	Y	

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SHEET 3 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.
8-1	24	J1-6	13	N		E53	16	Y	
8-2	26	J1-8	13	N		E54	16	Y	
8-3	25	J1-7	13	N		E53	16	Y	
8-4	27	J1-9	13	N		E54	16	Y	
9-1		SR1-6				E53	16	Y	
9-2		SR1-7				E53	16	Y	
9-3		SR1-8				E54	16	Y	
9-4		SR1-9				E54	16	Y	
10-1	28	J1-10	13	N		K1-4	13	Y	
10-2	21	J1-11	13	N		K1-8	13	Y	
11		J1-12	13	N		SR1-12			
71	25	J1-19	13	N		E72	19	Y	
72-1		SR1-14				E55	19	Y	
72-2		SR1-15				E56	19	Y	
73		SR1-16				E57	19	Y	
74-1		SR1-17				E58	19	Y	
74-2		SR1-18				E59	19	Y	

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NASA DRAWING NO. 2018612-011

SHEET 4 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.
12		J1-13	13	N		SR1-13			
13-1	37	J1-14	13	N		E55	19	Y	
13-2	36	J1-15	13	N		E56	19	Y	
13-3	37	J1-29	13	N		E55	19	Y	
13-4	36	J1-30	13	N		E56	19	Y	
14	24	J1-16	13	N		E57	19	Y	
15-1	25	J1-17	13	N		E58	19	Y	
15-2	26	J1-18	13	N		E59	19	Y	
15-3	25	J1-31	13	N		E58	19	Y	
15-4	26	J1-32	13	N		E59	19	Y	
16		K1-5	13	Y		SR1-26			
17	21	J1-20	13	N		E70	19	Y	
18-1		J1-21	13	N		SR1-21			
18-2		J1-22	13	N		SR1-22			
18-3		J1-23	13	N		SR1-23			
18-4		J1-24	13	N		SR1-24			
18-5		J1-25	13	N		SR1-25			
19	24	J1-26	13	N		E57	19	Y	

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SHEET 5 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.
20-1	27	J1-27	13	N		A7-3	13	Y	
20-2	23	J1-28	13	N		A7-2	13	Y	
21-1		J1-33	13	N		SR1-33			
21-2		J1-34	13	N		SR1-34			
22-1		J1-35	13	N		SR1-35			
22-2		J1-36	13	N		SR1-36			
23-1		J1-37	13	N		SR1-37			
23-2		J1-38	13	N		SR1-38			
24-1		J1-39	13	N		SR1-39			
24-2		J1-40	13	N		SR1-40			
25-1		J1-41	13	N		SR1-41			
25-2		J1-42	13	N		SR1-42			
26-1		J1-43	13	N		SR1-43			
26-2		J1-44	13	N		SR1-44			
27-1		J1-45	13	N		SR1-45			
27-2		J1-46	13	N		SR1-46			

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION SPEC FIND NO.	NO.	TO: CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION SPEC FIND NO.	NO.
28-1			J1-47	13	N			SR1-47				
28-2			J1-48	13	N			SR1-48				
29-1			J1-51	13	N			B1A-S3				
29-2			J1-52	13	N			B1A-S1				
30-1			J1-53	13	N			B1A-S2				
30-2			J1-54	13	N			B1A-S4				
31-1			J1-55	13	N			B1B-S3				
31-2			J1-56	13	N			B1B-S1				
32-1			J1-57	13	N			B1B-S2				
32-2			J1-58	13	N			B1B-S4				
33-1			SR1-27					A7-3	13	Y		
33-2			SR1-28					A7-2	13	Y		
34-1			SR1-10					K1-4	13	Y		
34-2			SR1-11					K1-8	13	Y		

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION SPEC FIND NO.	NO.	TO: CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION SPEC FIND NO.	NO.
35-1			SR1-29					A7-6	13	Y		
35-2			SR1-30					A7-1	13	Y		
36-1			SR1-31					A7-6	13	Y		
36-2			SR1-32					A7-5	13	Y		
37-1			SR1-49					A7-6	13	Y		
37-2			SR1-50					A7-4	13	Y		
38			J5-A	13	Y	17		SR1-26				
38-1			J5-B	13	Y	18		SR1-27				
39-2			J5-C	13	Y	18		SR1-28				
40-1			J5-B	13	Y			B1A-P3				
40-2			J5-C	13	Y			B1A-P1				
41-1			J5-D	13	Y	17		SR1-29				
41-2			J5-E	13	Y	17		SR1-30				
42-1			J5-F	13	Y	17		SR1-31				
42-2			J5-H	13	Y	17		SR1-32				
43-1			J5-J	13	Y	17		SR1-33				
43-2			J5-K	13	Y	17		SR1-34				

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION SPEC FIND NO.	NO.	TO: CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION SPEC FIND NO.	NO.
44-1			J5-L	13	Y	17		SR1-35				
44-2			J5-M	13	Y	17		SR1-36				
45-1			J5-N	13	Y	17		SR1-37				
45-2			J5-P	13	Y	17		SR1-38				
46-1			J5-R	13	Y	17		SR1-39				
46-2			J5-S	13	Y	17		SR1-40				
47-1			J5-T	13	Y	17		SR1-41				
47-2			J5-U	13	Y	17		SR1-42				
48-1			J5-V	13	Y	17		SR1-43				
48-2			J5-W	13	Y	17		SR1-44				
49-1			J5-X	13	Y	17		SR1-45				
49-2			J5-Y	13	Y	17		SR1-46				
50-1			J5-Z	13	Y	17		SR1-47				
50-2			J5-a	13	Y	17		SR1-48				
51-1			J5-b	13	Y	18		SR1-49				
51-2			J5-c	13	Y	18		SR1-50				
52-1			J5-b	13	Y			B1A-P2				
52-2			J5-c	13	Y			B1A-P4				

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SHEET 9 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION SPEC FIND NO.	NO.	TO: CIRCUIT POINT	STRIP WIRE OR JACKET	T I N	TERMINATION SPEC FIND NO.	NO.
53			J6-A	13	Y	18		SR1-1				
54			J6-A	13	Y			E10	19	Y	31	
55						30						
55-A			SHLD-55					E10				
55-1			J6-B	13	Y	18		SR1-2				
55-2			J6-C	13	Y	18		SR1-3				
55-3			J6-D	13	Y	18		SR1-4				
55-4			J6-E	13	Y	18		SR1-5				
55-5			J6-W	13	Y	17		SR1-19				
55-6			J6-X	13	Y	17		SR1-20				
56-1			J6-F	13	Y	18		SR1-6				
56-2			J6-F	13	Y			SR1-7				
56-3			J6-J	13	Y	18		SR1-8				
56-4			J6-J	13	Y			SR1-9				

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SHEET 10 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM T/N	FROM TERMINATION FIND NO.	FROM SPEC	FROM NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO T/N	TO TERMINATION FIND NO.	TO SPEC	TO NO.
57		J6-N	13	Y	18			SR1-12					
58	22	J6-N	13	Y				P3-C	13	Y	18		
59	22	P3-C	13	Y				P4-C	13	Y			
60		P3-D	13	Y	17			SR1-10					
61		P4-D	13	Y	17			SR1-11					
62		J6-P	13	Y	17			SR1-13					
63-1		J6-R	13	Y	17			SR1-14					
63-2		J6-S	13	Y	17			SR1-15					
64		J6-T	13	Y	17			SR1-16					
65-1		J6-U	13	Y	17			SR1-17					
65-2		J6-V	13	Y	17			SR1-18					
66	23	J6-B	13	Y	[illegible]			J6-C	13	Y			
67	21	J6-D	13	Y	[illegible]			J6-E	13	Y			

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SHEET 11 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM T/N	FROM TERMINATION FIND NO.	FROM SPEC	FROM NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO T/N	TO TERMINATION FIND NO.	TO SPEC	TO NO.
68-1		J6-Y	13	y	17			SR1-21					
68-2		J6-Z	13	Y	17			SR1-22					
68-3		J6-a	13	Y	17			SR1-23					
68-4		J6-b	13	Y	17			SR1-24					
68-5		J6-d	13	Y	17			SR1-25					
69	25	E73	19	Y				K1-1	19	Y			
70	21	K1-8	19	Y				E71	19	Y			

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NASA DRAWING NO. 2018612-021
SHEET 12 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM T/N	FROM TERMINATION FIND NO.	FROM SPEC	FROM NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO T/N	TO TERMINATION FIND NO.	TO SPEC	TO NO.
1	21	J1-1	13	N				E50	16	Y			
2	21	E1	19	Y	31			E50	16	Y			
3		SR1-1						E50	16	Y			
4	29		1 50 1 25		19				1 25 1 00		20		
4B	21	E50	16	Y				SHLD 4	16	Y			
4L		J1-2	13	N				E51	16	Y			
4K		J1-4	13	N				E52	16	Y			
5	29		150 1 25		19				1 25 1 00		20		
5B	21	E50	16	Y				SHLD 5	16	Y			
5L		J1-3	13	N				E51	16	Y			
5K		J1-5	13	N				E52	16	Y			
6-1		SR1-2						E51	16	Y			
6-2		SR1-3						E51	16	Y			
6-3		SR1-4						E52	16	Y			
6-4		SR1-5						E52	16	Y			
6-5		SR1-19						E73	16	Y			
6-6		SR1-20						E52	16	Y			
7	25	E73	16	Y				E51	16	Y			

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NASA DRAWING NO. 2018612-021
SHEET 13 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM T/N	FROM TERMINATION FIND NO.	FROM SPEC	FROM NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO T/N	TO TERMINATION FIND NO.	TO SPEC	TO NO.
8-1	24	J1-6	13	N				E53	16	Y			
8-2	43	J1-8	13	N				E54	16	Y			
8-3	25	J1-7	13	N				E53	16	Y			
8-4	27	J1-9	13	N				E54	16	Y			
9-1		SR1-6						E53	16	Y			
9-2		SR1-7						E53	16	Y			
9-3		SR1-8						E54	16	Y			
9-4		SR1-9						E54	16	Y			
10-1	28	J1-10	13	N				K1-4	13	Y			
10-2	21	J1-11	13	N				K1-8	13	Y			
11		J1-12	13	N				SR1-12					
12	25	J1-19	13	N				E72	19	Y			
13-1		SR1-14						E55	19	Y			
13-2		SR1-15						E56	19	Y			
14		SR1-16						E57	19	Y			
15-1		SR1-17						E58	19	Y			
15-2		SR1-18						E59	19	Y			

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
16		J1-13	13	N			SR1-13				
17-1	37	J1-14	13	N			E55	19	Y		
17-2	36	J1-15	13	N			E56	19	Y		
17-3	37	J1-29	13	N			E55	19	Y		
17-4	36	J1-30	13	N			E56	19	Y		
18	24	J1-16	13	N			E57	19	Y		
19-1	25	J1-17	13	N			E58	19	Y		
19-2	26	J1-18	13	N			E59	19	Y		
19-3	25	J1-31	13	N			E58	19	Y		
19-4	26	J1-32	13	N			E59	19	Y		
20		K1-5	13	Y			SR1-26				
21	21	J1-20	13	N			E70	19	Y		
22-1		J1-21	13	N			SR1-21				
22-2		J1-22	13	N			SR1-22				
22-3		J1-23	13	N			SR1-23				
22-4		J1-24	13	N			SR1-24				
22-5		J1-25	13	N			SR1-25				
23	24	J1-26	13	N			E57	19	Y		

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NASA DRAWING NO.
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SHEET 14 of 21

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
24-1	27	J1-27	13	N			A7-3	13	Y		
24-2	23	J1-28	13	N			A7-2	13	Y		
25-1		J1-33	13	N			SR1-33				
25-2		J1-34	13	N			SR1-34				
26-1		J1-35	13	N			SR1-35				
26-2		J1-36	13	N			SR1-36				
27-1		J1-37	13	N			SR1-37				
27-2		J1-38	13	N			SR1-38				
28-1		J1-39	13	N			SR1-39				
28-2		J1-40	13	N			SR1-40				
29-1		J1-41	13	N			SR1-41				
29-2		J1-42	13	N			SR1-42				
30-1		J1-43	13	N			SR1-43				
30-2		J1-44	13	N			SR1-44				
31-1		J1-45	13	N			SR1-45				
31-2		J1-46	13	N			SR1-46				

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NASA DRAWING NO.
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SHEET 15 of 21

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
32-1		J1-47	13	N			SR1-47				
32-2		J1-48	13	N			SR1-48				
33-1		J1-51	13	N			B1A-S3				
33-2		J1-52	13	N			B1A-S1				
34-1		J1-53	13	N			B1A-S2				
34-2		J1-54	13	N			B1A-S4				
35-1		J1-55	13	N			B1B-S3				
35-2		J1-56	13	N			B1B-S1				
36-1		J1-57	13	N			B1B-S2				
36-2		J1-58	13	N			B1B-S4				
37-1		SR1-27					A7-3	13	Y		
37-2		SR1-28					A7-2	13	Y		
38-1		SR1-10					K1-6	13	Y		
38-2		SR1-11					K1-2	13	Y		
39	26	J1-59	13	N			K1-1	16	Y		

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION
K

NASA DRAWING NO.
2018612-021
SHEET 16 of 21

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
40-1		SR1-29					A7-6	13	Y		
40-2		SR1-30					A7-1	13	Y		
41-1		SR1-31					A7-6	13	Y		
41-2		SR1-32					A7-5	13	Y		
42-1		SR1-49					A7-6	13	Y		
42-2		SR1-50					A7-4	13	Y		
43		J5-A	13	Y	17		SR1-26				
44-1		J5-B	13	Y	18		SR1-27				
44-2		J5-C	13	Y	18		SR1-28				
45-1		J5-B	13	Y			B1A-P3				
45-2		J5-C	13	Y			B1A-P1				
46-1		J5-D	13	Y	17		SR1-29				
46-2		J5-E	13	Y	17		SR1-30				
47-1		J5-F	13	Y	17		SR1-31				
47-2		J5-H	13	Y	17		SR1-32				
48-1		J5-J	13	Y	17		SR1-33				
48-2		J5-K	13	Y	17		SR1-34				

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION
K

NASA DRAWING NO.
2018612-021
SHEET 17 of 21

MANNED SPACECRAFT CENTER
HOUSTON TEXAS
REVISION K
NASA DRAWING NO. 201861 2-021
SHEET 18 of 21

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION SPEC FIND NO.	TO NO.
49-1			J5-L	13Y	17		SR1-35			
49-2			J5-M	13Y	17		SR1-36			
50-1			J5-N	13Y	17		SR1-37			
50-2			J5-P	13Y	17		SR1-38			
51-1			J5-R	13Y	17		SR1-39			
51-2			J5-S	13Y	17		SR1-40			
52-1			J5-T	13Y	17		SR1-41			
52-2			J5-U	13Y	17		SR1-42			
53-1			J5-V	13Y	17		SR1-43			
53-2			J5-W	13Y	17		SR1-44			
54-1			J5-X	13Y	17		SR1-45			
54-2			J5-Y	13Y	17		SR1-46			
55-1			J5-Z	13Y	17		SR1-47			
55-2			J5-a	13Y	17		SR1-48			
56-1			J5-b	13Y	18		SR1-49			
56-2			J5-c	13Y	18		SR1-50			
57-1			J5-b	13Y			B1A-P2			
57-2			J5-c	13Y			B1A-P4			

MANNED SPACECRAFT CENTER
HOUSTON TEXAS
REVISION K
NASA DRAWING NO. 201861 2-021
SHEET 19 of 21

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION SPEC FIND NO.	TO NO.
58			J6-A	13Y	18		SR1-1			
59			J6-A	13Y			E10	19Y	31	
60					30					
61 A			SHLD-55				E10			
61-1			J6-B	13Y	18		SR1-2			
61-2			J6-C	13Y	18		SR1-3			
61-3			J6-D	13Y	18		SR1-4			
61-4			J6-E	13Y	18		SR1-5			
61-5			J6-W	13Y	17		SR1-19			
61-6			J6-X	13Y	17		SR1-20			
62-1			J6-F	13Y	18		SR1-6			
62-2			J6-F	13Y			SR1-7			
62-3			J6-J	13Y	18		SR1-8			
62-4			J6-H	13Y			SR1-9			

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REVISION K
NASA DRAWING NO. 201861 2-021
SHEET 20 of 21

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION SPEC FIND NO.	TO NO.
63			J6-N	13Y	18		SR1-12			
64	22		J6-N	13Y			P3-C	13Y	18	
65	22		P3-C	13Y			P4-C	13Y		
66			P3-D	13Y	17-20		SR1-10			
67			P4-D	13Y	17		SR1-11			
68			J6-P	13Y	17		SR1-13			
69-1			J6-R	13Y	17		SR1-14			
69-2			J6-S	13Y	17		SR1-15			
70			J6-T	13Y	17		SR1-16			
71-1			J6-U	13Y	17		SR1-17			
71-2			J6-V	13Y	17		SR1-18			
72			J6-B	13Y			J6-C	13Y		
73			J6-D	13Y			J6-E	13Y		

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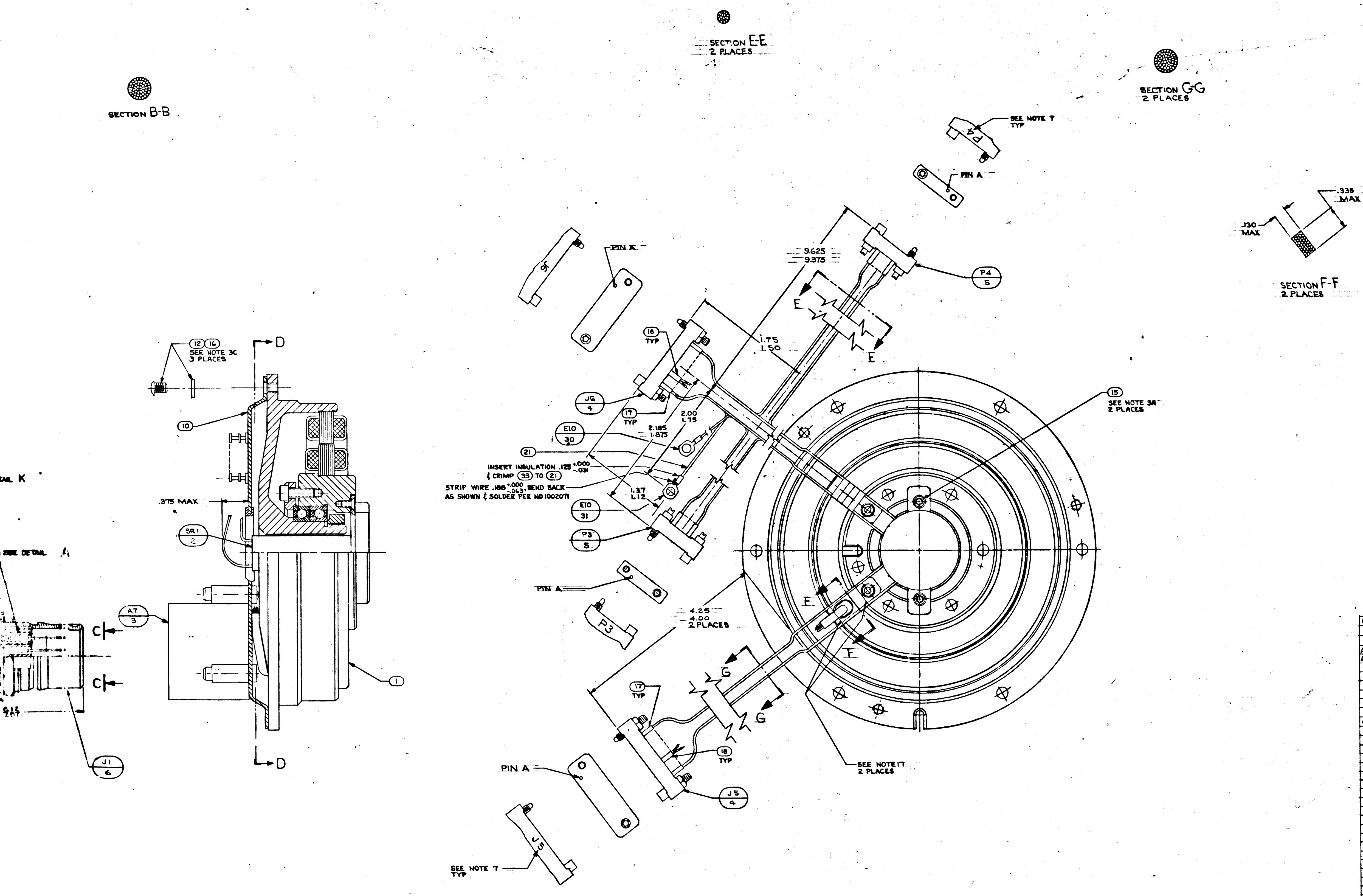
HOUSTON TEXAS
REVISION K
NASA DRAWING NO. 201861 2-021
SHEET 21 of 21

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION SPEC FIND NO.	TO NO.
74-1			J6-Y	13Y	17		SR1-21			
74-2			J6-Z	13Y	17		SR1-22			
74-3			J6-a	13Y	17		SR1-23			
74-4			J6-b	13Y	17		SR1-24			
74-5			J6-c	13Y	17		SR1-25			
75	21		K1-3	19Y			E71	19Y		

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17167			
A	REVISED TDRR 18324	5-11-65		WK
B	REVISED TDRR 18902	5-18-65		WK
C	REVISED TDRR 19270	5-18-65		WK
D	REVISED TDRR 21320	8-26-65		WK
E	REVISED TDRR 21676	8-31-65		WK
F	REVISED TDRR 22014	8-31-65		WK
G	REVISED TDRR 22332	9-21-65		WK
H	REVISED TDRR 23048	10-13-65		
J	REVISED TDRR 23702	2 Nov 65		WK
K	REVISED TDRR 24900	4 Jan 66		WK
L	REVISED TDRR 25486	25 Jan 66		WK
M	REVISED TDRR 26243	2-1-66		
N	REVISED TDRR 26254	23 Feb 66		
P	REVISED TDRR 27508	30 Mar 66		
R	REVISED TDRR 28813	17 May 66		
S	REVISED TDRR 28850	17 May 66		



4
3
2
1
SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX
.130 MAX
SEE NOTE 7 TYP
PIN A
P4
5
9.625
9.375
E
E
PIN A
1.75
1.50
18 TYP
J6
4
17 TYP
2.00
1.75
E10
30
2.185
1.875
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
PIN A
P3
4.25
4.00
2 PLACES
15
SEE NOTE 3A
2 PLACES
F
F
E
G
G
17 TYP
18 TYP
J5
4
SEE NOTE 17
2 PLACES
PIN A
J5
SEE NOTE 7 TYP
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
SEE DETAIL
A7
3
C
C
1
J1
6
DETAIL K

A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	43
1	—	1010353-13	RELAY ELECTRO MAG SENSITIVE	42
2	1	MS15795-803	WASHER, FLAT METAL ROUND	41
A/R	A/R	1006835	CURING AGENT	40
A/R	A/R	1006834	RESIN	39
2	2	2021504-44	RESISTOR	38
1	1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1	1000223	WASHER, CABLE CLAMP	35
2	2	1000220 SEE NOTE 15	CLAMP CABLE	34
1	1	1010717-3	TERMINAL, LUG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1	1010717-1	TERMINAL, LUG	31
1	1	1000020-11	SHIELD & GROUND ASSY	30
2	2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1	1010416-8	WIRE AWG 28E VIO 25" LONG	26
1	1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	13	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
1	1	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
2	2	1001488-2	SCREW, HEX SOC HD, SELF-LKG	11
1	1	2018792	GUIDE, WIRE ASSEMBLY	10
—	1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	61	1010862	BUSHING, SLEEVE	8
61	61	1010781-1	CONTACT ELEC	7
1	1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	1	2018625	SLIP RING ASSEMBLY, SO CONTACT	2
1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

MASTER

NEXT ASSY	USED ON
2018601	DL2018601
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DTB DATE 1/8/65
CHECKED G Quinn 3/8/65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 9-2-65
MIT APPROVAL

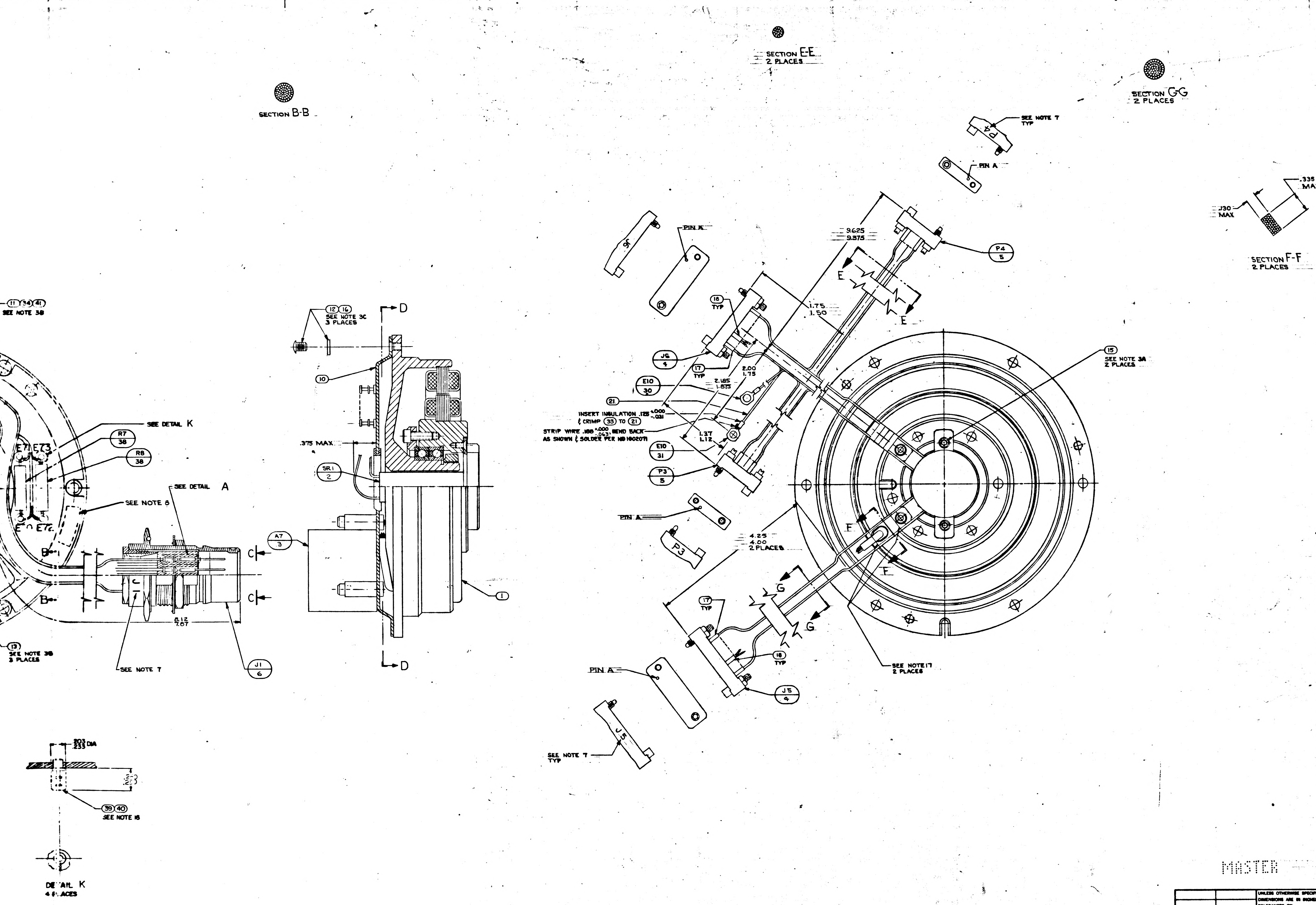
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 1 OF 21

2018612

34


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX
.130 MAX
SEE NOTE 7 TYP
PIN A
P4
P4 5
9.625
9.375
1.75
1.50
E
E
F
F
G
G
J6 4
17 TYP
18 TYP
2.00
1.75
2.185
1.875
E10 30
E10 31
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063 BEND BACK AS SHOWN & SOLDER PER ND1002071
1.37
1.12
P3 5
P3
4.25
4.00
2 PLACES
15
SEE NOTE 3A 2 PLACES
SEE NOTE 17 2 PLACES
J5 4
J5
SEE NOTE 7 TYP
11 34 41
SEE NOTE 38
12 16
SEE NOTE 3C 3 PLACES
D
D
10
.375 MAX
SR1 2
A7 3
1
C
C
SEE DETAIL K
R7 38
R8 38
E71 E73
E72
SEE NOTE 8
SEE DETAIL A
B
B
8.12
7.07
J1 6
SEE NOTE 7
13
SEE NOTE 38 3 PLACES
.303 DIA
.233
39 40
SEE NOTE 16
DETAIL K
4 PLACES

SYM	DESCRIPTION		DATE	APPROVAL
	REVISION TDRR 1716			
A	REVISED TDRR 1836			
B	REVISED TDRR 1890	2	5-18-64	
C	REVISED TDRR 192	D	5-18	
D	REVISED TDRR 2132	D	8-26	
E	REVISED TDRR 2167		8-31-65	
F	REVISED TDRR 220		9-3-65	
G	REVISED TDRR 2233		9-21-65	
H	REVISED TDRR 230		10-13-65	
J	REVISED TDRR 2370			
K	REVISED TDRR 2491			
L	REVISED TDRR 2548			
M	REVISED TDRR [illegible]	3	2-66	
N	REVISED TDRR [illegible]	4	23	
P	REVISED TDRR 2750			
R	REVISED TDRR 2881			
S	REVISED TDRR 288	2		

021	011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH
1	—	1010353-13	RELAY ELECTRO MAG SENSITIVE
2	1	MS15795-803	WASHER, FLAT METAL ROUND
A/R	A/R	1006835	CURING AGENT
A/R	A/R	1006834	RESIN
2	2	2021504-44	RESISTOR
1	1	1010416-4	WIRE AWG 28E ORN 10" LONG
1	1	1010416-5	WIRE AWG 28E YEL 10" LONG
1	1	1000223	WASHER CABLE CLAMP
2	2	1000220 SEE NOTE 15	CLAMP CABLE
1	1	1010717-3	TERMINAL, LUG
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED
1	1	1010717-1	TERMINAL, LUG
1	1	1000020-11	SHIELD & GROUND ASSY
2	2	1010778-2	WIRE, SHIELDED, TEFLON MULTICOND 11" LONG
1	1	1010416-10	WIRE AWG 28E WHT 16" LONG
1	1	1010416-9	WIRE AWG 28E GY 30" LONG
1	1	1010416-8	WIRE AWG 28E VIO 25" LONG
1	1	1010416-7	WIRE AWG 28E BLU 18" LONG
1	1	1010416-6	WIRE AWG 28E GRN 15" LONG
1	1	1010416-3	WIRE AWG 28E RED 20" LONG
1	1	1010416-2	WIRE AWG 28E BRN 20" LONG
1	1	1010416-1	WIRE AWG 28E BLK 42" LONG
2	2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK
2	2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK
13	13	1006776-14	INSULATION SLEEVING ELEC 1/4 LONG
36	36	1006776-18	INSULATION SLEEVING ELEC 1/4 LONG
3	3	MS15795-705	WASHER, FLAT, METAL, ROUND
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE
1	1	1001488-1	SCREW, HEX SOC HD, SELF-LKG
3	3	1001488-8	SCREW, HEX SOC HD, SELF-LKG
3	3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE
2	2	1001488-2	SCREW, HEX SOC HD, SELF-LKG
1	1	2018792	GUIDE, WIRE ASSEMBLY
—	1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE
61	61	1010862	BUSHING, SLEEVE
61	61	1010781-1	CONTACT ELEC
1	1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS
2	2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS
2	2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS
1	1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY
1	1	2018625	SLIP RING ASSEMBLY, 50 CONTACT
1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

LIST OF MATERIALS

MASTER

NEXT ASSY	USED ON
2018601	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

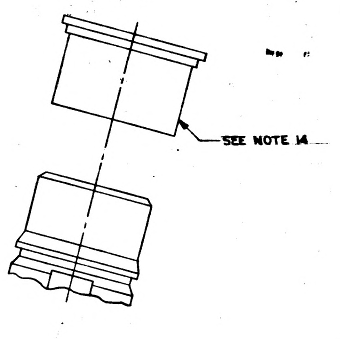
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
SUB NO. CONTRACT
DRAWN DTB DATE 1/8/65
CHECKED G Quinn 3/8/65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

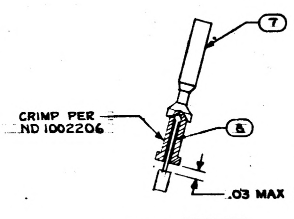
INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET

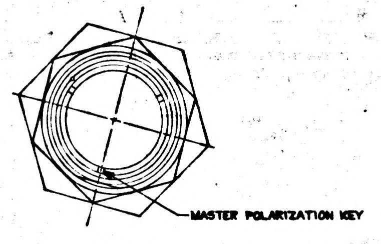
2018612 REV S SHT 1



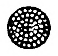
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

DETAIL A
SCALE 4/1

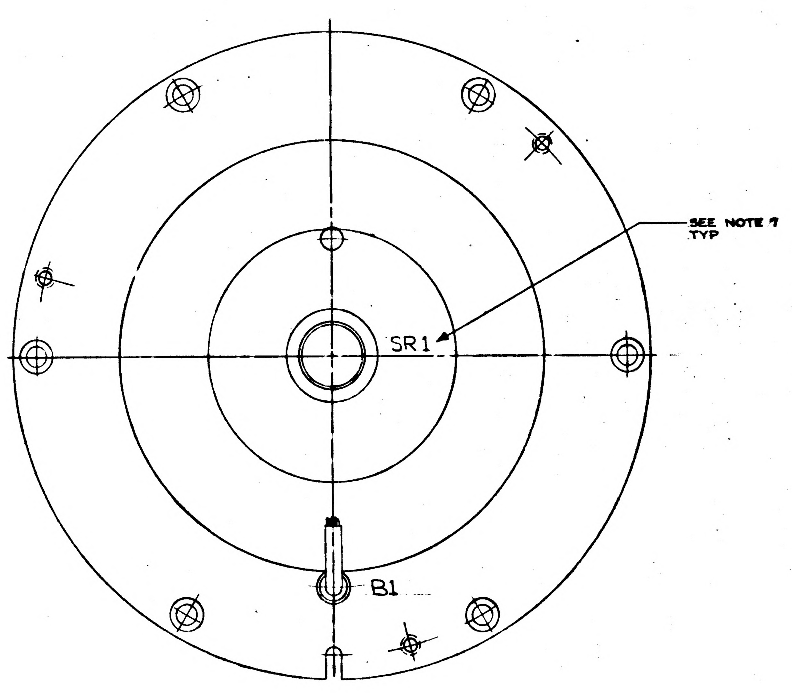

MASTER POLARIZATION KEY

VIEW C-C

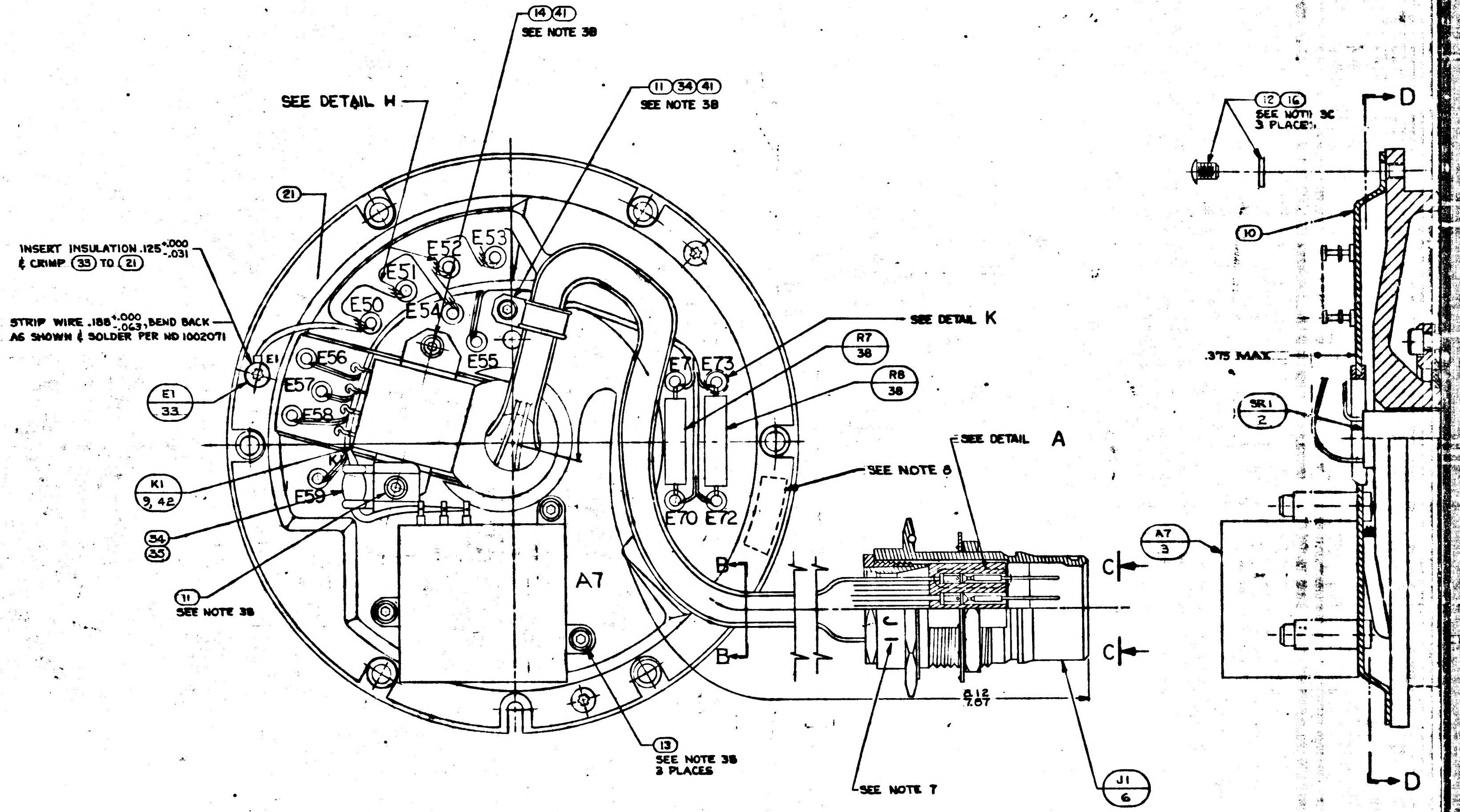


SECTION B-B

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16

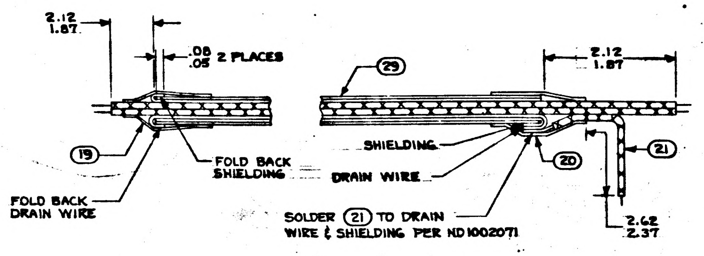

SEE NOTE 7
TYP
SR1
B1

VIEW D-D


14 41
SEE NOTE 38
11 34 41
SEE NOTE 38
SEE DETAIL H
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1 33
K1 9, 42
34 35
11
SEE NOTE 38
E1
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
K1
A7
E71
E73
E70
E72
B
B
SEE DETAIL K
R7 38
R8 38
SEE DETAIL A
SEE NOTE 8
13
SEE NOTE 38
3 PLACES
SEE NOTE 7
8.12
7.87
J1 6
C
C
A7 3
SR1 2
.375 MAX
10
12 16
SEE NOTE 3C
3 PLACES
D
D

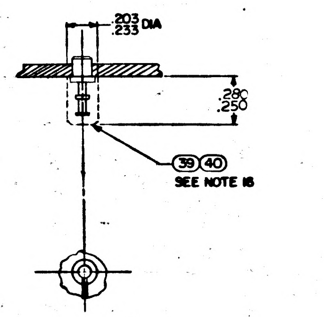
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS PER TABLE I
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER NE 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002028
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
   - A = SHIELD GROUND ON "FROM END"
   - B = SHIELD GROUND ON "TO END"
   - K = BLACK
   - L = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-165, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS (39) & (40) PER ND 1002009 METHOD B
17. TAPE HARNESS IN AREA INDICATED USING ITEM (43) TO MAINTAIN HARNESS CONFIGURATION PER SECTION F-F AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM (43)


2.12
1.87
.08
.05
2 PLACES
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
29
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND 1002071
2.62
2.37

DETAIL H
SCALE: NONE

TABLE I	
ASSEMBLY NO.	P.S. NUMBER
2018612-011	PS 2018612
2018612-021	PS 2016143


.203
.233 DIA
.280
.250
39 40
SEE NOTE 16

DETAIL K
4 PLACES

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22014 F

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NASA DRAWING NO. 2018612-011

SHEET 2 of 21

CONDUCTOR INDIVIDUAL LENGTH		FROM						TO					
FIND NUMBER	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T I N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T I N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.
1	21	J1-1	13	N				E50	16	Y			
2	21	E1	19	Y		31		E50	16	Y			
3		SR1-1						E50	16	Y			
4	29		1 50		1 25	19			1 25		1 00	20	
4B	21	E50	16	Y				SHLD 4	16	Y			
4L		J1-2	13	N				E51	16	Y			
4K		J1-4	13	N				E52	16	Y			
5	29		1 50		1 25	19			1 25		1 00	20	
5B	21	E50	16	Y				SHLD 5	16	Y			
5L		J1-3	13	N				E51	16	Y			
5K		J1-5	13	N				E52	16	Y			
6-1		SR1-2						E51	16	Y			
6-2		SR1-3						E51	16	Y			
6-3		SR1-4						E52	16	Y			
6-4		SR1-5						E52	16	Y			
6-5	25	SR1-19	13	[illegible]				K1-1	16	Y			
6-6		SR1-20						E52	16	Y			
7	25	K1-1	13	Y				E51	16	Y			

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SHEET 3 of 21

CONDUCTOR INDIVIDUAL LENGTH		FROM						TO					
FIND NUMBER	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T I N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T I N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.
8-1	24	J1-6	13	N				E53	16	Y			
8-2	26	J1-8	13	N				E54	16	Y			
8-3	25	J1-7	13	N				E53	16	Y			
8-4	27	J1-9	13	N				E54	16	Y			
9-1		SR1-6						E53	16	Y			
9-2		SR1-7						E53	16	Y			
9-3		SR1-8						E54	16	Y			
9-4		SR1-9						E54	16	Y			
10-1	28	J1-10	13	N				K1-4	13	Y			
10-2	21	J1-11	13	N				K1-8	13	Y			
11		J1-12	13	N				SR1-12					
71	25	J1-19	13	N				E72	19	Y			
72-1		SR1-14						E55	19	Y			
72-2		SR1-15						E56	19	Y			
73		SR1-16						E57	19	Y			
74-1		SR1-17						E58	19	Y			
74-2		SR1-18						E59	19	Y			

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SHEET 4 of 21

CONDUCTOR INDIVIDUAL LENGTH		FROM						TO					
FIND NUMBER	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T I N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T I N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.
12		J1-13	13	N				SR1-13					
13-1	37	J1-14	13	N				E55	19	Y			
13-2	36	J1-15	13	N				E56	19	Y			
13-3	37	J1-29	13	N				E55	19	Y			
13-4	36	J1-30	13	N				E56	19	Y			
14	24	J1-16	13	N				E57	19	Y			
15-1	25	J1-17	13	N				E58	19	Y			
15-2	26	J1-18	13	N				E59	19	Y			
15-3	25	J1-31	13	N				E58	19	Y			
15-4	26	J1-32	13	N				E59	19	Y			
16		K1-5	13	Y				SR1-26					
17	21	J1-20	13	N				E70	19	Y			
18-1		J1-21	13	N				SR1-21					
18-2		J1-22	13	N				SR1-22					
18-3		J1-23	13	N				SR1-23					
18-4		J1-24	13	N				SR1-24					
18-5		J1-25	13	N				SR1-25					
19	24	J1-26	13	N				E57	19	Y			

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SHEET 5 of 21

CONDUCTOR INDIVIDUAL LENGTH		FROM						TO					
FIND NUMBER	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T I N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	T I N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	NO.
20-1	27	J1-27	13	N				A7-3	13	Y			
20-2	23	J1-28	13	N				A7-2	13	Y			
21-1		J1-33	13	N				SR1-33					
21-2		J1-34	13	N				SR1-34					
22-1		J1-35	13	N				SR1-35					
22-2		J1-36	13	N				SR1-36					
23-1		J1-37	13	N				SR1-37					
23-2		J1-38	13	N				SR1-38					
24-1		J1-39	13	N				SR1-39					
24-2		J1-40	13	N				SR1-40					
25-1		J1-41	13	N				SR1-41					
25-2		J1-42	13	N				SR1-42					
26-1		J1-43	13	N				SR1-43					
26-2		J1-44	13	N				SR1-44					
27-1		J1-45	13	N				SR1-45					
27-2		J1-46	13	N				SR1-46					

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SHEET 6 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
28-1			J1-47	13	N			SR1-47				
28-2			J1-48	13	N			SR1-48				
29-1			J1-51	13	N			B1A-S3				
29-2			J1-52	13	N			B1A-S1				
30-1			J1-53	13	N			B1A-S2				
30-2			J1-54	13	N			B1A-S4				
31-1			J1-55	13	N			B1B-S3				
31-2			J1-56	13	N			B1B-S1				
32-1			J1-57	13	N			B1B-S2				
32-2			J1-58	13	N			B1B-S4				
33-1			SR1-27					A7-3	13	Y		
33-2			SR1-28					A7-2	13	Y		
34-1			SR1-10					K1-4	13	Y		
34-2			SR1-11					K1-8	13	Y		

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SHEET 7 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
35-1			SR1-29					A7-6	13	Y		
35-2			SR1-30					A7-1	13	Y		
36-1			SR1-31					A7-6	13	Y		
36-2			SR1-32					A7-5	13	Y		
37-1			SR1-49					A7-6	13	Y		
37-2			SR1-50					A7-4	13	Y		
38			J5-A	13	Y	17		SR1-26				
38-1			J5-B	13	Y	18		SR1-27				
39-2			J5-C	13	Y	18		SR1-28				
40-1			J5-B	13	Y			B1A-P3				
40-2			J5-C	13	Y			B1A-P1				
41-1			J5-D	13	Y	17		SR1-29				
41-2			J5-E	13	Y	17		SR1-30				
42-1			J5-F	13	Y	17		SR1-31				
42-2			J5-H	13	Y	17		SR1-32				
43-1			J5-J	13	Y	17		SR1-33				
43-2			J5-K	13	Y	17		SR1-34				

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SHEET 8 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
44-1			J5-L	13	Y	17		SR1-35				
44-2			J5-M	13	Y	17		SR1-36				
45-1			J5-N	13	Y	17		SR1-37				
45-2			J5-P	13	Y	17		SR1-38				
46-1			J5-R	13	Y	17		SR1-39				
46-2			J5-S	13	Y	17		SR1-40				
47-1			J5-T	13	Y	17		SR1-41				
47-2			J5-U	13	Y	17		SR1-42				
48-1			J5-V	13	Y	17		SR1-43				
48-2			J5-W	13	Y	17		SR1-44				
49-1			J5-X	13	Y	17		SR1-45				
49-2			J5-Y	13	Y	17		SR1-46				
50-1			J5-Z	13	Y	17		SR1-47				
50-2			J5-a	13	Y	17		SR1-48				
51-1			J5-b	13	Y	18		SR1-49				
51-2			J5-c	13	Y	18		SR1-50				
52-1			J5-b	13	Y			B1A-P2				
52-2			J5-c	13	Y			B1A-P4				

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SHEET 9 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION SPEC FIND NO.	NO.
53			J6-A	13	Y	18		SR1-1				
54			J6-A	13	Y			E10	19	Y	31	
55						30						
55-A			SHLD-55					E10				
55-1			J6-B	13	Y	18		SR1-2				
55-2			J6-C	13	Y	18		SR1-3				
55-3			J6-D	13	Y	18		SR1-4				
55-4			J6-E	13	Y	18		SR1-5				
55-5			J6-W	13	Y	17		SR1-19				
55-6			J6-X	13	Y	17		SR1-20				
56-1			J6-F	13	Y	18		SR1-6				
56-2			J6-F	13	Y			SR1-7				
56-3			J6-J	13	Y	18		SR1-8				
56-4			J6-J	13	Y			SR1-9				

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CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM T/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO T/N	TO TERMINATION FIND NO.
57		J6-N	13	Y	18	SR1-12			
58	22	J6-N	13	Y		P3-C	13	Y	18
59	22	P3-C	13	Y		P4-C	13	Y	
60		P3-D	13	Y	17	SR1-10			
61		P4-D	13	Y	17	SR1-11			
62		J6-P	13	Y	17	SR1-13			
63-1		J6-R	13	Y	17	SR1-14			
63-2		J6-S	13	Y	17	SR1-15			
64		J6-T	13	Y	17	SR1-16			
65-1		J6-U	13	Y	17	SR1-17			
65-2		J6-V	13	Y	17	SR1-18			
66	23	J6-B	13	Y		J6-C	13	Y	
67	21	J6-D	13	Y		J6-E	13	Y	

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NASA DRAWING NO. 2018612 -011 SHEET 11 of 21

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM T/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO T/N	TO TERMINATION FIND NO.
68-1		J6-Y	13	Y	17	SR1-21			
68-2		J6-Z	13	Y	17	SR1-22			
68-3		J6-a	13	Y	17	SR1-23			
68-4		J6-b	13	Y	17	SR1-24			
68-5		J6-d	13	Y	17	SR1-25			
69	25	E73	19	Y		K1-1	19	Y	
70	21	K1-8	19	Y		E71	19	Y	

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REVISION S

NASA DRAWING NO. 2018612-021 SHEET 12 of 21

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM T/N	FROM CUT WIRE OR SHIELD	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO T/N	TO CUT WIRE OR SHIELD	TO TERMINATION FIND NO.
1	21	J1-1	13	N			E50	16	Y		
2	21	E1	19	Y		31	E50	16	Y		
3		SR1-1					E50	16	Y		
4	29		1 50		1 25	19		1 25		1 00	20
4B	21	E50	16	Y			SHLD 4	16	Y		
4L		J1-2	13	N			E51	16	Y		
4K		J1-4	13	N			E52	16	Y		
5	29		1 50		1 25	19		1 25		1 00	20
5B	21	E50	16	Y			SHLD 5	16	Y		
5L		J1-3	13	N			E51	16	Y		
5K		J1-5	13	N			E52	16	Y		
6-1		SR1-2					E51	16	Y		
6-2		SR1-3					E51	16	Y		
6-3		SR1-4					E52	16	Y		
6-4		SR1-5					E52	16	Y		
6-5		SR1-19					E73	16	Y		
6-6		SR1-20					E52	16	Y		
7	25	E73	16	Y			E51	16	Y		

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NASA DRAWING NO. 2018612-021 SHEET 13 of 21

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM T/N	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO T/N
8-1	24	J1-6	13	N	E53	16	Y
8-2	43	J1-8	13	N	E54	16	Y
8-3	25	J1-7	13	N	E53	16	Y
8-4	27	J1-9	13	N	E54	16	Y
9-1		SR1-6			E53	16	Y
9-2		SR1-7			E53	16	Y
9-3		SR1-8			E54	16	Y
9-4		SR1-9			E54	16	Y
~~10-1~~	~~28~~	~~J1-10~~	~~13~~	~~N~~	~~K1-4~~	~~13~~	~~Y~~
10-2	21	J1-11	13	N	K1-8	13	Y
11		J1-12	13	N	SR1-12		
12	25	J1-19	13	N	E72	19	Y
13-1		SR1-14			E55	19	Y
13-2		SR1-15			E56	19	Y
14		SR1-16			E57	19	Y
15-1		SR1-17			E58	19	Y
15-2		SR1-18			E59	19	Y

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REVISION 5

NASA DRAWING NO.
2018612-021
SHEET 14 of 21

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	FROM TERMINATION SPEC	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION SPEC
16		J1-13	13N		SR1-13		
17-1	37	J1-14	13N		E55	19Y	
17-2	36	J1-15	13N		E56	19Y	
17-3	37	J1-29	13N		E55	19Y	
17-4	36	J1-30	13N		E56	19Y	
18	24	J1-16	13N		E57	19Y	
19-1	25	J1-17	13N		E58	19Y	
19-2	26	J1-18	13N		E59	19Y	
19-3	25	J1-31	13N		E58	19Y	
19-4	26	J1-32	13N		E59	19Y	
20		K1-5	13Y		SR1-26		
21	21	J1-20	13N		E70	19Y	
22-1		J1-21	13N		SR1-21		
22-2		J1-22	13N		SR1-22		
22-3		J1-23	13N		SR1-23		
22-4		J1-24	13N		SR1-24		
22-5		J1-25	13N		SR1-25		
23	24	J1-26	13N		E57	19Y	

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NASA DRAWING NO.
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SHEET 15 of 21

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	FROM TERMINATION SPEC	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION SPEC
24-1	27	J1-27	13N		A7-3	13Y	
24-2	23	J1-28	13N		A7-2	13Y	
25-1		J1-33	13N		SR1-33		
25-2		J1-34	13N		SR1-34		
26-1		J1-35	13N		SR1-35		
26-2		J1-36	13N		SR1-36		
27-1		J1-37	13N		SR1-37		
27-2		J1-38	13N		SR1-38		
28-1		J1-39	13N		SR1-39		
28-2		J1-40	13N		SR1-40		
29-1		J1-41	13N		SR1-41		
29-2		J1-42	13N		SR1-42		
30-1		J1-43	13N		SR1-43		
30-2		J1-44	13N		SR1-44		
31-1		J1-45	13N		SR1-45		
31-2		J1-46	13N		SR1-46		

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NASA DRAWING NO.
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SHEET 16 of 21

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	FROM TERMINATION SPEC	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION SPEC
32-1		J1-47	13N		SR1-47		
32-2		J1-48	13N		SR1-48		
33-1		J1-51	13N		B1A-S3		
33-2		J1-52	13N		B1A-S1		
34-1		J1-53	13N		B1A-S2		
34-2		J1-54	13N		B1A-S4		
35-1		J1-55	13N		B1B-S3		
35-2		J1-56	13N		B1B-S1		
36-1		J1-57	13N		B1B-S2		
36-2		J1-58	13N		B1B-S4		
37-1		SR1-27			A7-3	13Y	
37-2		SR1-28			A7-2	13Y	
38-1		SR1-10			K1-6	13Y	
38-2		SR1-11			K1-2	13Y	
39	26	J1-59	13N		K1-1	16Y	

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2018612-021
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CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	FROM TERMINATION SPEC	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION SPEC
40-1		SR1-29			A7-6	13Y	
40-2		SR1-30			A7-1	13Y	
41-1		SR1-31			A7-6	13Y	
41-2		SR1-32			A7-5	13Y	
42-1		SR1-49			A7-6	13Y	
42-2		SR1-50			A7-4	13Y	
43		J5-A	13Y	17	SR1-26		
44-1		J5-B	13Y	18	SR1-27		
44-2		J5-C	13Y	18	SR1-28		
45-1		J5-B	13Y		B1A-P3		
45-2		J5-C	13Y		B1A-P1		
46-1		J5-D	13Y	17	SR1-29		
46-2		J5-E	13Y	17	SR1-30		
47-1		J5-F	13Y	17	SR1-31		
47-2		J5-H	13Y	17	SR1-32		
48-1		J5-J	13Y	17	SR1-33		
48-2		J5-K	13Y	17	SR1-34		

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
49-1		J5-L	13Y	17		SR1-35			
49-2		J5-M	13Y	17		SR1-36			
50-1		J5-N	13Y	17		SR1-37			
50-2		J5-P	13Y	17		SR1-38			
51-1		J5-R	13Y	17		SR1-39			
51-2		J5-S	13Y	17		SR1-40			
52-1		J5-T	13Y	17		SR1-41			
52-2		J5-U	13Y	17		SR1-42			
53-1		J5-V	13Y	17		SR1-43			
53-2		J5-W	13Y	17		SR1-44			
54-1		J5-X	13Y	17		SR1-45			
54-2		J5-Y	13Y	17		SR1-46			
55-1		J5-Z	13Y	17		SR1-47			
55-2		J5-a	13Y	17		SR1-48			
56-1		J5-b	13Y	18		SR1-49			
56-2		J5-c	13Y	18		SR1-50			
57-1		J5-b	13Y			B1A-P2			
57-2		J5-c	13Y			B1A-P4			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
58		J6-A	13Y	18		SR1-1			
59		J6-A	13Y			E10	19Y	31	
60				30					
61 A		SHLD-55				E10			
61-1		J6-B	13Y	18		SR1-2			
61-2		J6-C	13Y	18		SR1-3			
61-3		J6-D	13Y	18		SR1-4			
61-4		J6-E	13Y	18		SR1-5			
61-5		J6-W	13Y	17		SR1-19			
61-6		J6-X	13Y	17		SR1-20			
62-1		J6-F	13Y	18		SR1-6			
62-2		J6-F	13Y			SR1-7			
62-3		J6-J	13Y	18		SR1-8			
62-4		J6-H	13Y			SR1-9			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
63		J6-N	13Y	18		SR1-12			
64	22	J6-N	13Y			P3-C	13Y	18	
65	22	P3-C	13Y			P4-C	13Y		
66		P3-D	13Y	17		SR1-10			
67		P4-D	13Y	17		SR1-11			
68		J6-P	13Y	17		SR1-13			
69-1		J6-R	13Y	17		SR1-14			
69-2		J6-S	13Y	17		SR1-15			
70		J6-T	13Y	17		SR1-16			
71-1		J6-U	13Y	17		SR1-17			
71-2		J6-V	13Y	17		SR1-18			
72		J6-B	13Y			J6-C	13Y		
73		J6-D	13Y			J6-E	13Y		

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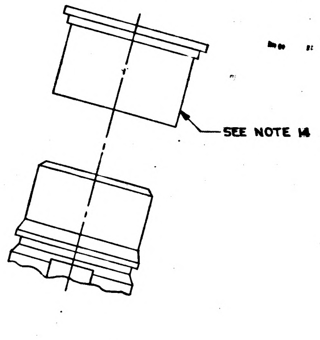
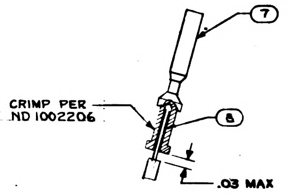
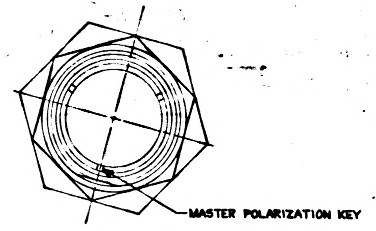
CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
74-1		J6-Y	13Y	17		SR1-21			
74-2		J6-Z	13Y	17		SR1-22			
74-3		J6-a	13Y	17		SR1-23			
74-4		J6-b	13Y	17		SR1-24			
74-5		J6-c	13Y	17		SR1-25			
75	21	K1-3	19Y			E71	19Y		
76	28	K1-4	19Y			K1-8	19Y		



DETAIL J

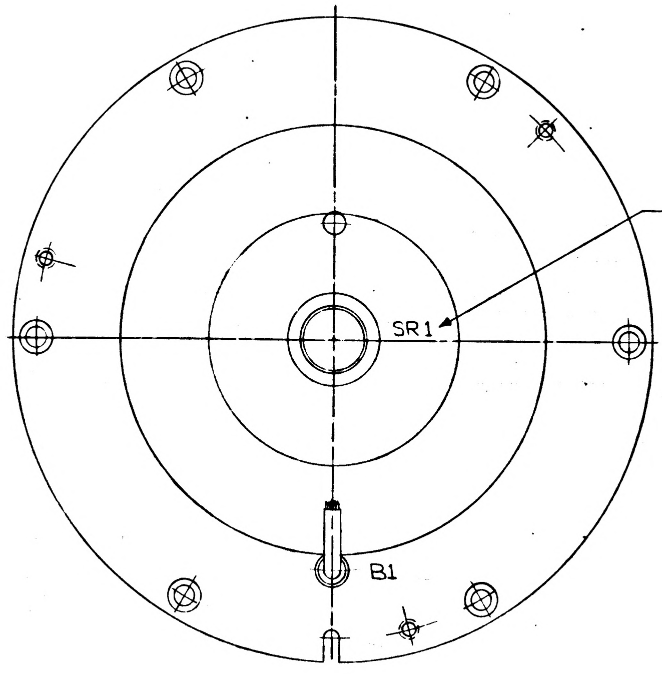

7
CRIMP PER ND 1002206
8
.03 MAX

DETAIL A
SCALE 4/1


MASTER POLARIZATION KEY

VIEW C-C

SECTION B-B


SEE NOTE 7
TYP
SR1
B1

VIEW D-D

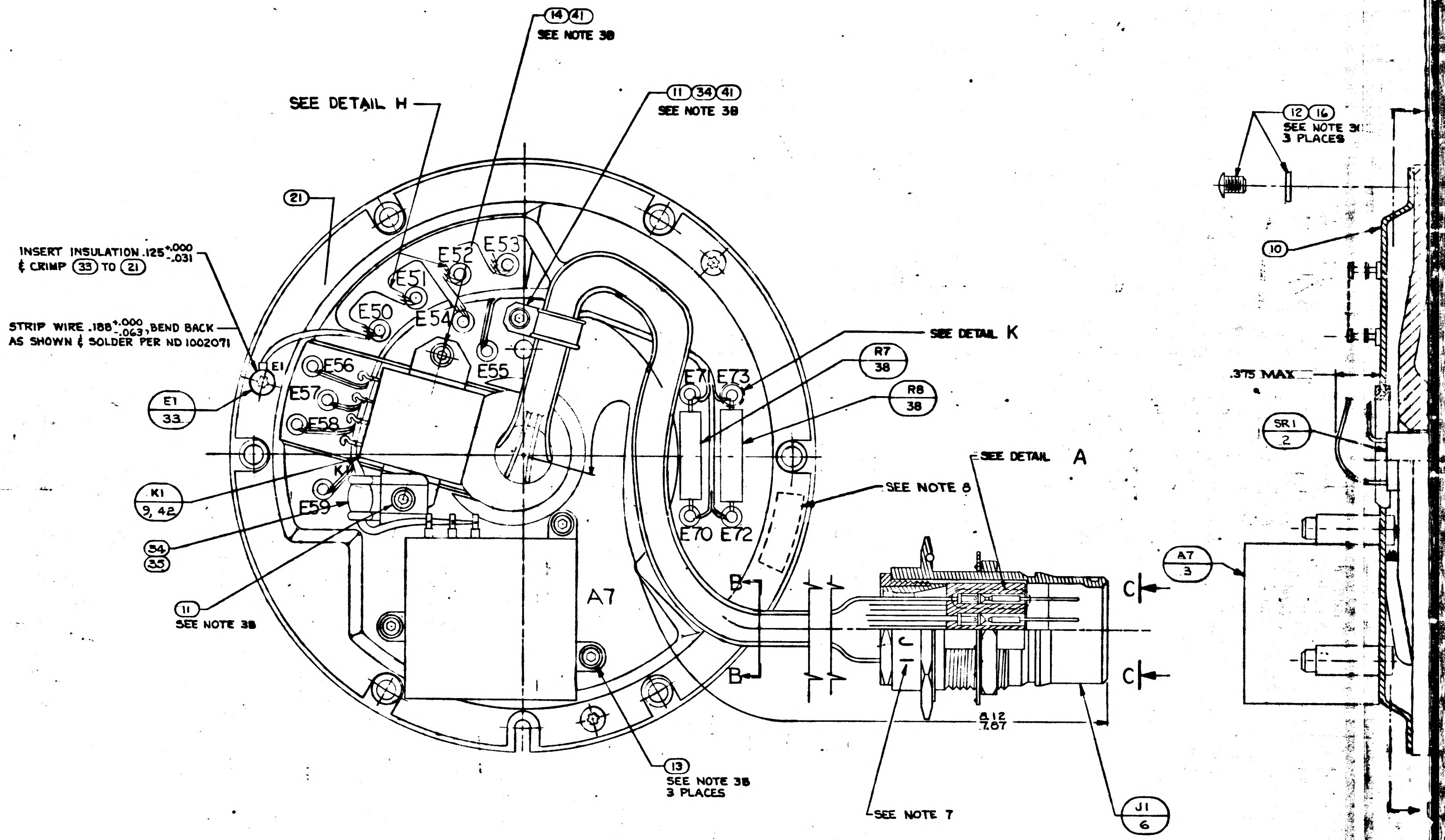
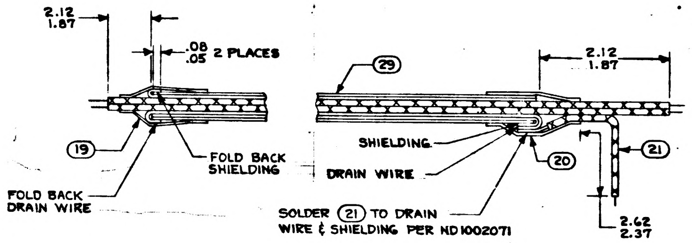
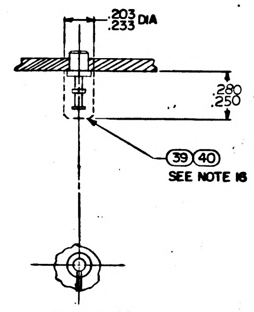

14 41
SEE NOTE 38
11 34 41
SEE NOTE 38
SEE DETAIL H
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063 BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1
E1 33
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
K1
K1 9,42
34 35
11
SEE NOTE 38
E71
E73
E70
E72
SEE DETAIL K
R7 38
R8 38
SEE DETAIL A
SEE NOTE 8
A7
B
B
C
C
8.12
7.87
13
SEE NOTE 38
3 PLACES
SEE NOTE 7
J1 6
12 16
SEE NOTE 3
3 PLACES
10
.375 MAX
SR1 2
A7 3

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16


2.12
1.87
.08
.05 2 PLACES
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
29
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND 1002071
2.62
2.37

DETAIL H
SCALE: NONE


.203
.233 DIA
.290
.250
39 40
SEE NOTE 16

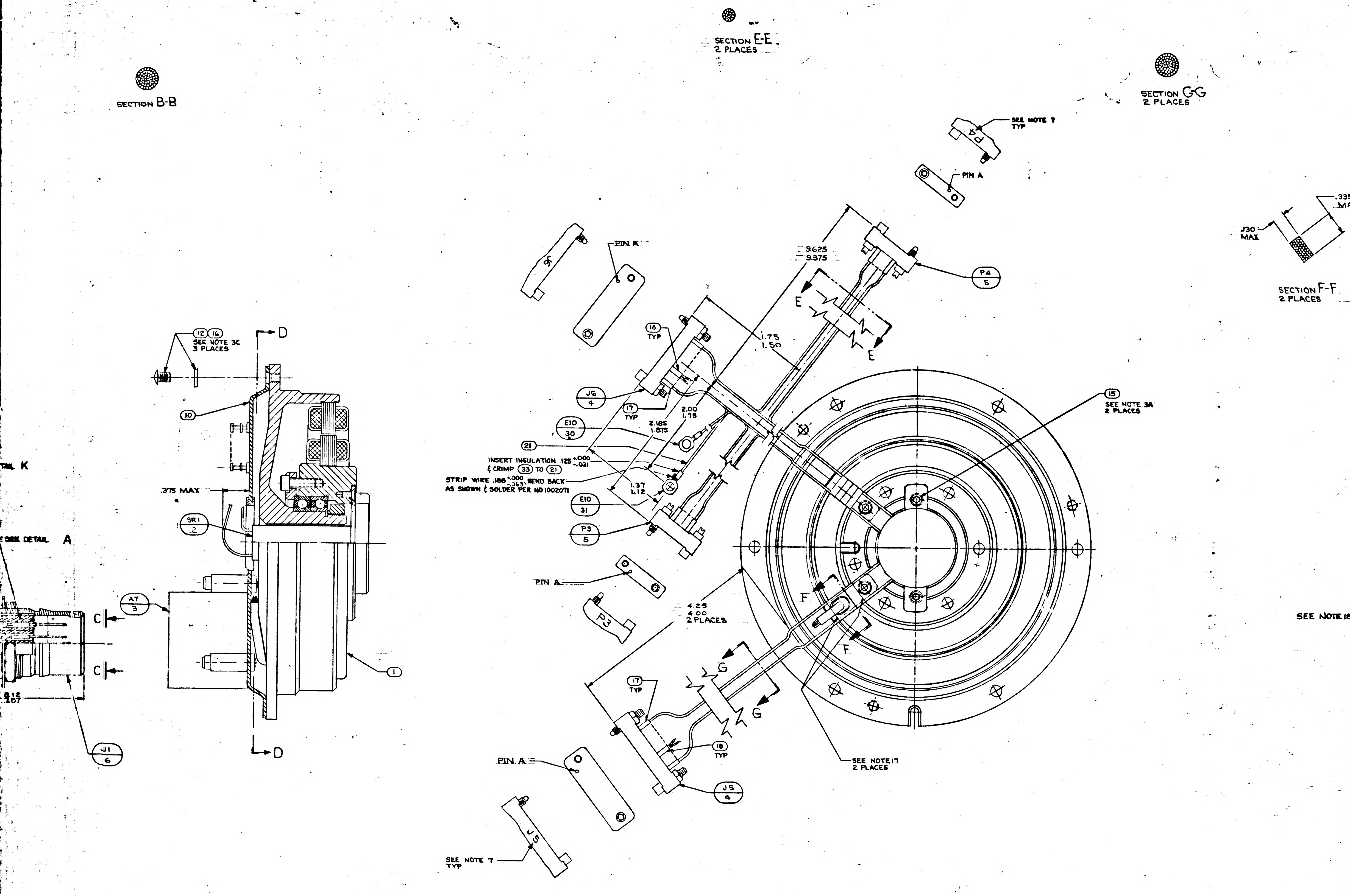
DETAIL K
4 PLACES

TABLE I	
ASSEMBLY NO.	P.S. NUMBER
2018612-011	PS 2018612
2018612-021	PS 2016143

3H

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS PER TABLE I
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
   - A. = SHIELD GROUND ON "FROM END"
   - B. = SHIELD GROUND ON "TO END"
   - K. = BLACK
   - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS (39) & (40) PER ND 1002009 METHOD B
17. TAPE HARNESS IN AREA INDICATED USING ITEM (43) TO MAINTAIN HARNESS CONFIGURATION PER SECTION F-F AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM (43).
18. TAPE (44) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.

	REV	SHT
2018612	T	1


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SEE NOTE 7
TYP
P4
PIN A
.335
MAX
.130
MAX
SECTION F-F
2 PLACES
9.625
9.375
P4
5
E
E
1.75
1.50
J6
PIN A
18
TYP
J6
4
17
TYP
2.00
1.75
2.185
1.875
E10
30
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
PIN A
P3
4.25
4.00
2 PLACES
15
SEE NOTE 3A
2 PLACES
F
F
G
G
17
TYP
18
TYP
J5
4
PIN A
J5
SEE NOTE 7
TYP
SEE NOTE 17
2 PLACES
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
A7
3
C
C
1
J1
6
TAIL K
SEE DETAIL A
.915
.857

SYM	DESCRIPTION REVISIONS TDRR 17167	DATE	APPROVAL	
A	REVISED TDRR 18324	4-4-65		WK
B	REVISED TDRR 18902	5-18-65		WK
C	REVISED TDRR 19270	5-18-65		WK
D	REVISED TDRR 21320	7-26-65		WK
E	REVISED TDRR 21676	8-31-65		WK
F	REVISED TDRR 22014	8-31-65		WK
G	REVISED TDRR 22332	9-21-65		WK
H	REVISED TDRR 23048	10-13-65		
J	REVISED TDRR 23702	2 Nov 65		WK
K	REVISED TDRR 24900	4 Jan 66		WK
L	REVISED TDRR 25486	25 Jan 66		WK
M	REVISED TDRR 26243	2-66		
N	REVISED TDRR 26254	23 Feb 66		
P	REVISED TDRR 27508	30 Mar 66		
R	REVISED TDRR 28813	17 May 66		
S	REVISED TDRR 28850	17 May 66		
T	REVISED TDRR 32109	7 DEC	SCS	

SEE NOTE 18

021	011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	MIL-I-15126 TYPE ACT	TAPE, ADH, ELEC. PRESS SENSITIVE ½ WIDE	44
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	43
1	—	1010353-13	RELAY ELECTRO MAG SENSITIVE	42
2	1	MS15795-803	WASHER, FLAT METAL ROUND	41
A/R	A/R	1006835	CURING AGENT	40
A/R	A/R	1006834	RESIN	39
2	2	2021504-44	RESISTOR	38
1	1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1	~~1000223~~	~~WASHER, CABLE CLAMP~~	35
2	2	1000220 SEE NOTE 15	CLAMP, CABLE	34
1	1	1010717-3	TERMINAL, LUG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1	1010717-1	TERMINAL, LUG	31
1	1	1000020-11	SHIELD & GROUND ASSY	30
2	2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1	1010416-8	WIRE AWG 28E VIO 25" LONG	26
1	1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	13	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
1	1	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
2	2	1001488-2	SCREW, HEX SOC HD, SELF-LKG	11
1	1	2018792	GUIDE, WIRE ASSEMBLY	10
—	1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	61	1010862	BUSHING, SLEEVE	8
61	61	1010781-1	CONTACT ELEC	7
1	1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
	QTY REQD			

LIST OF MATERIALS

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DTB DATE 1/8/65
CHECKED G Quinn 3/8/65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY RESOLVER OUTER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 1 OF 21

2018612

2018612 REV T SHT 1

2/2018612

TDRR 17167 MAR 9 1965

22014 F

FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
1	21		J1-1	13	N				E50	16	Y			
2	21		E1	19	Y	31			E50	16	Y			
3			SR1-1						E50	16	Y			
4	29			1 50 1 25		19				1 25 1 00		20		
4B	21		E50	16	Y				SHLD 4	16	Y			
4L			J1-2	13	N				E51	16	Y			
4K			J1-4	13	N				E52	16	Y			
5	29			1 50 1 25		19				1 25 1 00		20		
5B	21		E50	16	Y				SHLD 5	16	Y			
5L			J1-3	13	N				E51	16	Y			
5K			J1-5	13	N				E52	16	Y			
6-1			SR1-2						E51	16	Y			
6-2			SR1-3						E51	16	Y			
6-3			SR1-4						E52	16	Y			
6-4			SR1-5						E52	16	Y			
6-5	25		SR1-19	13					K1-1	16	Y			
6-6			SR1-20						E52	16	Y			
7	25		[illegible]	13	Y				E51	16	Y			

O.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS

REVISION F

NASA DRAWING NO. 2018612-011 SHEET 2 of 21

TDRR 17167 MAR 9 1965

FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
8-1	24		J1-6	13	N				E53	16	Y			
8-2	26		J1-8	13	N				E54	16	Y			
8-3	25		J1-7	13	N				E53	16	Y			
8-4	27		J1-9	13	N				E54	16	Y			
9-1			SR1-6						E53	16	Y			
9-2			SR1-7						E53	16	Y			
9-3			SR1-8						E54	16	Y			
9-4			SR1-9						E54	16	Y			
10-1	28		J1-10	13	N				K1-4	13	Y			
10-2	21		J1-11	13	N				K1-8	13	Y			
11			J1-12	13	N				SR1-12					
71	25		J1-19	13	N				E72	19	Y			
72-1			SR1-14						E55	19	Y			
72-2			SR1-15						E56	19	Y			
73			SR1-16						E57	19	Y			
74-1			SR1-17						E58	19	Y			
74-2			SR1-18						E59	19	Y			

O.A. RESOLV.

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FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
12			J1-13	13	N				SR1-13					
13-1	37		J1-14	13	N				E55	19	Y			
13-2	36		J1-15	13	N				E56	19	Y			
13-3	37		J1-29	13	N				E55	19	Y			
13-4	36		J1-30	13	N				E56	19	Y			
14	24		J1-16	13	N				E57	19	Y			
15-1	25		J1-17	13	N				E58	19	Y			
15-2	26		J1-18	13	N				E59	19	Y			
15-3	25		J1-31	13	N				E58	19	Y			
15-4	26		J1-32	13	N				E59	19	Y			
16			K1-5	13	Y				SR1-26					
17	21		J1-20	13	N				E70	19	Y			
18-1			J1-21	13	N				SR1-21					
18-2			J1-22	13	N				SR1-22					
18-3			J1-23	13	N				SR1-23					
18-4			J1-24	13	N				SR1-24					
18-5			J1-25	13	N				SR1-25					
19	24		J1-26	13	N				E57	19	Y			

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NASA DRAWING NO. 2018612-011 SHEET 4 of 21

FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	T/N	TERMINATION FIND NO.	SPEC	NO.
20-1	27		J1-27	13	N				A7-3	13	Y			
20-2	23		J1-28	13	N				A7-2	13	Y			
21-1			J1-33	13	N				SR1-33					
21-2			J1-34	13	N				SR1-34					
22-1			J1-35	13	N				SR1-35					
22-2			J1-36	13	N				SR1-36					
23-1			J1-37	13	N				SR1-37					
23-2			J1-38	13	N				SR1-38					
24-1			J1-39	13	N				SR1-39					
24-2			J1-40	13	N				SR1-40					
25-1			J1-41	13	N				SR1-41					
25-2			J1-42	13	N				SR1-42					
26-1			J1-43	13	N				SR1-43					
26-2			J1-44	13	N				SR1-44					
27-1			J1-45	13	N				SR1-45					
27-2			J1-46	13	N				SR1-46					

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC NO.
28-1			J1-47	13	N			SR1-47				
28-2			J1-48	13	N			SR1-48				
29-1			J1-51	13	N			B1A-S3				
29-2			J1-52	13	N			B1A-S1				
30-1			J1-53	13	N			B1A-S2				
30-2			J1-54	13	N			B1A-S4				
31-1			J1-55	13	N			B1B-S3				
31-2			J1-56	13	N			B1B-S1				
32-1			J1-57	13	N			B1B-S2				
32-2			J1-58	13	N			B1B-S4				
33-1			SR1-27					A7-3	13	Y		
33-2			SR1-28					A7-2	13	Y		
34-1			SR1-10					K1-4	13	Y		
34-2			SR1-11					K1-8	13	Y		

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC NO.
35-1			SR1-29					A7-6	13	Y		
35-2			SR1-30					A7-1	13	Y		
36-1			SR1-31					A7-6	13	Y		
36-2			SR1-32					A7-5	13	Y		
37-1			SR1-49					A7-6	13	Y		
37-2			SR1-50					A7-4	13	Y		
38			J5-A	13	Y	17		SR1-26				
38-1			J5-B	13	Y	18		SR1-27				
39-2			J5-C	13	Y	18		SR1-28				
40-1			J5-B	13	Y			B1A-P3				
40-2			J5-C	13	Y			B1A-P1				
41-1			J5-D	13	Y	17		SR1-29				
41-2			J5-E	13	Y	17		SR1-30				
42-1			J5-F	13	Y	17		SR1-31				
42-2			J5-H	13	Y	17		SR1-32				
43-1			J5-J	13	Y	17		SR1-33				
43-2			J5-K	13	Y	17		SR1-34				

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC NO.
44-1			J5-L	13	Y	17		SR1-35				
44-2			J5-M	13	Y	17		SR1-36				
45-1			J5-N	13	Y	17		SR1-37				
45-2			J5-P	13	Y	17		SR1-38				
46-1			J5-R	13	Y	17		SR1-39				
46-2			J5-S	13	Y	17		SR1-40				
47-1			J5-T	13	Y	17		SR1-41				
47-2			J5-U	13	Y	17		SR1-42				
48-1			J5-V	13	Y	17		SR1-43				
48-2			J5-W	13	Y	17		SR1-44				
49-1			J5-X	13	Y	17		SR1-45				
49-2			J5-Y	13	Y	17		SR1-46				
50-1			J5-Z	13	Y	17		SR1-47				
50-2			J5-a	13	Y	17		SR1-48				
51-1			J5-b	13	Y	18		SR1-49				
51-2			J5-c	13	Y	18		SR1-50				
52-1			J5-b	13	Y			B1A-P2				
52-2			J5-c	13	Y			B1A-P4				

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TO TERMINATION FIND NO.	SPEC NO.
53			J6-A	13	Y	18		SR1-1				
54			J6-A	13	Y			E10	19	Y	31	
55						30						
55-A			SHLD-55					E10				
55-1			J6-B	13	Y	18		SR1-2				
55-2			J6-C	13	Y	18		SR1-3				
55-3			J6-D	13	Y	18		SR1-4				
55-4			J6-E	13	Y	18		SR1-5				
55-5			J6-W	13	Y	17		SR1-19				
55-6			J6-X	13	Y	17		SR1-20				
56-1			J6-F	13	Y	18		SR1-6				
56-2			J6-F	13	Y			SR1-7				
56-3			J6-J	13	Y	18		SR1-8				
56-4			J6-J	13	Y			SR1-9				

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CONDUCTOR		FROM				TO			
FIND NUMBER	NO.	CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC NO.	CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC NO.
1	21	J1-1	13 N			E50	16Y		
2	21	E1	19Y	31		E50	16Y		
3		SR1-1				E50	16Y		
4	29		1 50 1 25	19			1 25 1 00	20	
4B	21	E50	16Y			SHLD 4	16Y		
4L		J1-2	13N			E51	16Y		
4K		J1-4	13N			E52	16Y		
5	29		150 1 25	19			1 25 1 00	20	
5B	21	E50	16Y			SHLD 5	16Y		
5L		J1-3	13N			E51	16Y		
5K		J1-5	13N			E52	16Y		
6-1		SR1-2				E51	16Y		
6-2		SR1-3				E51	16Y		
6-3		SR1-4				E52	16Y		
6-4		SR1-5				E52	16Y		
6-5		SR1-19				E73	16Y		
6-6		SR1-20				E52	16Y		
7	25	E73	16Y			E51	16Y		

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CONDUCTOR		FROM				TO			
FIND NUMBER	NO.	CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC NO.	CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC NO.
57		J6-N	13Y	18		SR1-12			
58	22	J6-N	13Y			P3-C	13Y	18	
59	22	P3-C	13Y			P4-C	13Y		
60		P3-D	13Y	17		SR1-10			
61		P4-D	13Y	17		SR1-11			
62		J6-P	13Y	17		SR1-13			
63-1		J6-R	13Y	17		SR1-14			
63-2		J6-S	13Y	17		SR1-15			
64		J6-T	13Y	17		SR1-16			
65-1		J6-U	13Y	17		SR1-17			
65-2		J6-V	13Y	17		SR1-18			
66	23	J6-B	13Y	17		J6-C	13Y		
67	21	J6-D	13Y	17		J6-E	13Y		

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CONDUCTOR		FROM				TO			
FIND NUMBER	NO.	CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC NO.	CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC NO.
8-1	24	J1-6	13N			E53	16Y		
8-2	43	J1-8	13N			E54	16Y		
8-3	25	J1-7	13N			E53	16Y		
8-4	27	J1-9	13N			E54	16Y		
9-1		SR1-6				E53	16Y		
9-2		SR1-7				E53	16Y		
9-3		SR1-8				E54	16Y		
9-4		SR1-9				E54	16Y		
~~10-1~~	~~28~~	~~J1-10~~	~~13N~~			~~K1-4~~	~~13Y~~		
10-2	21	J1-11	13N			K1-8	13Y		
11		J1-12	13N			SR1-12			
12	25	J1-19	13N			E72	19Y		
13-1		SR1-14				E55	19Y		
13-2		SR1-15				E56	19Y		
14		SR1-16				E57	19Y		
15-1		SR1-17				E58	19Y		
15-2		SR1-18				E59	19Y		

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CONDUCTOR		FROM				TO			
FIND NUMBER	NO.	CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC NO.	CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC NO.
68-1		J6-Y	13Y	17		SR1-21			
68-2		J6-Z	13Y	17		SR1-22			
68-3		J6-a	13Y	17		SR1-23			
68-4		J6-b	13Y	17		SR1-24			
68-5		J6-c	13Y	17		SR1-25			
69	25	E73	19Y			K1-1	19Y		
70	21	K1-8	19Y			E71	19Y		

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC
16		J1-13	13N		SR1-13		
17-1	37	J1-14	13N		E55	19Y	
17-2	36	J1-15	13N		E56	19Y	
17-3	37	J1-29	13N		E55	19Y	
17-4	36	J1-30	13N		E56	19Y	
18	24	J1-16	13N		E57	19Y	
19-1	25	J1-17	13N		E58	19Y	
19-2	26	J1-18	13N		E59	19Y	
19-3	25	J1-31	13N		E58	19Y	
19-4	26	J1-32	13N		E59	19Y	
20		K1-5	13Y		SR1-26		
21	21	J1-20	13N		E70	19Y	
22-1		J1-21	13N		SR1-21		
22-2		J1-22	13N		SR1-22		
22-3		J1-23	13N		SR1-23		
22-4		J1-24	13N		SR1-24		
22-5		J1-25	13N		SR1-25		
23	24	J1-26	13N		E57	19Y	

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC
24-1	27	J1-27	13N		A7-3	13Y	
24-2	23	J1-28	13N		A7-2	13Y	
25-1		J1-33	13N		SR1-33		
25-2		J1-34	13N		SR1-34		
26-1		J1-35	13N		SR1-35		
26-2		J1-36	13N		SR1-36		
27-1		J1-37	13N		SR1-37		
27-2		J1-38	13N		SR1-38		
28-1		J1-39	13N		SR1-39		
28-2		J1-40	13N		SR1-40		
29-1		J1-41	13N		SR1-41		
29-2		J1-42	13N		SR1-42		
30-1		J1-43	13N		SR1-43		
30-2		J1-44	13N		SR1-44		
31-1		J1-45	13N		SR1-45		
31-2		J1-46	13N		SR1-46		

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC
32-1		J1-47	13N		SR1-47		
32-2		J1-48	13N		SR1-48		
33-1		J1-51	13N		B1A-S3		
33-2		J1-52	13N		B1A-S1		
34-1		J1-53	13N		B1A-S2		
34-2		J1-54	13N		B1A-S4		
35-1		J1-55	13N		B1B-S3		
35-2		J1-56	13N		B1B-S1		
36-1		J1-57	13N		B1B-S2		
36-2		J1-58	13N		B1B-S4		
37-1		SR1-27			A7-3	13Y	
37-2		SR1-28			A7-2	13Y	
38-1		SR1-10			K1-6	13Y	
38-2		SR1-11			K1-2	13Y	
39	26	J1-59	13N		K1-1	16Y	

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC
40-1		SR1-29			A7-6	13Y	
40-2		SR1-30			A7-1	13Y	
41-1		SR1-31			A7-6	13Y	
41-2		SR1-32			A7-5	13Y	
42-1		SR1-49			A7-6	13Y	
42-2		SR1-50			A7-4	13Y	
43		J5-A	13Y	17	SR1-26		
44-1		J5-B	13Y	18	SR1-27		
44-2		J5-C	13Y	18	SR1-28		
45-1		J5-B	13Y		B1A-P3		
45-2		J5-C	13Y		B1A-P1		
46-1		J5-D	13Y	17	SR1-29		
46-2		J5-E	13Y	17	SR1-30		
47-1		J5-F	13Y	17	SR1-31		
47-2		J5-H	13Y	17	SR1-32		
48-1		J5-J	13Y	17	SR1-33		
48-2		J5-K	13Y	17	SR1-34		

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CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC	NO.
63		J6-N	13Y		18		SR1-12				
64	22	J6-N	13Y				P3-C	13Y	18		
65	22	P3-C	13Y				P4-C	13Y			
66		P3-D	13Y		17		SR1-10				
67		P4-D	13Y		17		SR1-11				
68		J6-P	13Y		17		SR1-13				
69-1		J6-R	13Y		17		SR1-14				
69-2		J6-S	13Y		17		SR1-15				
70		J6-T	13Y		17		SR1-16				
71-1		J6-U	13Y		17		SR1-17				
71-2		J6-V	13Y		17		SR1-18				
72		J6-B	13Y				J6-C	13Y			
73		J6-D	13Y				J6-E	13Y			

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CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC	NO.
49-1		J5-L	13Y		17		SR1-35				
49-2		J5-M	13Y		17		SR1-36				
50-1		J5-N	13Y		17		SR1-37				
50-2		J5-P	13Y		17		SR1-38				
51-1		J5-R	13Y		17		SR1-39				
51-2		J5-S	13Y		17		SR1-40				
52-1		J5-T	13Y		17		SR1-41				
52-2		J5-U	13Y		17		SR1-42				
53-1		J5-V	13Y		17		SR1-43				
53-2		J5-W	13Y		17		SR1-44				
54-1		J5-X	13Y		17		SR1-45				
54-2		J5-Y	13Y		17		SR1-46				
55-1		J5-Z	13Y		17		SR1-47				
55-2		J5-a	13Y		17		SR1-48				
56-1		J5-b	13Y		18		SR1-49				
56-2		J5-c	13Y		18		SR1-50				
57-1		J5-b	13Y				B1A-P2				
57-2		J5-c	13Y				B1A-P4				

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CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC	NO.
74-1		J6-Y	13Y		17		SR1-21				
74-2		J6-Z	13Y		17		SR1-22				
74-3		J6-a	13Y		17		SR1-23				
74-4		J6-b	13Y		17		SR1-24				
74-5		J6-c	13Y		17		SR1-25				
75	21	K1-3	19Y				E71	19Y			
76	28	K1-4	19Y				K1-8	19Y			

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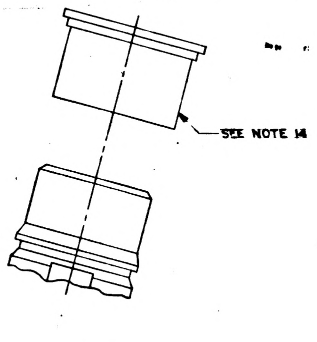
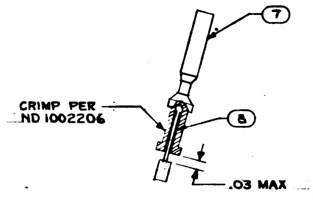
SHEET 19 of 21

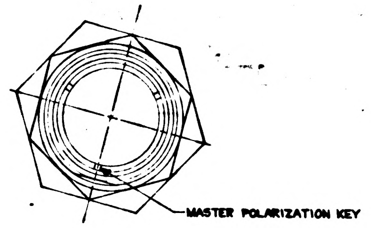
CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION FIND NO.	SPEC	NO.
58		J6-A	13Y		18		SR1-1				
59		J6-A	13Y				E10	19Y	31		
60					30						
61 A		SHLD-55					E10				
61-1		J6-B	13Y		18		SR1-2				
61-2		J6-C	13Y		18		SR1-3				
61-3		J6-D	13Y		18		SR1-4				
61-4		J6-E	13Y		18		SR1-5				
61-5		J6-W	13Y		17		SR1-19				
61-6		J6-X	13Y		17		SR1-20				
62-1		J6-F	13Y		18		SR1-6				
62-2		J6-F	13Y				SR1-7				
62-3		J6-J	13Y		18		SR1-8				
62-4		J6-K	13Y				SR1-9				



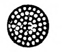
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

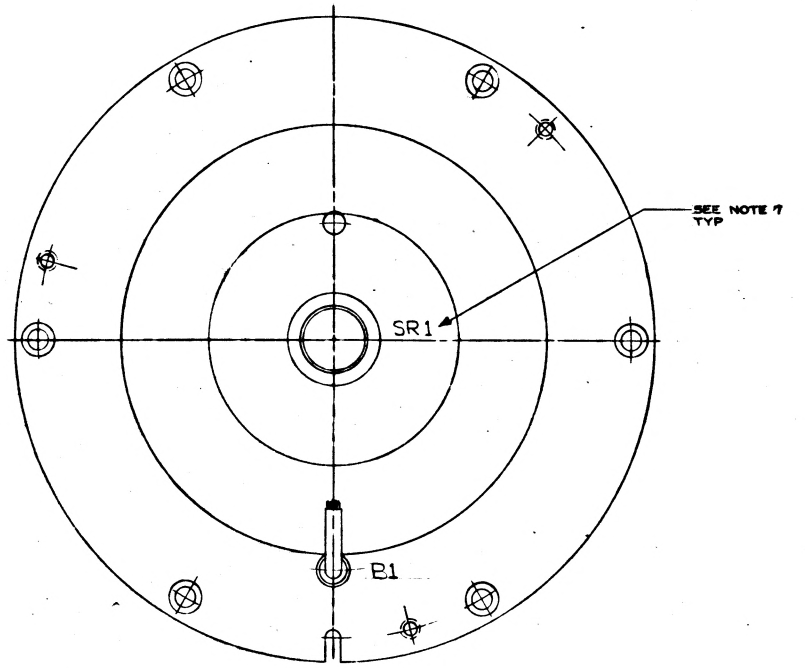
DETAIL A
SCALE 4/1


MASTER POLARIZATION KEY

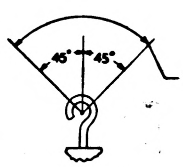
VIEW C-C



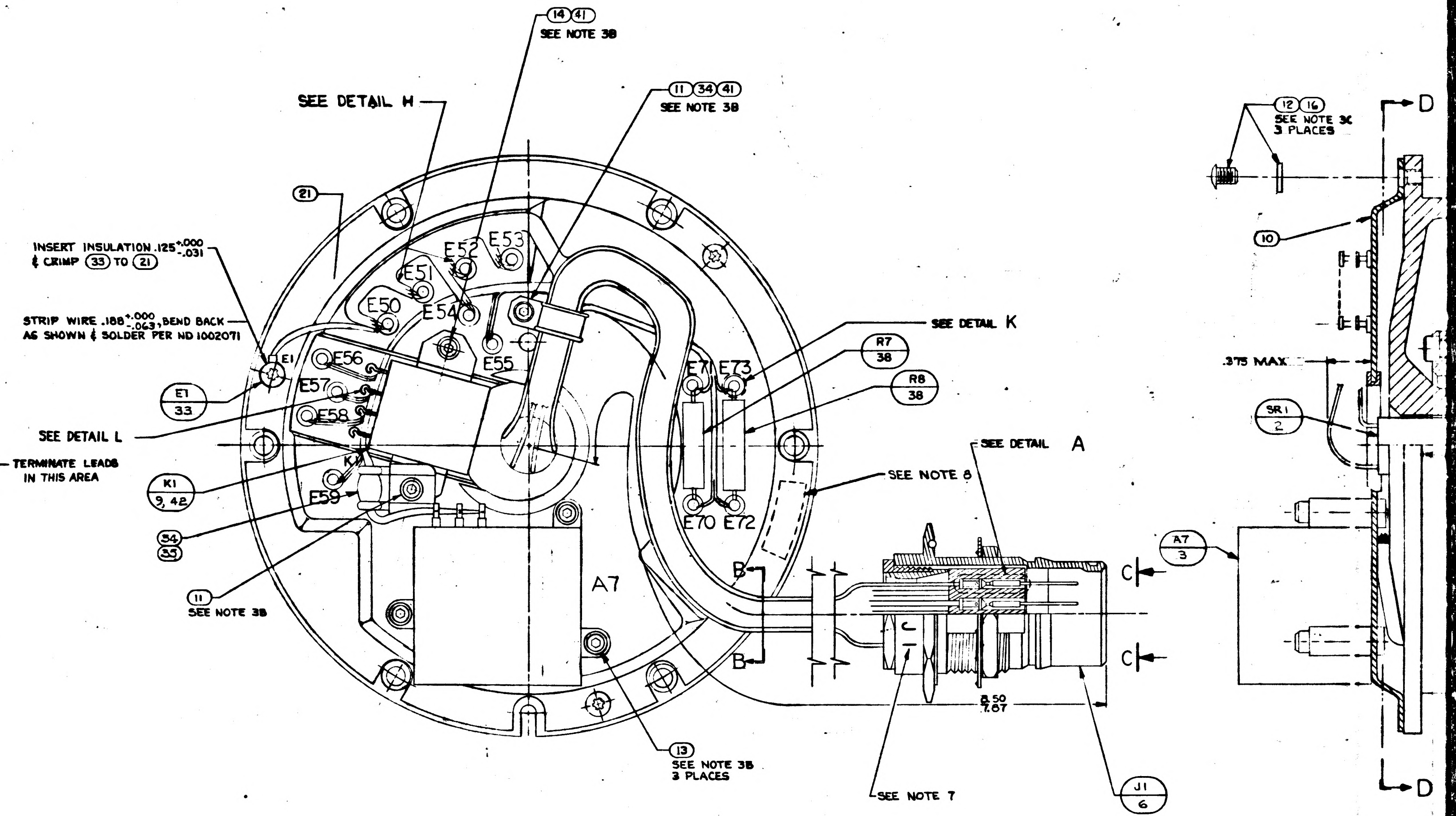
SECTION B-B

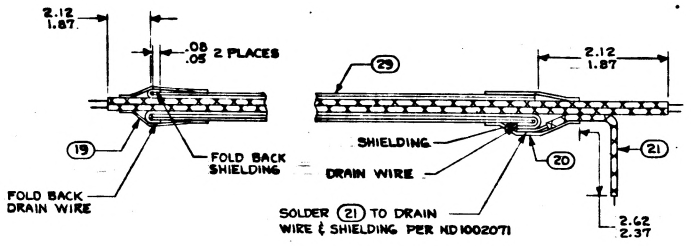

SEE NOTE 7
TYP
SR1
E1

VIEW D-D

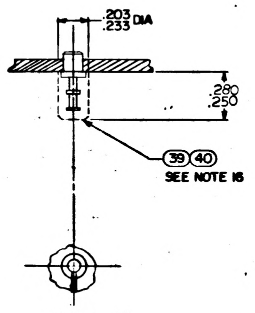

45°
45°
TERMINATE LEADS IN THIS AREA

DETAIL L
7 PLACES


14 41
SEE NOTE 3B
11 34 41
SEE NOTE 3B
SEE DETAIL H
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1
E1 33
SEE DETAIL L
K1 9, 42
34
35
11
SEE NOTE 3B
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
K1
A7
E70
E71
E72
E73
SEE DETAIL K
R7 38
R8 38
SEE NOTE 8
SEE DETAIL A
B
B
C
C
8.50
7.87
13
SEE NOTE 3B
3 PLACES
SEE NOTE 7
J1 6
12 16
SEE NOTE 3C
3 PLACES
10
.375 MAX
SR1 2
A7 3
D
D


2.12
1.87
.08
.05
2 PLACES
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
29
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND1002071
2.62
2.37

DETAIL H
SCALE: NONE


.203
.233 DIA
.280
.250
39 40
SEE NOTE 16

DETAIL K
4 PLACES

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16

TABLE I	
ASSEMBLY NO.	P.S. NUMBER
2018612-011	PS 2018612
2018612-021	PS 2016143

NOTES:

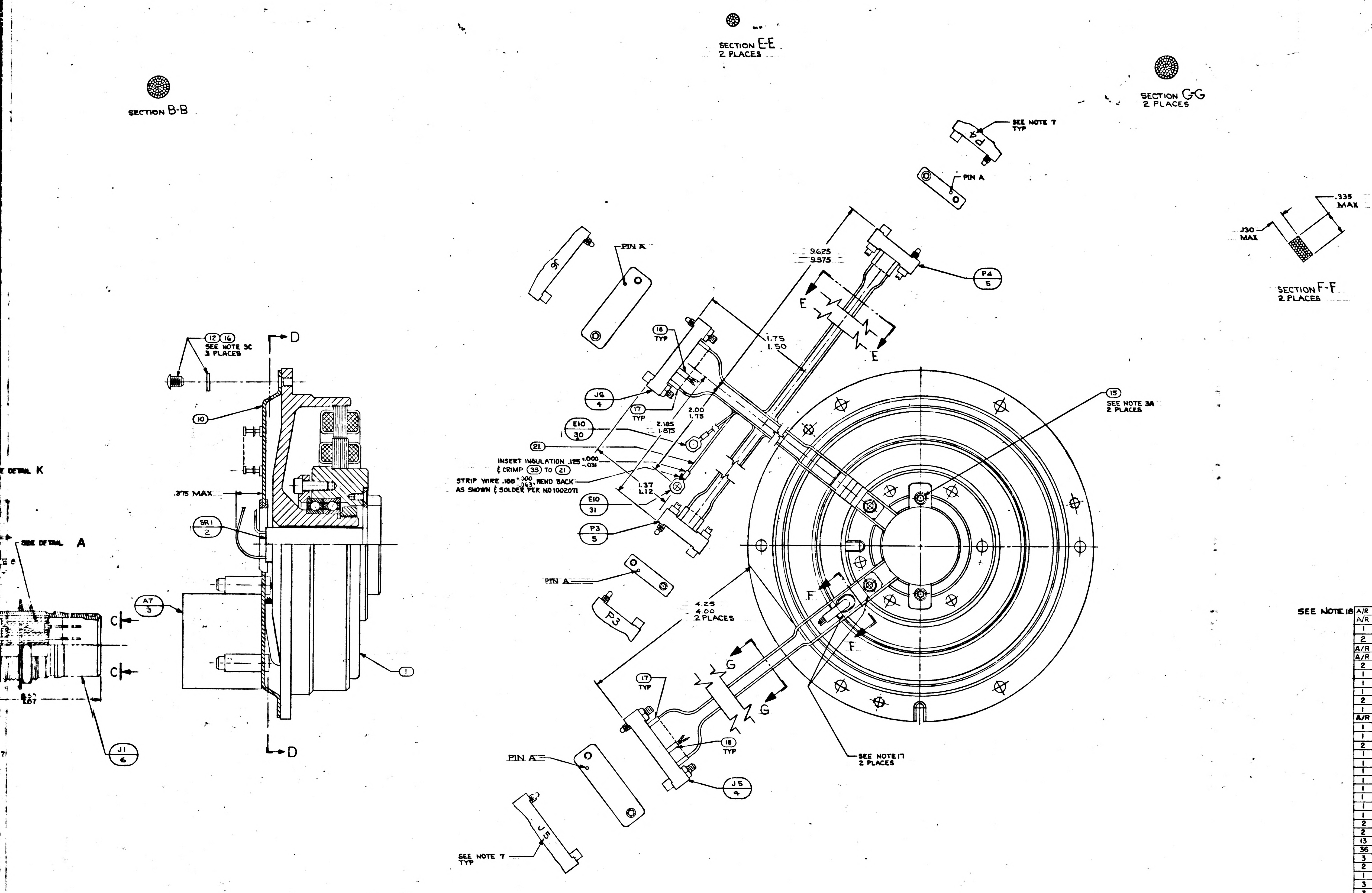
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS PER TABLE I
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
    - A. = SHIELD GROUND ON "FROM END"
    - B. = SHIELD GROUND ON "TO END"
    - K. = BLACK
    - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS (39) & (40) PER ND 1002009 METHOD B
17. TAPE HARNESS IN AREA INDICATED USING ITEM (43) TO MAINTAIN HARNESS CONFIGURATION PER SECTION F-F AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM (43).
18. TAPE (44) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.

3H

2018612 REV U SHT 1

1/2018612

SYM	DESCRIPTION REVISIONS TDRR 17167	DATE		
A	REVISED TDRR 18324	[illegible]-65		
B	REVISED TDRR 18902	5-18-65		
C	REVISED TDRR 19270	5-18-65		
D	REVISED TDRR 21320	7-26-65		
E	REVISED TDRR 21676	8-31-65		
F	REVISED TDRR 22014	8-31-65		
G	REVISED TDRR 22332	9-21-65		
H	REVISED TDRR 23045	10-13-65		
J	REVISED TDRR 23702	2Nov65		
K	REVISED TDRR 24900	4Jan66		
L	REVISED TDRR 25486	25Jan66		
M	REVISED TDRR 26243	2-1-66		
N	REVISED TDRR 26254	23Feb66		
P	REVISED TDRR 27508	30Mar66		
R	REVISED TDRR 28813	17May66		
S	REVISED TDRR 28850	17May66		
T	REVISED TDRR 32109	7DEC66	SCS	
U	REVISED TDRR 32849	3 FEB 67	JC	


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX
.130 MAX
SEE NOTE 7 TYP
P4
PIN A
J6
P4 5
9.625
9.375
E
E
1.75
1.50
18 TYP
J6 4
17 TYP
2.00
1.75
E10 30
2.185
1.875
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10 31
P3 5
PIN A
P3
4.25
4.00
2 PLACES
15
SEE NOTE 3A
2 PLACES
F
F
G
G
17 TYP
18 TYP
SEE NOTE 17
2 PLACES
PIN A
J5 4
J5
SEE NOTE 7 TYP
12 16
SEE NOTE 3C
3 PLACES
D
D
10
SEE DETAIL K
.375 MAX
SR1 2
SEE DETAIL A
A7 3
C
C
1
J1 6

SEE NOTE 18

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	MIL-I-151-26 TYPE ACT	TAPE, ADH, ELEC. PRESS SENSITIVE ½ WIDE	44
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	43
1	—	1010353-15	RELAY ELECTRO MAG SENSITIVE	42
2	1	MS 5795-803	WASHER, FLAT METAL ROUND	41
A/R	A/R	1006835	CURING AGENT	40
A/R	A/R	1006834	RESIN	39
2	2	2021504-44	RESISTOR	38
1	1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1	1000223	WASHER, CABLE CLAMP	35
2	2	1000220 SEE NOTE 15	CLAMP, CABLE	34
1	1	1010717-3	TERMINAL, LUG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1	1010717-1	TERMINAL, LUG	31
1	1	1000020-11	SHIELD & GROUND ASSY	30
2	2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1	1010416-8	WIRE AWG 28E VIO 25" LONG	26
1	1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	13	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC, SPLINE	15
1	1	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
2	2	1001488-2	SCREW, HEX SOC HD, SELF-LKG	11
1	1	2018792	GUIDE, WIRE ASSEMBLY	10
—	1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	61	1010862	BUSHING, SLEEVE	8
61	61	1010781-1	CONTACT ELEC	7
1	1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
021	011	LIST OF MATERIALS		

MASTER

NEXT ASSY	USED ON
2018601	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN DTB DATE 1/8/65
CHECKED G QUINN 3/8/65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 1 OF 21

2018612 U

2720186122

TDRR 17167 MAR 9 1965

220d F

CONDUCTOR		FROM							TO						
FIND NUMBER	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
1	21	J1-1	17		N				E50	25		Y			
2	21	E1	25		Y	31			E50	25		Y			
3		SR1-1							E50	25		Y			
4	29		1 50	1 25		19				1 25	1 00		20		
4B	21	E50	25		Y				SHLD 4	25		Y			
4L		J1-2	17		N				E51	25		Y			
4K		J1-4	17		N				E52	25		Y			
5	29		1 50	1 25		19				1 25	1 00		20		
5B	21	E50	25		Y				SHLD 5	25		Y			
5L		J1-3	17		N				E51	25		Y			
5K		J1-5	17		N				E52	25		Y			
6-1		SR1-2							E51	25		Y			
6-2		SR1-3							E51	25		Y			
6-3		SR1-4							E52	25		Y			
6-4		SR1-5							E52	25		Y			
6-5	25	SR1-19	17		Y				K1-1	18		Y			
6-6		SR1-20							E52	25		Y			
7	25	[illegible]	18		Y				E51	25		Y			

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

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CONDUCTOR		FROM							TO						
FIND NUMBER	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
8-1	24	J1-6	17		N				E53	25		Y			
8-2	26	J1-8	17		N				E54	25		Y			
8-3	25	J1-7	17		N				E53	25		Y			
8-4	27	J1-9	17		N				E54	25		Y			
9-1		SR1-6							E53	25		Y			
9-2		SR1-7							E53	25		Y			
9-3		SR1-8							E54	25		Y			
9-4		SR1-9							E54	25		Y			
10-1	28	J1-10	17		N				K1-4	18		Y			
10-2	21	J1-11	17		N				K1-8	18		Y			
11		J1-12	17		N				SR1-12						
71	25	J1-19	17		N				E72	25		Y			
72-1		SR1-14							E55	25		Y			
72-2		SR1-15							E56	25		Y			
73		SR1-16							E57	25		Y			
74-1		SR1-17							E58	25		Y			
74-2		SR1-18							E59	25		Y			

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SHEET 3 of 21

CONDUCTOR		FROM							TO						
FIND NUMBER	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
12		J1-13	17		N				SR1-13						
13-1	37	J1-14	17		N				E55	25		Y			
13-2	36	J1-15	17		N				E56	25		Y			
13-3	37	J1-29	17		N				E55	25		Y			
13-4	36	J1-30	17		N				E56	25		Y			
14	24	J1-16	17		N				E57	25		Y			
15-1	25	J1-17	17		N				E58	25		Y			
15-2	26	J1-18	17		N				E59	25		Y			
15-3	25	J1-31	17		N				E58	25		Y			
15-4	26	J1-32	17		N				E59	25		Y			
16		K1-5	18		Y				SR1-26						
17	21	J1-20	17		N				E70	25		Y			
18-1		J1-21	17		N				SR1-21						
18-2		J1-22	17		N				SR1-22						
18-3		J1-23	17		N				SR1-23						
18-4		J1-24	17		N				SR1-24						
18-5		J1-25	17		N				SR1-25						
19	24	J1-26	17		N				E57	25		Y			

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NASA DRAWING NO. 2018612-011

SHEET 4 of 21

CONDUCTOR		FROM							TO						
FIND NUMBER	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	CIRCUIT POINT	CUT WIRE OR SHIELD	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
20-1	27	J1-27	17		N				A7-3	17		Y			
20-2	23	J1-28	17		N				A7-2	17		Y			
21-1		J1-33	17		N				SR1-33						
21-2		J1-34	17		N				SR1-34						
22-1		J1-35	17		N				SR1-35						
22-2		J1-36	17		N				SR1-36						
23-1		J1-37	17		N				SR1-37						
23-2		J1-38	17		N				SR1-38						
24-1		J1-39	17		N				SR1-39						
24-2		J1-40	17		N				SR1-40						
25-1		J1-41	17		N				SR1-41						
25-2		J1-42	17		N				SR1-42						
26-1		J1-43	17		N				SR1-43						
26-2		J1-44	17		N				SR1-44						
27-1		J1-45	17		N				SR1-45						
27-2		J1-46	17		N				SR1-46						

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REVISION U

NASA DRAWING NO. 2018612 -011

SHEET 8 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	TIN	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TIN	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
44-1		J5-L	17	Y	17		SR1-35				
44-2		J5-M	17	Y	17		SR1-36				
45-1		J5-N	17	Y	17		SR1-37				
45-2		J5-P	17	Y	17		SR1-38				
46-1		J5-R	17	Y	17		SR1-39				
46-2		J5-S	17	Y	17		SR1-40				
47-1		J5-T	17	Y	17		SR1-41				
47-2		J5-U	17	Y	17		SR1-42				
48-1		J5-V	17	Y	17		SR1-43				
48-2		J5-W	17	Y	17		SR1-44				
49-1		J5-X	17	Y	17		SR1-45				
49-2		J5-Y	17	Y	17		SR1-46				
50-1		J5-Z	17	Y	17		SR1-47				
50-2		J5-a	17	Y	17		SR1-48				
51-1		J5-b	17	Y	18		SR1-49				
51-2		J5-c	17	Y	18		SR1-50				
52-1		J5-b	17	Y			B1A-P2				
52-2		J5-c	17	Y			B1A-P4				

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REVISION U

NASA DRAWING NO. 2018612 -011

SHEET 6 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	TIN	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TIN	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
28-1		J1-47	17	N			SR1-47				
28-2		J1-48	17	N			SR1-48				
29-1		J1-51	17	N			B1A-S3				
29-2		J1-52	17	N			B1A-S1				
30-1		J1-53	17	N			B1A-S2				
30-2		J1-54	17	N			B1A-S4				
31-1		J1-55	17	N			B1B-S3				
31-2		J1-56	17	N			B1B-S1				
32-1		J1-57	17	N			B1B-S2				
32-2		J1-58	17	N			B1B-S4				
33-1		SR1-27					A7-3	17	Y		
33-2		SR1-28					A7-2	17	Y		
34-1		SR1-10					K1-4	18	Y		
34-2		SR1-11					K1-8	18	Y		

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	TIN	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TIN	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
53		J6-A	17	Y	18		SR1-1				
54		J6-A	17	Y			E10	25	Y	31	
55					30						
55-A		SHLD-55					E10				
55-1		J6-B	17	Y	18		SR1-2				
55-2		J6-C	17	Y	18		SR1-3				
55-3		J6-D	17	Y	18		SR1-4				
55-4		J6-E	17	Y	18		SR1-5				
55-5		J6-W	17	Y	17		SR1-19				
55-6		J6-X	17	Y	17		SR1-20				
56-1		J6-F	17	Y	18		SR1-6				
56-2		J6-F	17	Y			SR1-7				
56-3		J6-J	17	Y	18		SR1-8				
56-4		J6-J	17	Y			SR1-9				

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	TIN	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TIN	TO TERMINATION FIND NO.	TO TERMINATION SPEC NO.
35-1		SR1-29					A7-6	17	Y		
35-2		SR1-30					A7-1	17	Y		
36-1		SR1-31					A7-6	17	Y		
36-2		SR1-32					A7-5	17	Y		
37-1		SR1-49					A7-6	17	Y		
37-2		SR1-50					A7-4	17	Y		
38		J5-A	17	Y	17		SR1-26				
38-1		J5-B	17	Y	18		SR1-27				
39-2		J5-C	17	Y	18		SR1-28				
40-1		J5-B	17	Y			B1A-P3				
40-2		J5-C	17	Y			B1A-P1				
41-1		J5-D	17	Y	17		SR1-29				
41-2		J5-E	17	Y	17		SR1-30				
42-1		J5-F	17	Y	17		SR1-31				
42-2		J5-H	17	Y	17		SR1-32				
43-1		J5-J	17	Y	17		SR1-33				
43-2		J5-K	17	Y	17		SR1-34				

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
1	21	J1-1	17 N				E50	25Y			
2	21	E1	25Y	31			E50	25Y			
3		SR1-1					E50	25Y			
4	29		1 50 1 25	19				1 25 1 00	20		
4B	21	E50	25Y				SHLD 4	25Y			
4L		J1-2	17N				E51	25Y			
4K		J1-4	17N				E52	25Y			
5	29		150 1 25	19				1 25 1 00	20		
5B	21	E50	25Y				SHLD 5	25Y			
5L		J1-3	17N				E51	25Y			
5K		J1-5	17N				E52	25Y			
6-1		SR1-2					E51	25Y			
6-2		SR1-3					E51	25Y			
6-3		SR1-4					E52	25Y			
6-4		SR1-5					E52	25Y			
6-5		SR1-19					E73	25Y			
6-6		SR1-20					E52	25Y			
7	25	E73	16Y				E51	25Y			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
57		J6-N	17Y	18			SR1-12				
58	22	J6-N	17Y				P3-C	17Y	18		
59	22	P3-C	17Y				P4-C	17Y			
60		P3-D	17Y	17			SR1-10				
61		P4-D	17Y	17			SR1-11				
62		J6-P	17Y	17			SR1-13				
63-1		J6-R	17Y	17			SR1-14				
63-2		J6-S	17Y	17			SR1-15				
64		J6-T	17Y	17			SR1-16				
65-1		J6-U	17Y	17			SR1-17				
65-2		J6-V	17Y	17			SR1-18				
66	23	J6-B	17Y	1			J6-C	17Y			
67	21	J6-D	17Y	1			J6-E	17Y			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
8-1	24	J1-6	17N				E53	25Y			
8-2	43	J1-8	17N				E54	25Y			
8-3	25	J1-7	17N				E53	25Y			
8-4	27	J1-9	17N				E54	25Y			
9-1		SR1-6					E53	25Y			
9-2		SR1-7					E53	25Y			
9-3		SR1-8					E54	25Y			
9-4		SR1-9					E54	25Y			
~~10-1~~	~~28~~	~~J1-10~~	~~13N~~				~~K1-4~~	~~13Y~~			
10-2	21	J1-11	17N				K1-8	18Y			
11		J1-12	17N				SR1-12				
12	25	J1-19	17N				E72	25Y			
13-1		SR1-14					E55	25Y			
13-2		SR1-15					E56	25Y			
14		SR1-16					E57	25Y			
15-1		SR1-17					E58	25Y			
15-2		SR1-18					E59	25Y			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
68-1		J6-Y	17Y	17			SR1-21				
68-2		J6-Z	17Y	17			SR1-22				
68-3		J6-a	17Y	17			SR1-23				
68-4		J6-b	17Y	17			SR1-24				
68-5		J6-d	17Y	17			SR1-25				
69	25	E73	25Y				K1-1	18Y			
70	21	K1-8	18Y				E71	25Y			

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	SPEC NO.
16			J1-13	17N			SR1-13			
17-1	37		J1-14	17N			E55	25Y		
17-2	36		J1-15	17N			E56	25Y		
17-3	37		J1-29	17N			E55	25Y		
17-4	36		J1-30	17N			E56	25Y		
18	24		J1-16	17N			E57	25Y		
19-1	25		J1-17	17N			E58	25Y		
19-2	26		J1-18	17N			E59	25Y		
19-3	25		J1-31	17N			E58	25Y		
19-4	26		J1-32	17N			E59	25Y		
20			K1-5	18Y			SR1-26			
21	21		J1-20	17N			E70	25Y		
22-1			J1-21	17N			SR1-21			
22-2			J1-22	17N			SR1-22			
22-3			J1-23	17N			SR1-23			
22-4			J1-24	17N			SR1-24			
22-5			J1-25	17N			SR1-25			
23	24		J1-26	17N			E57	25Y		

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	SPEC NO.
24-1	27		J1-27	17N			A7-3	17Y		
24-2	23		J1-28	17N			A7-2	17Y		
25-1			J1-33	17N			SR1-33			
25-2			J1-34	17N			SR1-34			
26-1			J1-35	17N			SR1-35			
26-2			J1-36	17N			SR1-36			
27-1			J1-37	17N			SR1-37			
27-2			J1-38	17N			SR1-38			
28-1			J1-39	17N			SR1-39			
28-2			J1-40	17N			SR1-40			
29-1			J1-41	17N			SR1-41			
29-2			J1-42	17N			SR1-42			
30-1			J1-43	17N			SR1-43			
30-2			J1-44	17N			SR1-44			
31-1			J1-45	17N			SR1-45			
31-2			J1-46	17N			SR1-46			

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	SPEC NO.
32-1			J1-47	17N			SR1-47			
32-2			J1-48	17N			SR1-48			
33-1			J1-51	17N			B1A-S3			
33-2			J1-52	17N			B1A-S1			
34-1			J1-53	17N			B1A-S2			
34-2			J1-54	17N			B1A-S4			
35-1			J1-55	17N			B1B-S3			
35-2			J1-56	17N			B1B-S1			
36-1			J1-57	17N			B1B-S2			
36-2			J1-58	17N			B1B-S4			
37-1			SR1-27				A7-3	17Y		
37-2			SR1-28				A7-2	17Y		
38-1			SR1-10				K1-6	18Y		
38-2			SR1-11				K1-2	18Y		
39	26		J1-59	17N			K1-1	18Y		

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CONDUCTOR FIND NUMBER	FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	SPEC NO.
40-1			SR1-29				A7-6	17Y		
40-2			SR1-30				A7-1	17Y		
41-1			SR1-31				A7-6	17Y		
41-2			SR1-32				A7-5	17Y		
42-1			SR1-49				A7-6	17Y		
42-2			SR1-50				A7-4	17Y		
43			J5-A	17Y		17	SR1-26			
44-1			J5-B	17Y		18	SR1-27			
44-2			J5-C	17Y		18	SR1-28			
45-1			J5-B	17Y			B1A-P3			
45-2			J5-C	17Y			B1A-P1			
46-1			J5-D	17Y		17	SR1-29			
46-2			J5-E	17Y		17	SR1-30			
47-1			J5-F	17Y		17	SR1-31			
47-2			J5-H	17Y		17	SR1-32			
48-1			J5-J	17Y		17	SR1-33			
48-2			J5-K	17Y		17	SR1-34			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
49-1		J5-L	17Y		17		SR1-35				
49-2		J5-M	17Y		17		SR1-36				
50-1		J5-N	17Y		17		SR1-37				
50-2		J5-P	17Y		17		SR1-38				
51-1		J5-R	17Y		17		SR1-39				
51-2		J5-S	17Y		17		SR1-40				
52-1		J5-T	17Y		17		SR1-41				
52-2		J5-U	17Y		17		SR1-42				
53-1		J5-V	17Y		17		SR1-43				
53-2		J5-W	17Y		17		SR1-44				
54-1		J5-X	17Y		17		SR1-45				
54-2		J5-Y	17Y		17		SR1-46				
55-1		J5-Z	17Y		17		SR1-47				
55-2		J5-a	17Y		17		SR1-48				
56-1		J5-b	17Y		18		SR1-49				
56-2		J5-c	17Y		18		SR1-50				
57-1		J5-b	17Y				B1A-P2				
57-2		J5-c	17Y				B1A-P4				

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
58		J6-A	17Y		18		SR1-1				
59		J6-A	17Y				E10	25Y	31		
60					30						
61 A		SHLD-55					E10				
61-1		J6-B	17Y		18		SR1-2				
61-2		J6-C	17Y		18		SR1-3				
61-3		J6-D	17Y		18		SR1-4				
61-4		J6-E	17Y		18		SR1-5				
61-5		J6-W	17Y		17		SR1-19				
61-6		J6-X	17Y		17		SR1-20				
62-1		J6-F	17Y		18		SR1-6				
62-2		J6-F	17Y				SR1-7				
62-3		J6-J	17Y		18		SR1-8				
62-4		J6-H	17Y				SR1-9				

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
63		J6-N	17Y		18		SR1-12				
64	22	J6-N	17Y				P3-C	17Y	18		
65	22	P3-C	17Y				P4-C	17Y			
66		P3-D	17Y		17		SR1-10				
67		P4-D	17Y		17		SR1-11				
68		J6-P	17Y		17		SR1-13				
69-1		J6-R	17Y		17		SR1-14				
69-2		J6-S	17Y		17		SR1-15				
70		J6-T	17Y		17		SR1-16				
71-1		J6-U	17Y		17		SR1-17				
71-2		J6-V	17Y		17		SR1-18				
72		J6-B	17Y				J6-C	17Y			
73		J6-D	17Y				J6-E	17Y			

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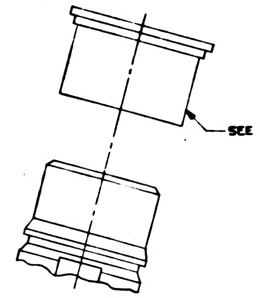
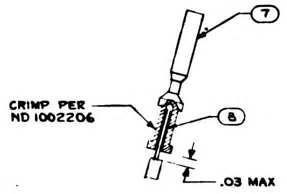
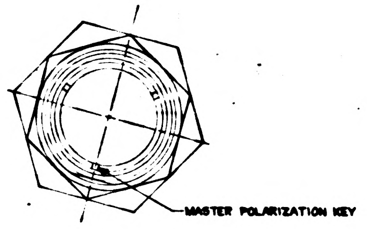
CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
74-1		J6-Y	17Y		17		SR1-21				
74-2		J6-Z	17Y		17		SR1-22				
74-3		J6-a	17Y		17		SR1-23				
74-4		J6-b	17Y		17		SR1-24				
74-5		J6-c	17Y		17		SR1-25				
75	21	K1-3	18Y				E71	25Y			
76	28	K1-4	18Y				K1-8	18Y			



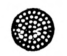
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

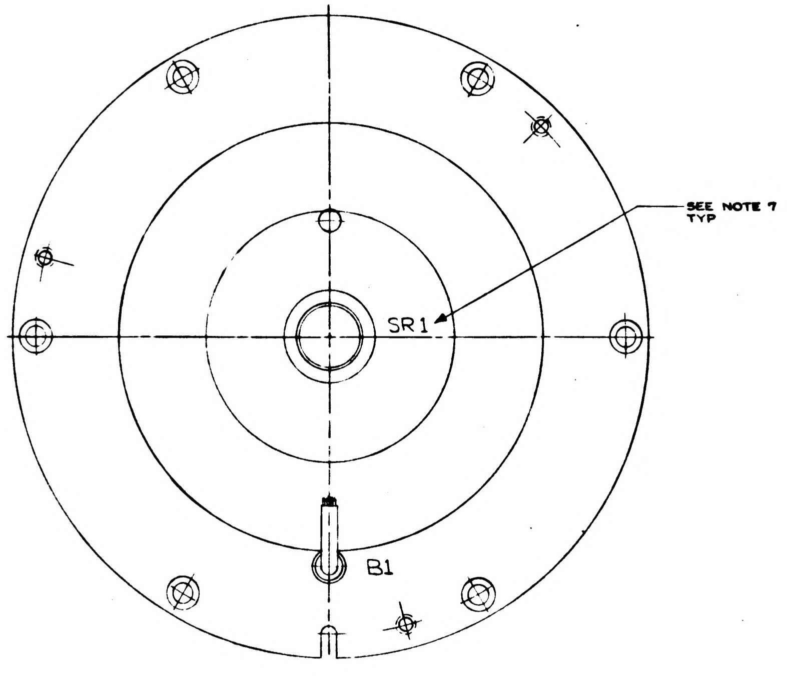
DETAIL A
SCALE 4/1


MASTER POLARIZATION KEY

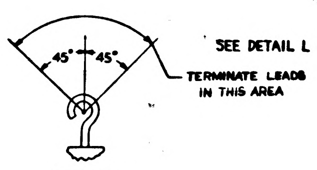
VIEW C-C



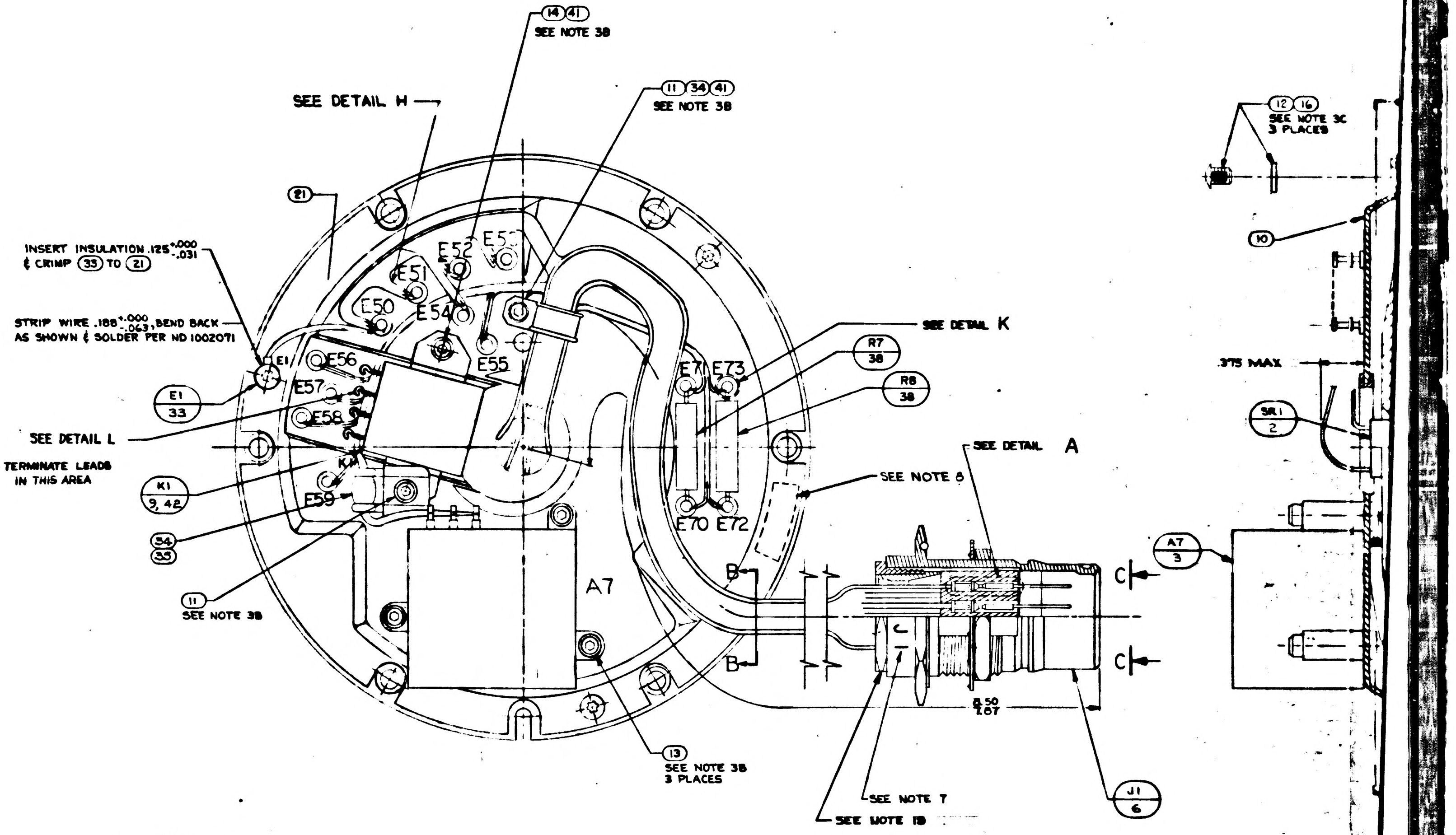
SECTION B-B

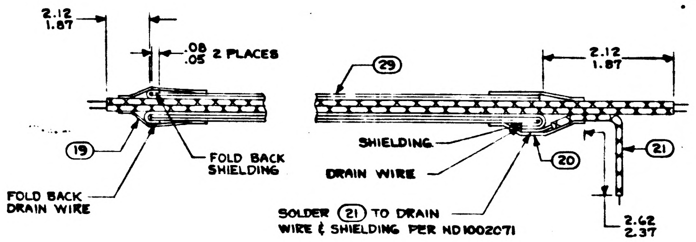

SEE NOTE 7 TYP
SR1
B1

VIEW D-D

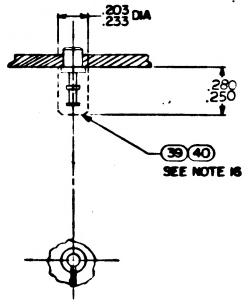

45°
45°
TERMINATE LEADS IN THIS AREA

DETAIL L
7 PLACES


14 41
SEE NOTE 38
SEE DETAIL H
11 34 41
SEE NOTE 38
12 16
SEE NOTE 3C
3 PLACES
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
E1
E1
33
SEE DETAIL L
K1
K1
9, 42
34
35
11
SEE NOTE 38
SEE DETAIL K
R7
38
R8
38
E71
E73
E70
E72
SEE DETAIL A
SEE NOTE 8
10
.375 MAX
SR1
2
A7
A7
3
B
B
C
C
8.50
8.07
13
SEE NOTE 38
3 PLACES
SEE NOTE 7
SEE NOTE 19
J1
6


2.12
1.87
.08
.05
2 PLACES
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
29
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND 1002071
2.62
2.37

DETAIL H
SCALE: NONE


.203
.233 DIA
.290
.250
39 40
SEE NOTE 16

DETAIL K
4 PLACES

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16

TABLE I	
ASSEMBLY NO.	PS. NUMBER
2018612-011	PS 2018612
2018612-021	PS 2016143

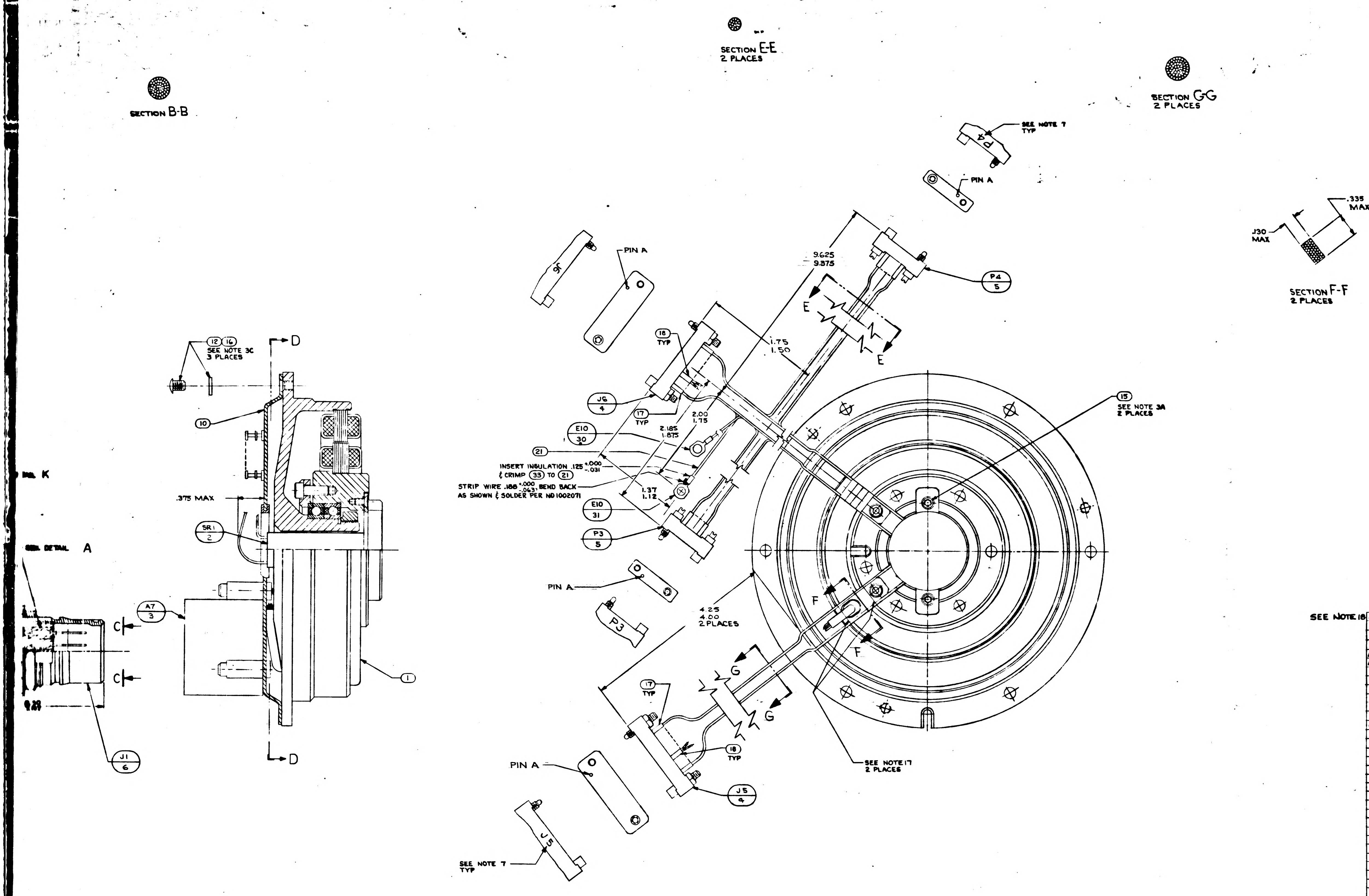
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS PER TABLE I
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"
    - K = BLACK
    - L = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-168, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS (39) & (40) PER ND 1002009 METHOD B
17. TAPE HARNESS IN AREA INDICATED USING ITEM (43) TO MAINTAIN HARNESS CONFIGURATION PER SECTION F-F AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM (43).
18. TAPE (44) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
19. TORQUE RETAINING NUT TO 45-55 lb-IN.

3H

2018612	V	1

1/2018612


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX
.130 MAX
SEE NOTE 7 TYP
P4
PIN A
J6
9.625
9.375
P4 5
E
E
1.75
1.50
18 TYP
J6 4
17 TYP
2.00
1.75
2.185
1.875
E10 30
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063 BEND BACK AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10 31
P3 5
15
SEE NOTE 3A 2 PLACES
PIN A
P3
4.25
4.00
2 PLACES
F
F
17 TYP
G
G
18 TYP
PIN A
J5 4
SEE NOTE 17 2 PLACES
J5
SEE NOTE 7 TYP
12 16
SEE NOTE 3C 3 PLACES
D
D
10
.375 MAX
SR1 2
DETAIL A
A7 3
C
C
1
J1 6
K

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 17167		
A	REVISED TDRR 18326	3-4-65	
B	REVISED TDRR 18902	5-18-65	
C	REVISED TDRR 19270	5-18-65	
D	REVISED TDRR 21320	7-26-65	
E	REVISED TDRR 21676	8-31-65	
F	REVISED TDRR 22014	8-31-65	
G	REVISED TDRR 22332	9-21-65	
H	REVISED TDRR 23048	10-13-65	
J	REVISED TDRR 23702	[illegible]	
K	REVISED TDRR 24900	[illegible] 66	
L	REVISED TDRR 25486	25 Jan 66	
M	REVISED TDRR 26243	[illegible] 66	
N	REVISED TDRR 26254	[illegible]	
P	REVISED TDRR 27508	[illegible]	
R	REVISED TDRR 28813	7 May 66	
S	REVISED TDRR 28850	7 May 66	
T	REVISED TDRR 32109	7 DEC [illegible]	SCS
U	REVISED TDRR 32849	3 FEB 67	JC
V	REVISED TDRR 33173	[illegible]	TEM

SEE NOTE 18

021	011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	MIL-I-15126 TYPE ACT	TAPE, ADH, ELEC. PRESS SENSITIVE ½ WIDE	44
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	43
1	—	1010353-15	RELAY ELECTRO MAG SENSITIVE	42
2	1	MS15795-803	WASHER, FLAT METAL ROUND	41
A/R	A/R	1006835	CURING AGENT	40
A/R	A/R	1006834	RESIN	39
2	2	2021504-44	RESISTOR	38
1	1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1	1000223	WASHER, CABLE CLAMP	35
2	2	1000220 SEE NOTE 15	CLAMP CABLE	34
1	1	1010717-3	TERMINAL, LUG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1	1010717-1	TERMINAL, LUG	31
1	1	1000020-11	SHIELD & GROUND ASSY	30
2	2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1	1010416-8	WIRE AWG 28E VIO 25" LONG	26
1	1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	13	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
1	1	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
2	2	1001489-2	SCREW, HEX SOC HD, SELF-LKG	11
1	1	2018792	GUIDE, WIRE ASSEMBLY	10
—	1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	61	1010862	BUSHING, SLEEVE	8
61	61	1010781-1	CONTACT ELEC	7
1	1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
	QTY REQD			

LIST OF MATERIALS

MASTER

NEXT ASSY	USED ON
2018601	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DTB DATE 1/8/65
CHECKED G Quinn 3/8/65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 1 OF 21

2018612 V

2018612 V T

2/2018612

O.A. RESOLV.
MANNED SPACECRAFT CENTER HOUSTON TEXAS
REVISION V
NASA DRAWING NO. 201812-011 SHEET 4 of 21

Conductor Find Number	Individual Length No.	From Circuit Point	From Cut Wire or Shield	From Y/N	From Strip Wire or Jacket	From Termination Spec Find No.	To Circuit Point	To Cut Wire or Shield	To Y/N	To Strip Wire or Jacket	To Termination Spec Find No.
12		J1-13	17	N			SR1-13				
13-1	37	J1-14	17	N			E55	25	Y		
13-2	36	J1-15	17	N			E56	25	Y		
13-3	37	J1-29	17	N			E55	25	Y		
13-4	36	J1-30	17	N			E56	25	Y		
14	24	J1-16	17	N			E57	25	Y		
15-1	25	J1-17	17	N			E58	25	Y		
15-2	26	J1-18	17	N			E59	25	Y		
15-3	25	J1-31	17	N			E58	25	Y		
15-4	26	J1-32	17	N			E59	25	Y		
16		K1-5	18	Y			SR1-26				
17	21	J1-20	17	N			E70	25	Y		
18-1		J1-21	17	N			SR1-21				
18-2		J1-22	17	N			SR1-22				
18-3		J1-23	17	N			SR1-23				
18-4		J1-24	17	N			SR1-24				
18-5		J1-25	17	N			SR1-25				
19	24	J1-26	17	N			E57	25	Y		

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NASA DRAWING NO. 201812-011 SHEET 2 of 21

Conductor Find Number	Individual Length No.	From Circuit Point	From Cut Wire or Shield	From Y/N	From Strip Wire or Jacket	From Termination Spec Find No.	To Circuit Point	To Cut Wire or Shield	To Y/N	To Strip Wire or Jacket	To Termination Spec Find No.
1	[illegible]	J1-1	17	N			E50	25	Y		
2	21	K1	25	Y		31	E50	25	Y		
3		SR1-1					E50	25	Y		
4	29		1 50		1 25	19		1 25		1 00	20
4B	21	E50	25	Y			SHLD 4	25	Y		
4L		J1-2	17	N			E51	25	Y		
4K		J1-4	17	N			E52	25	Y		
5	29		1 50		1 25	19		1 25		1 00	20
5B	21	E50	25	Y			SHLD 5	25	Y		
5L		J1-3	17	N			E51	25	Y		
5K		J1-5	17	N			E52	25	Y		
6-1		SR1-2					E51	25	Y		
6-2		SR1-3					E51	25	Y		
6-3		SR1-4					E52	25	Y		
6-4		SR1-5					E52	25	Y		
6-5		SR1-19	17	Y			K1-1	18	Y		
6-6		SR1-20					E52	25	Y		
7	25	[illegible]	18	Y			E51	25	Y		

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REVISION V
NASA DRAWING NO. 201812-011 SHEET 5 of 21

Conductor Find Number	Individual Length No.	From Circuit Point	From Cut Wire or Shield	From Y/N	From Strip Wire or Jacket	From Termination Spec Find No.	To Circuit Point	To Cut Wire or Shield	To Y/N	To Strip Wire or Jacket	To Termination Spec Find No.
20-1	27	J1-27	17	N			A7-3	17	Y		
20-2	23	J1-28	17	N			A7-2	17	Y		
21-1		J1-33	17	N			SR1-33				
21-2		J1-34	17	N			SR1-34				
22-1		J1-35	17	N			SR1-35				
22-2		J1-36	17	N			SR1-36				
23-1		J1-37	17	N			SR1-37				
23-2		J1-38	17	N			SR1-38				
24-1		J1-39	17	N			SR1-39				
24-2		J1-40	17	N			SR1-40				
25-1		J1-41	17	N			SR1-41				
25-2		J1-42	17	N			SR1-42				
26-1		J1-43	17	N			SR1-43				
26-2		J1-44	17	N			SR1-44				
27-1		J1-45	17	N			SR1-45				
27-2		J1-46	17	N			SR1-46				

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REVISION V
NASA DRAWING NO. 201812-011 SHEET 3 of 21

Conductor Find Number	Individual Length No.	From Circuit Point	From Cut Wire or Shield	From Y/N	From Strip Wire or Jacket	From Termination Spec Find No.	To Circuit Point	To Cut Wire or Shield	To Y/N	To Strip Wire or Jacket	To Termination Spec Find No.
8-1	24	J1-6	17	N			E53	25	Y		
8-2	26	J1-8	17	N			E54	25	Y		
8-3	25	J1-7	17	N			E53	25	Y		
8-4	27	J1-9	17	N			E54	25	Y		
9-1		SR1-6					E53	25	Y		
9-2		SR1-7					E53	25	Y		
9-3		SR1-8					E54	25	Y		
9-4		SR1-9					E54	25	Y		
10-1	28	J1-10	17	N			K1-4	18	Y		
10-2	21	J1-11	17	N			K1-8	18	Y		
11		J1-12	17	N			SR1-12				
71	25	J1-19	17	N			E72	25	Y		
72-1		SR1-14					E55	25	Y		
72-2		SR1-15					E56	25	Y		
73		SR1-16					E57	25	Y		
74-1		SR1-17					E58	25	Y		
74-2		SR1-18					E59	25	Y		

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
44-1			J5-L	17	Y	17			SR1-35					
44-2			J5-M	17	Y	17			SR1-36					
45-1			J5-N	17	Y	17			SR1-37					
45-2			J5-P	17	Y	17			SR1-38					
46-1			J5-R	17	Y	17			SR1-39					
46-2			J5-S	17	Y	17			SR1-40					
47-1			J5-T	17	Y	17			SR1-41					
47-2			J5-U	17	Y	17			SR1-42					
48-1			J5-V	17	Y	17			SR1-43					
48-2			J5-W	17	Y	17			SR1-44					
49-1			J5-X	17	Y	17			SR1-45					
49-2			J5-Y	17	Y	17			SR1-46					
50-1			J5-Z	17	Y	17			SR1-47					
50-2			J5-a	17	Y	17			SR1-48					
51-1			J5-b	17	Y	18			SR1-49					
51-2			J5-c	17	Y	18			SR1-50					
52-1			J5-b	17	Y				B1A-P2					
52-2			J5-c	17	Y				B1A-P4					

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REVISION V

NASA DRAWING NO. 2018612 -011
SHEET 8 of 21

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
28-1			J1-47	17	N				SR1-47					
28-2			J1-48	17	N				SR1-48					
29-1			J1-51	17	N				B1A-S3					
29-2			J1-52	17	N				B1A-S1					
30-1			J1-53	17	N				B1A-S2					
30-2			J1-54	17	N				B1A-S4					
31-1			J1-55	17	N				B1B-S3					
31-2			J1-56	17	N				B1B-S1					
32-1			J1-57	17	N				B1B-S2					
32-2			J1-58	17	N				B1B-S4					
33-1			SR1-27						A7-3	17	Y			
33-2			SR1-28						A7-2	17	Y			
34-1			SR1-10						K1-4	18	Y			
34-2			SR1-11						K1-8	18	Y			

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REVISION V

NASA DRAWING NO. 2018612 -011
SHEET 6 of 21

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
53			J6-A	17	Y	18			SR1-1					
54			J6-A	17	Y				E10	25	Y	31		
55						30								
55-A			SHLD-55						E10					
55-1			J6-B	17	Y	18			SR1-2					
55-2			J6-C	17	Y	18			SR1-3					
55-3			J6-D	17	Y	18			SR1-4					
55-4			J6-E	17	Y	18			SR1-5					
55-5			J6-W	17	Y	17			SR1-19					
55-6			J6-X	17	Y	17			SR1-20					
56-1			J6-F	17	Y	18			SR1-6					
56-2			J6-F	17	Y				SR1-7					
56-3			J6-J	17	Y	18			SR1-8					
56-4			J6-J	17	Y				SR1-9					

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REVISION V

NASA DRAWING NO. 2018612 -011
SHEET 9 of 21

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
35-1			SR1-29						A7-6	17	Y			
35-2			SR1-30						A7-1	17	Y			
36-1			SR1-31						A7-6	17	Y			
36-2			SR1-32						A7-5	17	Y			
37-1			SR1-49						A7-6	17	Y			
37-2			SR1-50						A7-4	17	Y			
38			J5-A	17	Y	17			SR1-26					
38-1			J5-B	17	Y	18			SR1-27					
39-2			J5-C	17	Y	18			SR1-28					
40-1			J5-B	17	Y				B1A-P3					
40-2			J5-C	17	Y				B1A-P1					
41-1			J5-D	17	Y	17			SR1-29					
41-2			J5-E	17	Y	17			SR1-30					
42-1			J5-F	17	Y	17			SR1-31					
42-2			J5-H	17	Y	17			SR1-32					
43-1			J5-J	17	Y	17			SR1-33					
43-2			J5-K	17	Y	17			SR1-34					

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MANNED SPACECRAFT CENTER
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REVISION V

NASA DRAWING NO. 2018612 -011
SHEET 7 of 21

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION V

NASA DRAWING NO.
2018612-021
SHEET 12 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	Y/N	FROM CUT WIRE OR SHIELD	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	Y/N	TO CUT WIRE OR SHIELD	TO TERMINATION FIND NO.
1	21	J1-1	17	N			E50	25	Y		
2	21	E1	25	Y		31	E50	25	Y		
3		SR1-1					E50	25	Y		
4	29		1 50		1 25	19		1 25		1 00	20
4B	21	E50	25	Y			SHLD 4	25	Y		
4L		J1-2	17	N			E51	25	Y		
4K		J1-4	17	N			E52	25	Y		
5	29		1 50		1 25	19		1 25		1 00	20
5B	21	E50	25	Y			SHLD 5	25	Y		
5L		J1-3	17	N			E51	25	Y		
5K		J1-5	17	N			E52	25	Y		
6-1		SR1-2					E51	25	Y		
6-2		SR1-3					E51	25	Y		
6-3		SR1-4					E52	25	Y		
6-4		SR1-5					E52	25	Y		
6-5		SR1-19					E73	25	Y		
6-6		SR1-20					E52	25	Y		
7	25	E73	16	Y			E51	25	Y		

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REVISION V

NASA DRAWING NO.
2018612 -011
SHEET 10 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	Y/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	Y/N	TO TERMINATION FIND NO.
57		J6-N	17	Y	18	SR1-12			
58	22	J6-N	17	Y		P3-C	17	Y	18
59	22	P3-C	17	Y		P4-C	17	Y	
60		P3-D	17	Y	17	SR1-10			
61		P4-D	17	Y	17	SR1-11			
62		J6-P	17	Y	17	SR1-13			
63-1		J6-R	17	Y	17	SR1-14			
63-2		J6-S	17	Y	17	SR1-15			
64		J6-T	17	Y	17	SR1-16			
65-1		J6-U	17	Y	17	SR1-17			
65-2		J6-V	17	Y	17	SR1-18			
66	23	J6-B	17	Y		J6-C	17	Y	
67	21	J6-D	17	Y		J6-E	17	Y	

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NASA DRAWING NO.
2018612-021
SHEET 13 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	Y/N	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	Y/N
8-1	24	J1-6	17	N	E53	25	Y
8-2	43	J1-8	17	N	E54	25	Y
8-3	25	J1-7	17	N	E53	25	Y
8-4	27	J1-9	17	N	E54	25	Y
9-1		SR1-6			E53	25	Y
9-2		SR1-7			E53	25	Y
9-3		SR1-8			E54	25	Y
9-4		SR1-9			E54	25	Y
~~10-1~~	~~28~~	[illegible]	[illegible]		[illegible]	[illegible]	
10-	21	J1-11	17	N	K1-8	18	Y
11		J1-12	17	N	SR1-12		
12	25	J1-19	17	N	E72	25	Y
13-1		SR1-14			E55	25	Y
13-2		SR1-15			E56	25	Y
14		SR1-16			E57	25	Y
15-1		SR1-17			E58	25	Y
15-2		SR1-18			E59	25	Y

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SHEET 11 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	Y/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	Y/N
68-1		J6-Y	17	Y	17	SR1-21		
68-2		J6-Z	17	Y	17	SR1-22		
68-3		J6-a	17	Y	17	SR1-23		
68-4		J6-b	17	Y	17	SR1-24		
68-5		J6-c	17	Y	17	SR1-25		
69	25	E73	25	Y		K1-1	18	Y
70	21	K1-8	18	Y		E71	25	Y

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NASA DRAWING NO.
2018612-021
SHEET 14 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y/N	TO TERMINATION FIND NO.	SPEC	NO.
16		J1-13	17	N				SR1-13					
17-1	37	J1-14	17	N				E55	25	Y			
17-2	36	J1-15	17	N				E56	25	Y			
17-3	37	J1-29	17	N				E55	25	Y			
17-4	36	J1-30	17	N				E56	25	Y			
18	24	J1-16	17	N				E57	25	Y			
19-1	25	J1-17	17	N				E58	25	Y			
19-2	26	J1-18	17	N				E59	25	Y			
19-3	25	J1-31	17	N				E58	25	Y			
19-4	26	J1-32	17	N				E59	25	Y			
20		K1-5.	18	Y				SR1-26					
21	21	J1-20	17	N				E70	25	Y			
22-1		J1-21	17	N				SR1-21					
22-2		J1-22	17	N				SR1-22					
22-3		J1-23	17	N				SR1-23					
22-4		J1-24	17	N				SR1-24					
22-5		J1-25	17	N				SR1-25					
23	24	J1-26	17	N				E57	25	Y			

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NASA DRAWING NO.
2018612-021
SHEET 15 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y/N	TO TERMINATION FIND NO.	SPEC	NO.
24-1	27	J1-27	17	N				A7-3	17	Y			
24-2	23	J1-28	17	N				A7-2	17	Y			
25-1		J1-33	17	N				SR1-33					
25-2		J1-34	17	N				SR1-34					
26-1		J1-35	17	N				SR1-35					
26-2		J1-36	17	N				SR1-36					
27-1		J1-37	17	N				SR1-37					
27-2		J1-38	17	N				SR1-38					
28-1		J1-39	17	N				SR1-39					
28-2		J1-40	17	N				SR1-40					
29-1		J1-41	17	N				SR1-41					
29-2		J1-42	17	N				SR1-42					
30-1		J1-43	17	N				SR1-43					
30-2		J1-44	17	N				SR1-44					
31-1		J1-45	17	N				SR1-45					
31-2		J1-46	17	N				SR1-46					

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NASA DRAWING NO.
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SHEET 16 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y/N	TO TERMINATION FIND NO.	SPEC	NO.
32-1		J1-47	17	N				SR1-47					
32-2		J1-48	17	N				SR1-48					
33-1		J1-51	17	N				B1A-83					
33-2		J1-52	17	N				B1A-81					
34-1		J1-53	17	N				B1A-82					
34-2		J1-54	17	N				B1A-84					
35-1		J1-55	17	N				B1B-83					
35-2		J1-56	17	N				B1B-81					
36-1		J1-57	17	N				B1B-82					
36-2		J1-58	17	N				B1B-84					
37-1		SR1-27						A7-3	17	Y			
37-2		SR1-28						A7-2	17	Y			
38-1		SR1-10						K1-6	18	Y			
38-2		SR1-11						K1-2	18	Y			
39	26	J1-59	17	N				K1-1	18	Y			

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NASA DRAWING NO.
2018612-021
SHEET 17 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		Y/N	TO TERMINATION FIND NO.	SPEC	NO.
40-1		SR1-29						A7-6	17	Y			
40-2		SR1-30						A7-1	17	Y			
41-1		SR1-31						A7-6	17	Y			
41-2		SR1-32						A7-5	17	Y			
42-1		SR1-49						A7-6	17	Y			
42-2		SR1-50						A7-4	17	Y			
43		J5-A	17	Y		17		SR1-26					
44-1		J5-B	17	Y		18		SR1-27					
44-2		J5-C	17	Y		18		SR1-28					
45-1		J5-B	17	Y				B1A-P3					
45-2		J5-C	17	Y				B1A-P1					
46-1		J5-D	17	Y		17		SR1-29					
46-2		J5-E	17	Y		17		SR1-30					
47-1		J5-F	17	Y		17		SR1-31					
47-2		J5-H	17	Y		17		SR1-32					
48-1		J5-J	17	Y		17		SR1-33					
48-2		J5-K	17	Y		17		SR1-34					

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NASA DRAWING NO.
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SHEET 18 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION FIND NO.	SPEC	NO.
49-1		J5-L	17	Y		17		SR1-35					
49-2		J5-M	17	Y		17		SR1-36					
50-1		J5-N	17	Y		17		SR1-37					
50-2		J5-P	17	Y		17		SR1-38					
51-1		J5-R	17	Y		17		SR1-39					
51-2		J5-S	17	Y		17		SR1-40					
52-1		J5-T	17	Y		17		SR1-41					
52-2		J5-U	17	Y		17		SR1-42					
53-1		J5-V	17	Y		17		SR1-43					
53-2		J5-W	17	Y		17		SR1-44					
54-1		J5-X	17	Y		17		SR1-45					
54-2		J5-Y	17	Y		17		SR1-46					
55-1		J5-Z	17	Y		17		SR1-47					
55-2		J5-a	17	Y		17		SR1-48					
56-1		J5-b	17	Y		18		SR1-49					
56-2		J5-c	17	Y		18		SR1-50					
57-1		J5-b	17	Y				B1A-P2					
57-2		J5-c	17	Y				B1A-P4					

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NASA DRAWING NO.
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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION FIND NO.	SPEC	NO.
58		J6-A	17	Y		18		SR1-1					
59		J6-A	17	Y				E10	25	Y	31		
60						30							
61 A		SHLD-55						E10					
61-1		J6-B	17	Y		18		SR1-2					
61-2		J6-C	17	Y		18		SR1-3					
61-3		J6-D	17	Y		18		SR1-4					
61-4		J6-E	17	Y		18		SR1-5					
61-5		J6-W	17	Y		17		SR1-19					
61-6		J6-X	17	Y		17		SR1-20					
62-1		J6-F	17	Y		18		SR1-6					
62-2		J6-F	17	Y				SR1-7					
62-3		J6-J	17	Y		18		SR1-8					
62-4		J6-Z	17	Y				SR1-9					

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NASA DRAWING NO.
2018612-021
SHEET 20 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION FIND NO.	SPEC	NO.
63		J6-N	17	Y		18		SR1-12					
64	22	J6-N	17	Y				P3-C	17	Y	18		
65	22	P3-C	17	Y				P4-C	17	Y			
66		P3-D	17	Y		17		SR1-10					
67		P4-D	17	Y		17		SR1-11					
68		J6-P	17	Y		17		SR1-13					
69-1		J6-R	17	Y		17		SR1-14					
69-2		J6-S	17	Y		17		SR1-15					
70		J6-T	17	Y		17		SR1-16					
71-1		J6-U	17	Y		17		SR1-17					
71-2		J6-V	17	Y		17		SR1-18					
72		J6-B	17	Y				J6-C	17	Y			
73		J6-D	17	Y				J6-E	17	Y			

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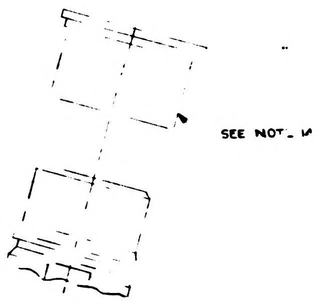
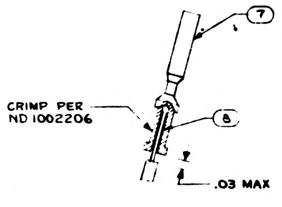
NASA DRAWING NO.
2018612-021
SHEET 21 of 21

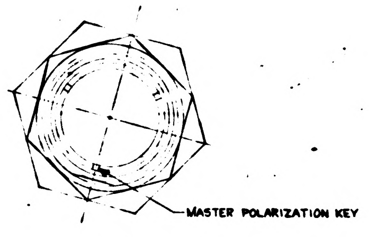
CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y/N	TO TERMINATION FIND NO.	SPEC	NO.
74-1		J6-Y	17	Y		17		SR1-21					
74-2		J6-Z	17	Y		17		SR1-22					
74-3		J6-a	17	Y		17		SR1-23					
74-4		J6-b	17	Y		17		SR1-24					
74-5		J6-c	17	Y		17		SR1-25					
75	21	K1-3	18	Y				E71	25	Y			
76	28	K1-4	18	Y				K1-8	18	Y			



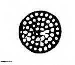
DETAIL J


(7)
CRIMP PER ND 1002206
(8)
.03 MAX

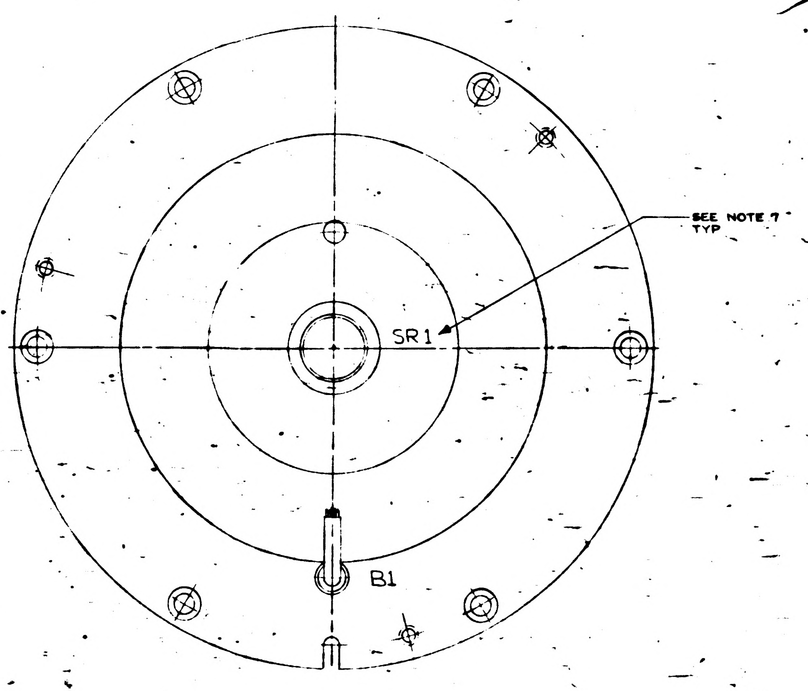
DETAIL A
SCALE 4/1


MASTER POLARIZATION KEY

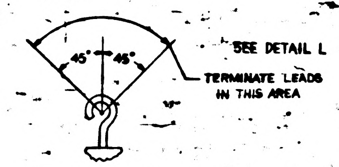
VIEW C-C



SECTION B-B


SEE NOTE 7 TYP
SR1
B1

VIEW D-D


45°
45°
TERMINATE LEADS IN THIS AREA

DETAIL L
7 PLACES

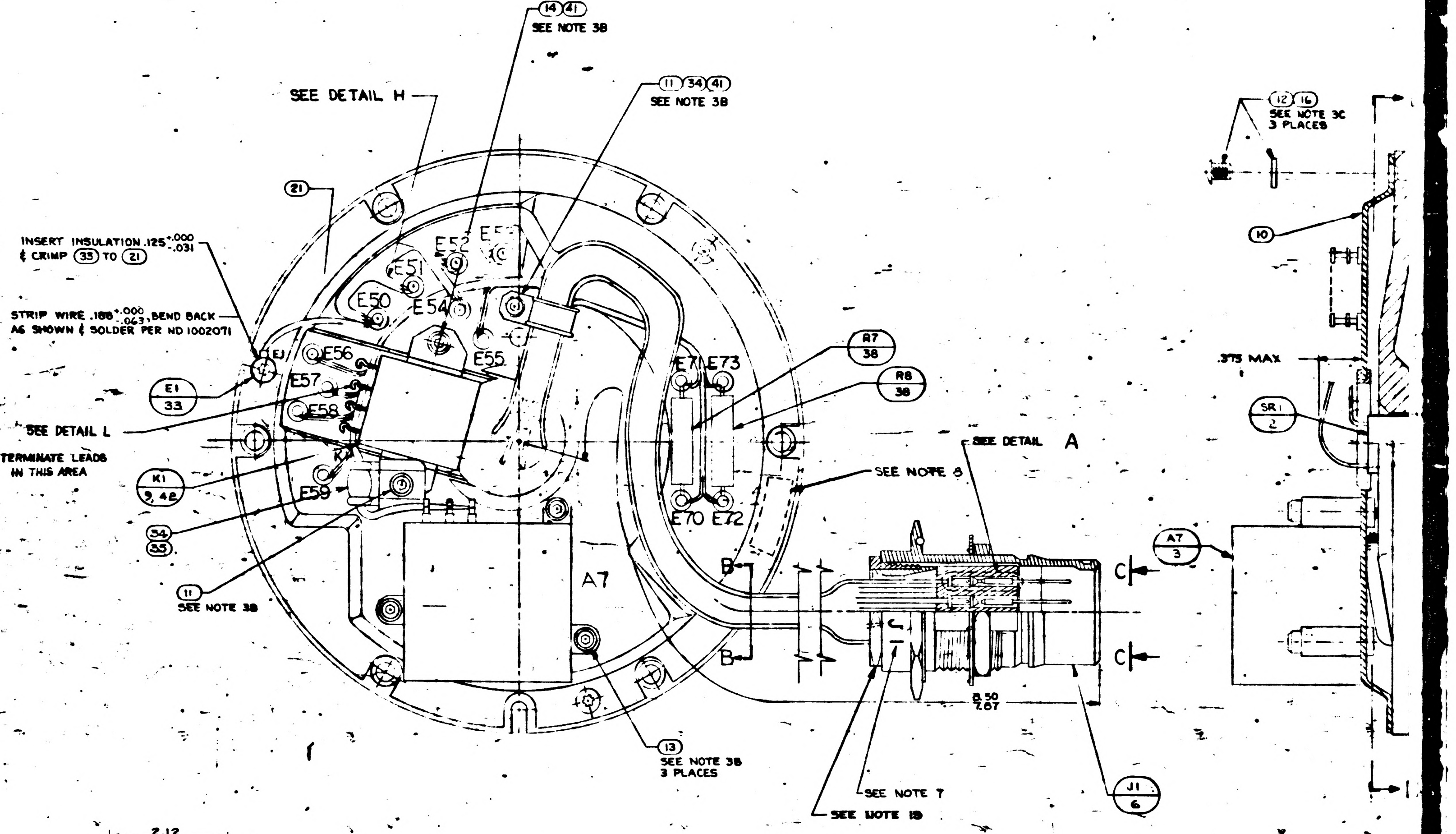
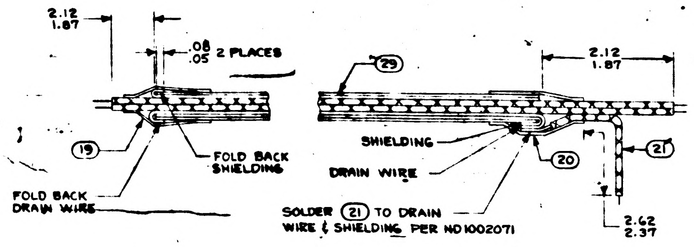

(14)(41)
SEE NOTE 3B
(11)(34)(41)
SEE NOTE 3B
SEE DETAIL H
(21)
INSERT INSULATION .125 +.000 -.031 & CRIMP (33) TO (21)
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1 / 33
SEE DETAIL L
K1 / 9, 42
(34)
(35)
(11)
SEE NOTE 3B
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
E71
E73
E70
E72
A7
R7 / 38
R8 / 38
SEE NOTE 8
SEE DETAIL A
(13)
SEE NOTE 3B
3 PLACES
B
B
C
C
8.50
7.87
SEE NOTE 7
SEE NOTE 19
J1 / 6
(12)(16)
SEE NOTE 3C
3 PLACES
(10)
.375 MAX
SR1 / 2
A7 / 3

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16


2.12
1.87
.08
.05
2 PLACES
(19)
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
(29)
2.12
1.87
SHIELDING
DRAIN WIRE
(20)
(21)
SOLDER (21) TO DRAIN WIRE & SHIELDING PER ND1002071
2.62
2.37

DETAIL H
SCALE: NONE

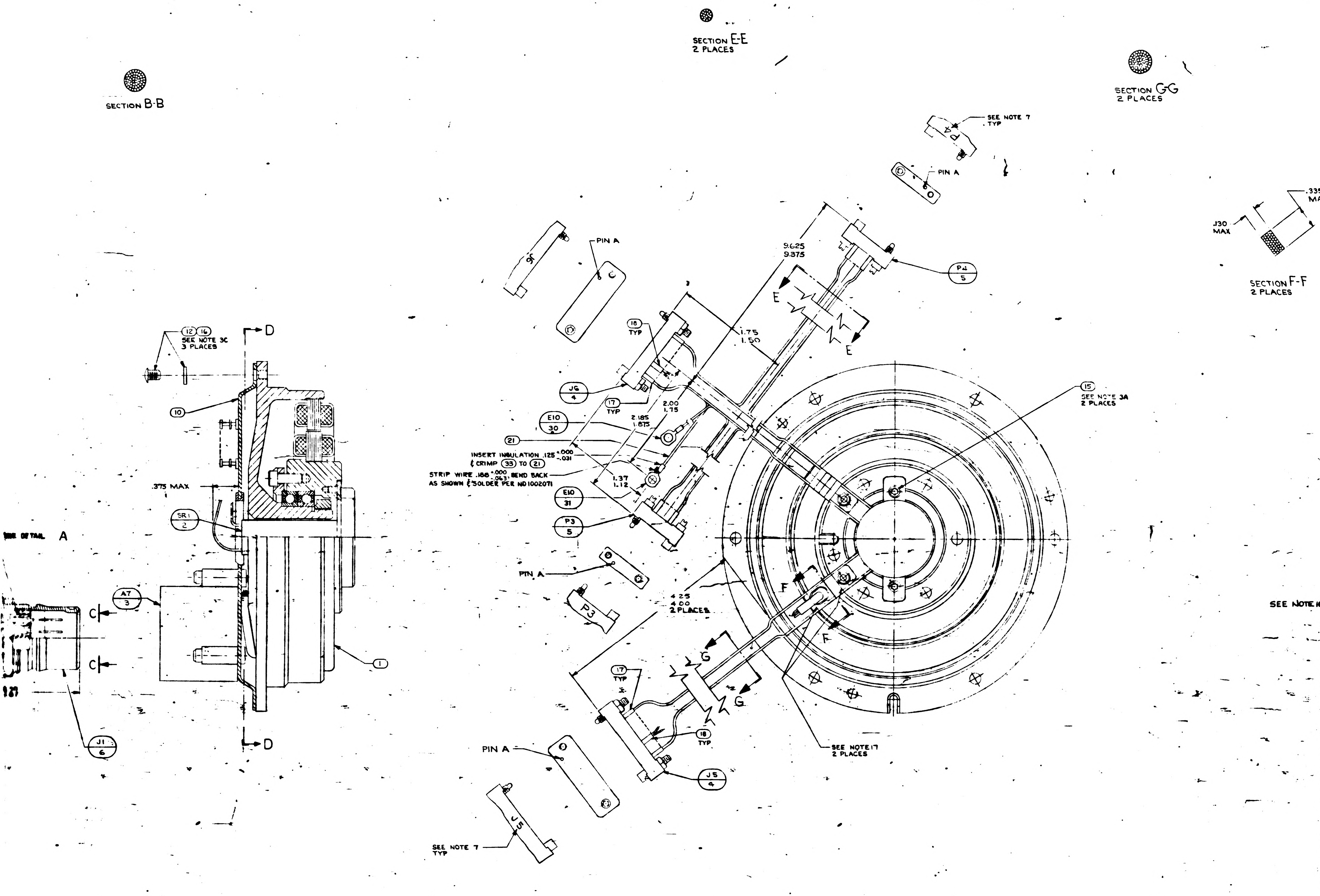
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS PER TABLE I
3. SCREW TORQUE REQUIREMENTS ±7%
    - A. 3.5 IN-LB
    - B. 5.0 IN-LB
    - C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS .10/.14 HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002028
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"
    - K = BLACK
    - L = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-168, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES
16. ~~ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS (38) & (40) PER ND 1002009 METHOD B~~
17. TAPE HARNESS IN AREA INDICATED USING ITEM (43) TO MAINTAIN HARNESS CONFIGURATION PER SECTION F-F AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM (43).
18. TAPE (44) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
19. TORQUE RETAINING NUT TO 45-55 lb-IN.

TABLE I	
ASSEMBLY NO.	P.S. NUMBER
2018612-011	PS 2018612
2018612-021	PS 2016143

34

2018612	REV W	SHT 1


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX
.130 MAX
SEE NOTE 7 TYP
PIN A
P4
5
9.625
9.375
E
1.75
1.50
15
SEE NOTE 3A
2 PLACES
12
16
SEE NOTE 3C
3 PLACES
D
10
18 TYP
J6
4
17 TYP
E10
30
2.00
1.75
2.185
1.875
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
.375 MAX
SR1
2
SEE DETAIL A
A7
3
C
1
PIN A
P3
4.25
4.00
2 PLACES
F
G
J1
6
17 TYP
18 TYP
J5
5
PIN A
SEE NOTE 7 TYP
J5
SEE NOTE 17
2 PLACES
D

REVISIONS TDRR 17167

SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 18336	3-8-65		WK
B	REVISED TDRR 18962	5-18-65		WK
C	REVISED TDRR 19270	5-18-65		WK
D	REVISED TDRR 21320	7-26-65		WK
E	REVISED TDRR 21676	8-31-65		WK
F	REVISED TDRR 22014	8-31-65		WK
G	REVISED TDRR 22332	9-21-65		WK
H	REVISED TDRR 23048	10-13-65		
J	REVISED TDRR 23702	2 Nov 65		WK
K	REVISED TDRR 24900	4 Jan 66		WK
L	REVISED TDRR 25486			WK
M	REVISED TDRR 26243	66		
N	REVISED TDRR 26254	23 Feb 66		
P	REVISED TDRR 27508	30 Mar 66		
R	REVISED TDRR 28813	17 May 66		
S	REVISED TDRR 28850	17 May 66		
T	REVISED TDRR 32109	7 DEC 66	SCS	
U	REVISED TDRR 32849	3 FEB 67	JC	
V	REVISED TDRR 33179	15 MAR 67	TEM	
W	REVISED PER TDRR 33359	5 APR 67		

D

C

B

A

SEE NOTE 18

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	MIL-I-181-26 TYPE ACT	TAPE, ADH, ELEC. PRESS SENSITIVE ½ WIDE	44
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/2 WIDTH	43
1	—	1010353-15	RELAY ELECTRO MAG SENSITIVE	42
2	1	MS15795-803	WASHER, FLAT METAL ROUND	41
~~A/R~~	~~A/R~~	~~1000835~~	~~CURING AGENT~~	~~40~~
~~A/R~~	~~A/R~~	~~1000834~~	~~RESIN~~	~~39~~
2	2	2021504-44	RESISTOR	38
1	1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1	1000223	WASHER CABLE CLAMP	35
2	2	1000220 SEE NOTE 15	CLAMP CABLE	34
1	1	1010717-3	TERMINAL, LUG	33
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1	1010717-1	TERMINAL, LUG	31
1	1	1000820-11	SHIELD & GROUND ASSY	30
2	2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1	1010416-8	WIRE AWG 28E VIO 25" LONG	26
1	1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	13	1006776-14	INSULATION SLEEVING ELEC ⅜ LONG	18
36	36	1006776-18	INSULATION SLEEVING ELEC ¼ LONG	17
3	3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
1	1	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
2	2	1001488-2	SCREW, HEX SOC HD, SELF-LKG	11
1	1	2018792	GUIDE, WIRE ASSEMBLY	10
—	~~1~~	~~1010353-10~~	RELAY, ELECTRO MAG, SENSITIVE	9
61	61	1010862	BUSHING, SLEEVE	8
61	61	1010781-1	CONTACT ELEC	7
1	1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
021	011	LIST OF MATERIALS		

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN DTB DATE 1/8/65
CHECKED G Quinn 3/8/65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

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HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 3 OF 21

2018612 W 1

2018612

4 3 2

2/2018612

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REVISION W

NASA DRAWING NO. 2018612-011

SHEET 2 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	CUT WIRE OR SHIELD	Y/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD	Y/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.
1	21	J1-1	17	N			E50	25	Y		
2	21	E1	25	Y		31	E50	25	Y		
3		SR1-1					E50	25	Y		
4	29		1 50		1 25	19		1 25		1 00	20
4B	21	E50	25	Y			SHLD 4	25	Y		
4L		J1-2	17	N			E51	25	Y		
4K		J1-4	17	N			E52	25	Y		
5	29		1 50		1 25	19		1 25		1 00	20
5B	21	E50	25	Y			SHLD 5	25	Y		
5L		J1-3	17	N			E51	25	Y		
5K		J1-5	17	N			E52	25	Y		
6-1		SR1-2					E51	25	Y		
6-2		SR1-3					E51	25	Y		
6-3		SR1-4					E52	25	Y		
6-4		SR1-5					E52	25	Y		
6-5		SR1-19	17	Y			K1-1	18	Y		
6-6		SR1-20					E52	25	Y		
7	25	K1-1	18	Y			E51	25	Y		

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NASA DRAWING NO. 2018612-011

SHEET 3 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	CUT WIRE OR SHIELD	Y/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD	Y/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.
8-1	24	J1-6	17	N			E53	25	Y		
8-2	26	J1-8	17	N			E54	25	Y		
8-3	25	J1-7	17	N			E53	25	Y		
8-4	27	J1-9	17	N			E54	25	Y		
9-1		SR1-6					E53	25	Y		
9-2		SR1-7					E53	25	Y		
9-3		SR1-8					E54	25	Y		
9-4		SR1-9					E54	25	Y		
10-1	28	J1-10	17	N			K1-4	16	Y		
10-2	21	J1-11	17	N			K1-8	18	Y		
11		J1-12	17	N			SR1-12				
71	25	J1-19	17	N			E72	25	Y		
72-1		SR1-14					E55	25	Y		
72-2		SR1-15					E56	25	Y		
73		SR1-1					E57	25	Y		
74-1		SR1-17					E58	25	Y		
74-2		SR1-16					E59	25	Y		

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REVISION W

NASA DRAWING NO. 2018612-011

SHEET 4 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	CUT WIRE OR SHIELD	Y/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD	Y/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.
12		J1-13	17	N			SR1-13				
13-1	37	J1-14	17	N			E55	25	Y		
13-2	36	J1-15	17	N			E56	25	Y		
13-3	37	J1-29	17	N			E55	25	Y		
13-4	36	J1-30	17	N			E56	25	Y		
14	24	J1-16	17	N			E57	25	Y		
15-1	25	J1-17	17	N			E58	25	Y		
15-2	26	J1-18	17	N			E59	25	Y		
15-3	25	J1-31	17	N			E58	25	Y		
15-4	26	J1-32	17	N			E59	25	Y		
16		K1-5	18	Y			SR1-26				
17	21	J1-20	17	N			E70	25	Y		
18-1		J1-21	17	N			SR1-21				
18-2		J1-22	17	N			SR1-22				
18-3		J1-23	17	N			SR1-23				
18-4		J1-24	17	N			SR1-24				
18-5		J1-25	17	N			SR1-25				
19	24	J1-26	17	N			E57	25	Y		

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REVISION W

NASA DRAWING NO. 2018612-011

SHEET 5 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	CUT WIRE OR SHIELD	Y/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD	Y/N	STRIP WIRE OR JACKET	TERMINATION SPEC FIND NO.
20-1	27	J1-27	17	N			A7-3	17	Y		
20-2	23	J1-28	17	N			A7-2	17	Y		
21-1		J1-33	17	N			SR1-33				
21-2		J1-34	17	N			SR1-34				
22-1		J1-35	17	N			SR1-35				
22-2		J1-36	17	N			SR1-36				
23-1		J1-37	17	N			SR1-37				
23-2		J1-38	17	N			SR1-38				
24-1		J1-39	17	N			SR1-39				
24-2		J1-40	17	N			SR1-40				
25-1		J1-41	17	N			SR1-41				
25-2		J1-42	17	N			SR1-42				
26-1		J1-43	17	N			SR1-43				
26-2		J1-44	17	N			SR1-44				
27-1		J1-45	17	N			SR1-45				
27-2		J1-46	17	N			SR1-46				

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	SPEC NO.
44-1		J5-L	17Y	17		SR1-35			
44-2		J5-M	17Y	17		SR1-36			
45-1		J5-N	17Y	17		SR1-37			
45-2		J5-P	17Y	17		SR1-38			
46-1		J5-R	17Y	17		SR1-39			
46-2		J5-S	17Y	17		SR1-40			
47-1		J5-T	17Y	17		SR1-41			
47-2		J5-U	17Y	17		SR1-42			
48-1		J5-V	17Y	17		SR1-43			
48-2		J5-W	17Y	17		SR1-44			
49-1		J5-X	17Y	17		SR1-45			
49-2		J5-Y	17Y	17		SR1-46			
50-1		J5-Z	17Y	17		SR1-47			
50-2		J5-a	17Y	17		SR1-48			
51-1		J5-b	17Y	18		SR1-49			
51-2		J5-c	17Y	18		SR1-50			
52-1		J5-d	17Y			E1A-P2			
52-2		J5-e	17Y			E1A-P4			

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SHEET 8 of 21

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	SPEC NO.
28-1		J1-47	17N			SR1-47			
28-2		J1-48	17N			SR1-48			
29-1		J1-51	17N			E1A-S3			
29-2		J1-52	17N			E1A-S1			
30-1		J1-53	17N			E1A-S2			
30-2		J1-54	17N			E1A-S4			
31-1		J1-55	17N			E1B-S3			
31-2		J1-56	17N			E1B-S1			
32-1		J1-57	17N			E1B-S2			
39-2		J1-58	17N			E1B-S4			
33-1		SR1-27				A7-3	17Y		
33-2		SR1-28				A7-2	17Y		
34-1		SR1-10				K1-4	18Y		
34-2		SR1-11				K1-B	18Y		

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SHEET 6 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	SPEC NO.
53		J6-A	17Y	18		SR1-1			
54		J6-A	17Y			E10	25Y	31	
*55				30					
55-A		SHLD-55				E10			
55-1		J6-B	17Y	18		SR1-2			
55-2		J6-C	17Y	18		SR1-3			
55-3		J6-D	17Y	18		SR1-4			
55-4		J6-E	17Y	18		SR1-5			
55-5		J6-W	17Y	17		SR1-19			
55-6		J6-X	17Y	17		SR1-20			
56-1		J6-F	17Y	18		SR1-6			
56-2		J6-F	17Y			SR1-7			
56-3		J6-J	17Y	18		SR1-8			
56-4		J6-J	17Y			SR1-9			

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SHEET 9 of 21

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	SPEC NO.
35-1		SR1-29				A7-6	17Y		
35-2		SR1-30				A7-1	17Y		
36-1		SR1-31				A7-6	17Y		
36-2		SR1-32				A7-5	17Y		
37-1		SR1-49				A7-6	17Y		
37-2		SR1-50				A7-4	17Y		
38		J5-A	17Y	17		SR1-26			
38-1		J5-B	17Y	18		SR1-27			
39-2		J5-C	17Y	18		SR1-28			
40-1		J5-B	17Y			E1A-P3			
40-2		J5-C	17Y			E1A-P1			
41-1		J5-D	17Y	17		SR1-29			
41-2		J5-E	17Y	17		SR1-30			
42-1		J5-F	17Y	17		SR1-31			
42-2		J5-H	17Y	17		SR1-32			
43-1		J5-J	17Y	17		SR1-33			
43-2		J5-K	17Y	17		SR1-34			

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NASA DRAWING NO. 2018612 -011

SHEET 7 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	TO: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
1	21		J1-1	17	N			E50	25	Y		
2	21		E1	25	Y	31		E50	25	Y		
3			SR1-1					E50	25	Y		
4	29			1 50 1 25		19			1 25 1 00		20	
4B	21		E50	25	Y			SHLD 4	25	Y		
4L			J1-2	17	N			E51	25	Y		
4K			J1-4	17	N			E52	25	Y		
5	29			1 50 1 25		19			1 25 1 00		20	
5B	21		E50	25	Y			SHLD 5	25	Y		
5L			J1-3	17	N			E51	25	Y		
5K			J1-5	17	N			E52	25	Y		
6-1			SR1-2					E51	25	Y		
6-2			SR1-3					E51	25	Y		
6-3			SR1-4					E52	25	Y		
6-4			SR1-5					E52	25	Y		
6-5			SR1-19					E73	25	Y		
6-6			SR1-20					E52	25	Y		
7	25		E73	16	Y			E51	25	Y		

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NASA DRAWING NO. 2018612-021
SHEET 12 of 21

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	TO: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
8-1	24		J1-6	17	N			E53	25	Y		
8-2	43		J1-8	17	N			E54	25	Y		
8-3	25		J1-7	17	N			E53	25	Y		
8-4	27		J1-9	17	N			E54	25	Y		
9-1			SR1-6					E53	25	Y		
9-2			SR1-7					E53	25	Y		
9-3			SR1-8					E54	25	Y		
9-4			SR1-9					E54	25	Y		
~~10-1~~	~~28~~		[illegible]	[illegible]				[illegible]	[illegible]			
10-	21		J1-11	17	N			K1-8	18	Y		
11			J1-12	17	N			SR1-12				
12	25		J1-19	17	N			E72	25	Y		
13-1			SR1-14					E55	25	Y		
13-2			SR1-15					E56	25	Y		
14			SR1-16					E57	25	Y		
15-1			SR1-17					E58	25	Y		
15-2			SR1-18					E59	25	Y		

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NASA DRAWING NO. 2018612-021
SHEET 13 of 21

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	TO: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
57			J6-N	17	Y	18		SR1-12				
58	22		J6-N	17	Y			P3-C	17	Y	18	
59	22		P3-C	17	Y			P4-C	17	Y		
60			P3-D	17	Y	17		SR1-10				
61			P4-D	17	Y	17		SR1-11				
62			J6-P	17	Y	17		SR1-13				
63-1			J6-R	17	Y	17		SR1-14				
63-2			J6-S	17	Y	17		SR1-15				
64			J6-T	17	Y	17		SR1-16				
65-1			J6-U	17	Y	17		SR1-17				
65-2			J6-V	17	Y	17		SR1-18				
66	23		J6-B	17	Y	1		J6-C	17	Y		
67	21		J6-H	17	Y	1		J6-E	17	Y		

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NASA DRAWING NO. 2018612-011
SHEET 10 of 21

TDRR 17167 MAR 9 1965

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.	TO: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC NO.
68-1			J6-Y	17	Y	17		SR1-21				
68-2			J6-Z	17	Y	17		SR1-22				
68-3			J6-a	17	Y	17		SR1-23				
68-4			J6-b	17	Y	17		SR1-24				
68-5			J6-c	17	Y	17		SR1-25				
69	25		E73	25	Y			K1-1	18	Y		
70	21		K1-8	18	Y			E71	25	Y		

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NASA DRAWING NO. 2018612-011
SHEET 11 of 21

Conductor Find Number	Individual Length No.	FROM Circuit Point	Strip Wire or Jacket	Y/N	TO Circuit Point	Strip Wire or Jacket	Y/N
32-1		J1-47	17	N	SR1-47		
32-2		J1-48	17	N	SR1-48		
33-1		J1-51	17	N	B1A-S3		
33-2		J1-52	17	N	B1A-S1		
34-1		J1-53	17	N	B1A-S2		
34-2		J1-54	17	N	B1A-S4		
35-1		J1-55	17	N	B1B-S3		
35-2		J1-56	17	N	B1B-S1		
36-1		J1-57	17	N	B1B-S2		
36-2		J1-58	17	N	B1B-S4		
37-1		SR1-27			A7-3	17	Y
37-2		SR1-28			A7-2	17	Y
38-1		SR1-10			K1-6	18	Y
38-2		SR1-11			K1-2	18	Y
39	26	J1-59	17	N	K1-1	18	Y

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REVISION
NASA DRAWING NO. 2018612-021 SHEET 16 of 21

Conductor Find Number	Individual Length No.	FROM Circuit Point	Strip Wire or Jacket	Y/N	TO Circuit Point	Strip Wire or Jacket	Y/N
16		J1-13	17	N	SR1-13		
17-1	37	J1-14	17	N	E55	25	Y
17-2	36	J1-15	17	N	E56	25	Y
17-3	37	J1-29	17	N	E55	25	Y
17-4	36	J1-30	17	N	E56	25	Y
18	24	J1-16	17	N	E57	25	Y
19-1	25	J1-17	17	N	E58	25	Y
19-2	26	J1-18	17	N	E59	25	Y
19-3	25	J1-31	17	N	E58	25	Y
19-4	26	J1-32	17	N	E59	25	Y
20		K1-5	18	Y	SR1-26		
21	21	J1-20	17	N	E70	25	Y
22-1		J1-21	17	N	SR1-21		
22-2		J1-22	17	N	SR1-22		
22-3		J1-23	17	N	SR1-23		
22-4		J1-24	17	N	SR1-24		
22-5		J1-25	17	N	SR1-25		
23	24	J1-26	17	N	E57	25	Y

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Conductor Find Number	Individual Length No.	FROM Circuit Point	Strip Wire or Jacket	Y/N	Termination Spec	TO Circuit Point	Strip Wire or Jacket	Y/N
40-1		SR1-29				A7-6	17	Y
40-2		SR1-30				A7-1	17	Y
41-1		SR1-31				A7-6	17	Y
41-2		SR1-32				A7-5	17	Y
42-1		SR1-49				A7-6	17	Y
42-2		SR1-50				A7-4	17	Y
43		J5-A	17	Y	17	SR1-26		
44-1		J5-B	17	Y	18	SR1-27		
44-2		J5-C	17	Y	18	SR1-28		
45-1		J5-B	17	Y		B1A-P3		
45-2		J5-C	17	Y		B1A-P1		
46-1		J5-D	17	Y	17	SR1-29		
46-2		J5-E	17	Y	17	SR1-30		
47-1		J5-F	17	Y	17	SR1-31		
47-2		J5-H	17	Y	17	SR1-32		
48-1		J5-J	17	Y	17	SR1-33		
48-2		J5-K	17	Y	17	SR1-34		

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Conductor Find Number	Individual Length No.	FROM Circuit Point	Strip Wire or Jacket	Y/N	TO Circuit Point	Strip Wire or Jacket	Y/N
24-1	27	J1-27	17	N	A7-3	17	Y
24-2	23	J1-28	17	N	A7-2	17	Y
25-1		J1-33	17	N	SR1-33		
25-2		J1-34	17	N	SR1-34		
26-1		J1-35	17	N	SR1-35		
26-2		J1-36	17	N	SR1-36		
27-1		J1-37	17	N	SR1-37		
27-2		J1-38	17	N	SR1-38		
28-1		J1-39	17	N	SR1-39		
28-2		J1-40	17	N	SR1-40		
29-1		J1-41	17	N	SR1-41		
29-2		J1-42	17	N	SR1-42		
30-1		J1-43	17	N	SR1-43		
30-2		J1-44	17	N	SR1-44		
31-1		J1-45	17	N	SR1-45		
31-2		J1-46	17	N	SR1-46		

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REVISION
NASA DRAWING NO. 2018612-021 SHEET 15 of 21

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC	NO.
49-1		J5-L	17Y	17			SR1-35				
49-2		J5-M	17Y	17			SR1-36				
50-1		J5-N	17Y	17			SR1-37				
50-2		J5-P	17Y	17			SR1-38				
51-1		J5-R	17Y	17			SR1-39				
51-2		J5-S	17Y	17			SR1-40				
52-1		J5-T	17Y	17			SR1-41				
52-2		J5-U	17Y	17			SR1-42				
53-1		J5-V	17Y	17			SR1-43				
53-2		J5-W	17Y	17			SR1-44				
54-1		J5-X	17Y	17			SR1-45				
54-2		J5-Y	17Y	17			SR1-46				
55-1		J5-Z	17Y	17			SR1-47				
55-2		J5-a	17Y	17			SR1-48				
56-1		J5-b	17Y	18			SR1-49				
56-2		J5-c	17Y	18			SR1-50				
57-1		J5-b	17Y				B1A-P2				
57-2		J5-c	17Y				B1A-P4				

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION W

NASA DRAWING NO. 2018612-021 SHEET 18 of 21

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC	NO.
58		J6-A	17Y	18			SR1-1				
59		J6-A	17Y				E10	25Y	31		
60				30							
61 A		SHLD-55					E10				
61-1		J6-B	17Y	18			SR1-2				
61-2		J6-C	17Y	18			SR1-3				
61-3		J6-D	17Y	18			SR1-4				
61-4		J6-E	17Y	18			SR1-5				
61-5		J6-W	17Y	17			SR1-19				
61-6		J6-X	17Y	17			SR1-20				
62-1		J6-F	17Y	18			SR1-6				
62-2		J6-F	17Y				SR1-7				
62-3		J6-J	17Y	18			SR1-8				
62-4		J6-Z	17Y				SR1-9				

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REVISION W

NASA DRAWING NO. 2018612-021 SHEET 19 of 21

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC	NO.
63		J6-N	17Y	18			SR1-12				
64	22	J6-N	17Y				P3-C	17Y	18		
65	22	P3-C	17Y				P4-C	17Y			
66		P3-D	17Y	17			SR1-10				
67		P4-D	17Y	17			SR1-11				
68		J6-P	17Y	17			SR1-13				
69-1		J6-R	17Y	17			SR1-14				
69-2		J6-S	17Y	17			SR1-15				
70		J6-T	17Y	17			SR1-16				
71-1		J6-U	17Y	17			SR1-17				
71-2		J6-V	17Y	17			SR1-18				
72		J6-B	17Y				J6-C	17Y			
73		J6-D	17Y				J6-E	17Y			

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION W

NASA DRAWING NO. 2018612-021 SHEET 20 of 21

CONDUCTOR		FROM					TO				
FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TERMINATION FIND NO.	SPEC	NO.
74-1		J6-Y	17Y	17			SR1-21				
74-2		J6-Z	17Y	17			SR1-22				
74-3		J6-a	17Y	17			SR1-23				
74-4		J6-b	17Y	17			SR1-24				
74-5		J6-c	17Y	17			SR1-25				
75	21	K1-3	18Y				E11	25Y			
76	28	K1-4	18Y				K1-8	18Y			

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION W

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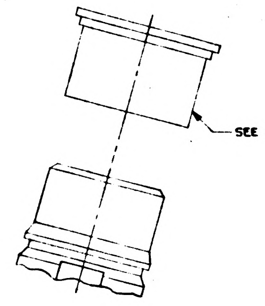
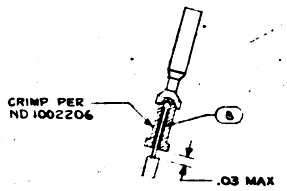
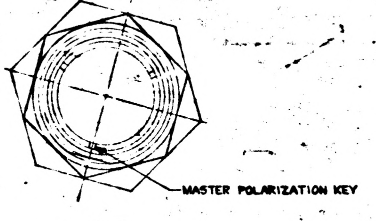


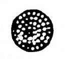
DETAIL J


CRIMP PER
ND 1002206
8
.03 MAX

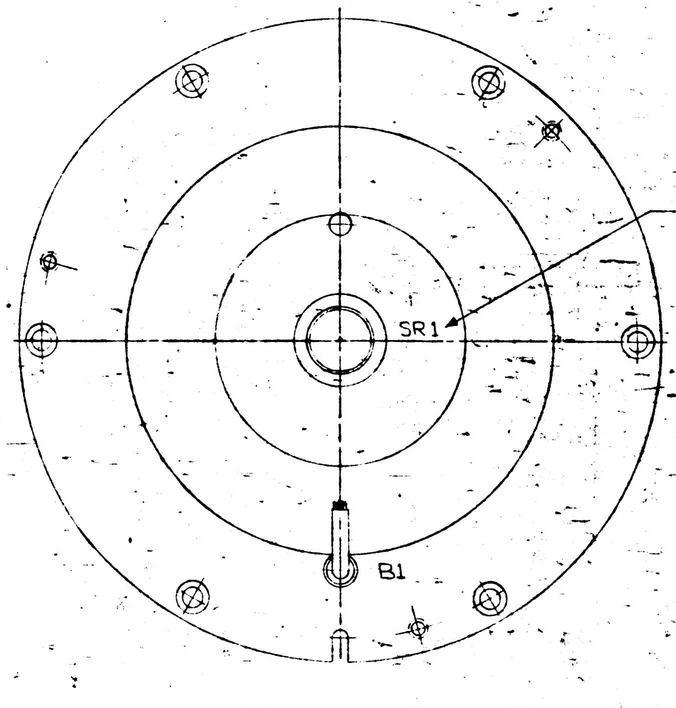
DETAIL A
SCALE 4/1


MASTER POLARIZATION KEY

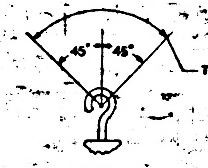
VIEW C-C



SECTION B-B


SEE NOTE 7
TYP
SR1
B1

VIEW D-D



DETAIL L
7 PLACES

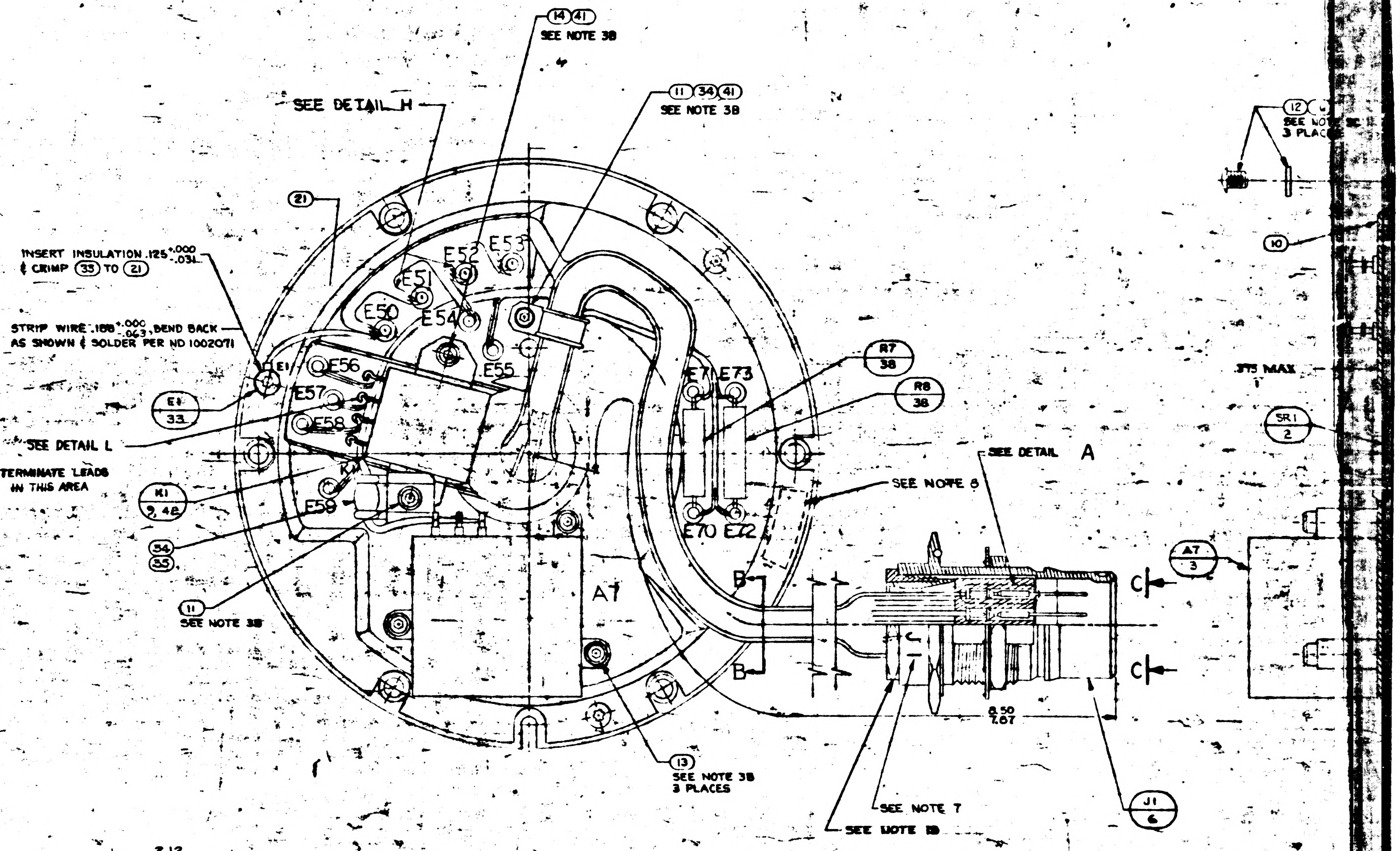
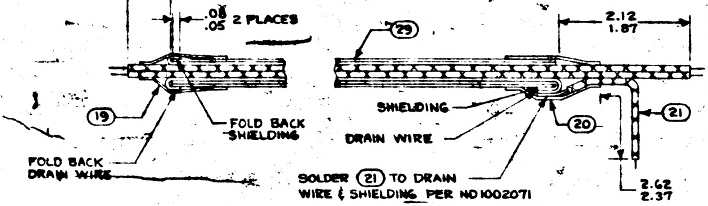

SEE DETAIL H
14 41
SEE NOTE 3B
11 34 41
SEE NOTE 3B
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 33 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND 1002071
E1
E1 / 33
SEE DETAIL L
TERMINATE LEADS
IN THIS AREA
K1 / 9, 48
54
55
11
SEE NOTE 3B
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
E71
E73
E70
E72
A1
R7 / 38
R8 / 38
SEE NOTE 8
SEE DETAIL A
B
B
C
C
8.50
7.87
13
SEE NOTE 3B
3 PLACES
SEE NOTE 7
SEE NOTE 19
J1 / 6
A7 / 3
SR1 / 2
.375 MAX
10
12
SEE NOTE
3 PLACES

TABLE I	
CABLE CLAMP (34)	
PART NO	DIA REF
1000220-1	1/16
-2	3/32
-3	1/8
-13	5/32
-4	3/16
-14	7/32
-5	1/4
-15	9/32
-6	5/16


2.12
1.87
.08
.05
2 PLACES
19
FOLD BACK
SHIELDING
FOLD BACK
DRAIN WIRE
29
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
SOLDER 21 TO DRAIN
WIRE & SHIELDING PER ND1002071
2.62
2.37

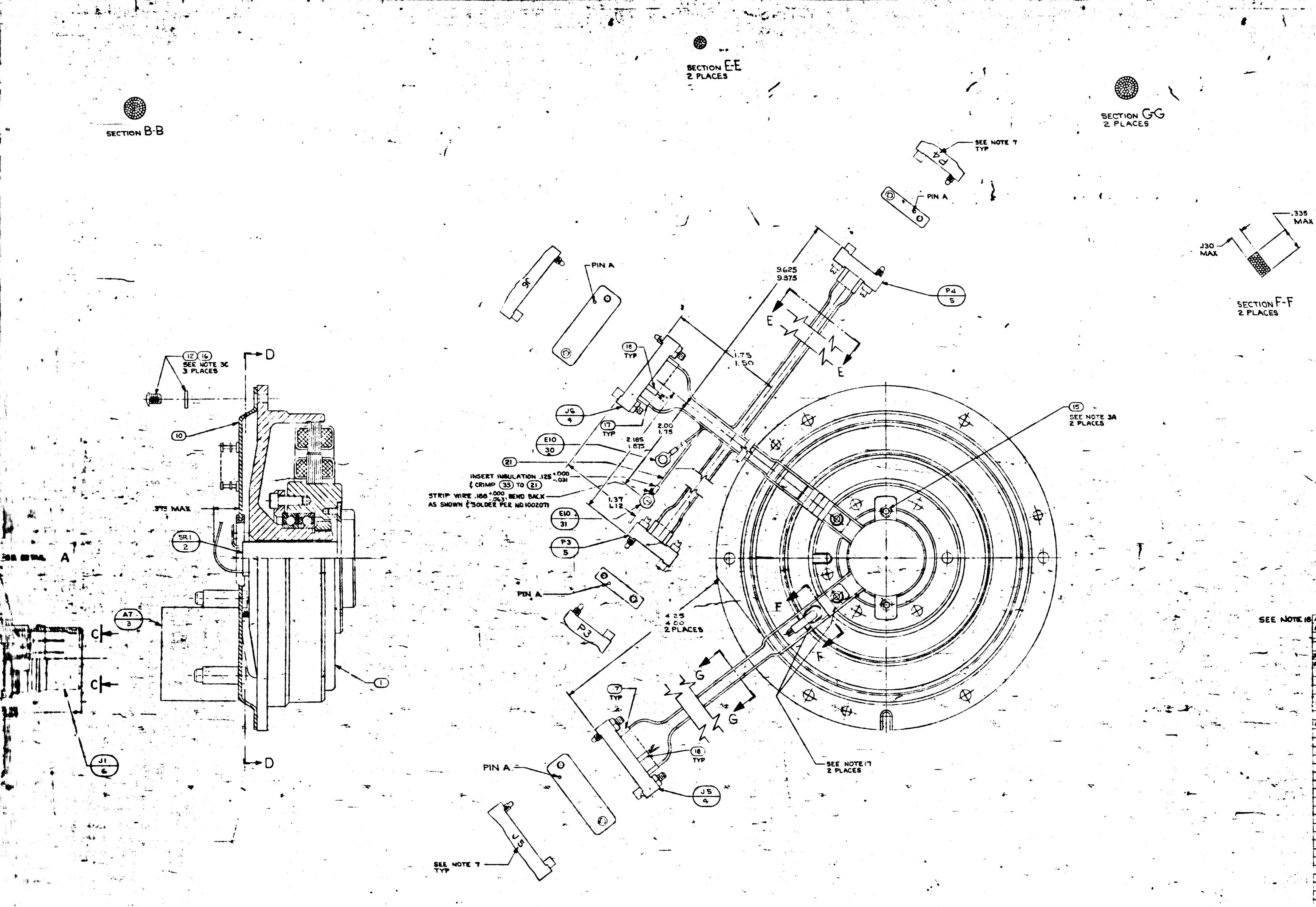
DETAIL H
SCALE: NONE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS PER TABLE I
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORGUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
   - A = SHIELD GROUND ON "FROM END"
   - B = SHIELD GROUND ON "TO END"
   - K = BLACK
   - L = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-168, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY. CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ~~ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS (39) & (40) PER ND 1002008 METHOD B~~
17. TAPE HARNESS IN AREA INDICATED USING ITEM (43) TO MAINTAIN HARNESS CONFIGURATION PER SECTION F-E AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM (43).
18. TAPE (44) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
19. TORQUE RETAINING NUT TO 45-55 lb-IN.

TABLE I	
ASSEMBLY NO.	P.S. NUMBER
2018612-011	PS 2018612
2018612-021	PS 2016143

2018612 | F | 1


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SECTION F-F
2 PLACES
.335 MAX
.130 MAX
SEE NOTE 7 TYP
P4
PIN A
9.625
9.375
P4
5
E
E
1.75
1.50
18 TYP
J6
4
17 TYP
2.00
1.75
2.185
1.875
E10
30
21
INSERT INSULATION .125 +.000 -.031 (CRIMP 33 TO 21)
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
PIN A
P3
4.25
4.00
2 PLACES
15
SEE NOTE 3A
2 PLACES
F
F
G
G
7 TYP
18 TYP
J5
4
PIN A
J5
SEE NOTE 7 TYP
SEE NOTE 17
2 PLACES
12 16
SEE NOTE 3C
3 PLACES
D
D
10
.375 MAX
SR1
2
A
A7
3
C
C
1
J1
6

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 2167			
A	~~REVISED TDRR 18366~~	[illegible]	[illegible]	[illegible]
B	REVISED TDRR 189 2	5-18-65	[illegible]	[illegible]
C	REVISED TDRR 19270	[illegible]	[illegible]	[illegible]
D	REVISED TDRR 21320	7-26-65	[illegible]	WR
E	REVISED TDRR 21676	8-31-65	[illegible]	WR
F	REVISED TDRR 22014	[illegible]	[illegible]	WR
G	REVISED TDRR 22332	9-21-65	[illegible]	WR
H	REVISED TDRR 23046	10-13-65	[illegible]	[illegible]
J	REVISED TDRR 23702	[illegible]	[illegible]	WR
K	REVISED TDRR 24900	[illegible] 66	[illegible]	WR
L	REVISED TDRR 25486	[illegible]	[illegible]	WR
M	REVISED TDRR 26243	[illegible] 66	[illegible]	[illegible]
N	REVISED TDRR 26254	[illegible]	[illegible]	[illegible]
P	REVISED TDRR 27508	[illegible]	[illegible]	[illegible]
R	REVISED TDRR 28813	7 May 66	[illegible]	[illegible]
S	REVISED TDRR 28850	17 May 66	[illegible]	[illegible]
T	REVISED TDRR 32109	7 DEC 66	SCS	[illegible]
U	REVISED TDRR 32849	3 FEB 67	[illegible]	[illegible]
V	REVISED TDRR 33179	[illegible]	[illegible]	
W	REVISED PER TDRR 33359	5 APR 67	[illegible]	[illegible]
Y	REVISED PER TDRR 33464	7 APR 67	[illegible]	[illegible]

SEE NOTE 18

021	011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND. NO.
A/R	A/R	MIL-I-151-26 TYPE ACT	TAPE, ADH, ELEC. PRESS SENSITIVE ½ WIDE	44
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/[illegible] WIDTH	43
1	—	1010353-15	RELAY ELECTRO MAG SENSITIVE	42
2	1	MS15795-803	WASHER, FLAT METAL ROUND	41
~~A/R~~	~~A/R~~	~~1000835~~	~~CURING AGENT~~	~~40~~
~~A/R~~	~~A/R~~	~~1000834~~	~~RESIN~~	~~39~~
2	2	2021504-44	RESISTOR	38
1	1	1010416-4	WIRE AWG 28E ORN 10" LONG	37
1	1	1010416-5	WIRE AWG 28E YEL 10" LONG	36
1	1	1000223	WASHER CABLE CLAMP	35
2	2	1000220 SEE NOTE 15	CLAMP CABLE	34
1	1	1010717-3	TERMINAL, LUG	33
A/R	A/R	M[illegible] TYPE P CLASS 2	TAPE, NYLON, WAXED	32
1	1	1010717-1	TERMINAL, LUG	31
1	1	1000020-11	SHIELD & GROUND ASSY	30
2	2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1	1010416-8	WIRE AWG 28E VIO 25" LONG	26
1	1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1	1010416-3	WIRE AWG 28E RED 20" LONG	23
1	1	1010416-2	WIRE AWG 28E BRN [illegible]" LONG	22
1	1	1010416-1	WIRE AWG 28E BLK 42" LONG	21
2	2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
13	13	1006776-14	INSULATION SLEEVING ELEC ⅛ LONG	18
36	36	1006776-18	INSULATION SLEEVING ELEC ⅛ LONG	17
3	3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC, SPLINE	15
1	1	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	3	1001488-8	SCREW, HEX SOC HD, SELF-LKG	13
3	3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
2	2	1001488-2	SCREW HEX SOC HD SELF-LKG	11
1	1	2018792	CASE, WIRE ASSEMBLY	10
—	1	1010353-10	RELAY, ELECTRO MAG. SENSITIVE	9
61	61	1010862	BUSHING, SLEEVE	8
~~61~~	~~61~~	~~1010781-1~~	~~CONTACT ELEC~~	~~7~~
1	1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	2	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	5
2	2	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	4
1	1	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
	QTY REQD			
			LIST OF MATERIALS	

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN DTB DATE 1/8/63
CHECKED G QUINN 3/8/65
APPROVAL [illegible] 8 Mar 65
APPROVAL
NASA APPROVAL [illegible] 3-9-63
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY RESOLVER
OUTER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 2 OF 21

2018612 Y 1

1/2018612

2/2018612

TDRR 17167 MAR 9 1965

O.A. RESOLV. | MANNED SPACECRAFT CENTER HOUSTON TEXAS | REVISION Y | NASA DRAWING NO. 201812-011 SHEET 2 of 21

CONDUCTOR FIND NUMBER	NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	CUT WIRE OR SHIELD	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	CUT WIRE OR SHIELD	TERMINATION FIND NO.	SPEC	NO.
1	21	J1-1	17	N					E50	25	Y				
2	21	E1	25	Y		31			E50	25	Y				
3		SR1-1							E50	25	Y				
4	29		1 50		1 25	19				1 25		1 00	20		
4B	21	E50	25	Y					SHLD 4	25	Y				
4L		J1-2	17	N					E51	25	Y				
4K		J1-4	17	N					E52	25	Y				
5	29		1 50		1 25	19				1 25		1 00	20		
5B	21	E50	25	Y					SHLD 5	25	Y				
5L		J1-3	17	N					E51	25	Y				
5K		J1-5	17	N					E52	25	Y				
6-1		SR1-2							E51	25	Y				
6-2		SR1-3							E51	25	Y				
6-3		SR1-4							E52	25	Y				
6-4		SR1-5							E52	25	Y				
6-5		SR1-19	17	Y					K1-11	18	Y				
6-6		SR1-20							E52	25	Y				
7	25	K1-1	18	Y					E51	25	Y				

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CONDUCTOR FIND NUMBER	NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	CUT WIRE OR SHIELD	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	CUT WIRE OR SHIELD	TERMINATION FIND NO.	SPEC	NO.
8-1	24	J1-6	17	N					E53	26	Y				
8-2	26	J1-8	17	N					E54	26	Y				
8-3	25	J1-7	17	N					E53	25	Y				
8-4	27	J1-9	17	N					E54	25	Y				
9-1		SR1-6							E53	25	Y				
9-2		SR1-7							E53	25	Y				
9-3		SR1-8							E54	25	Y				
9-4		SR1-9							E54	25	Y				
10-1	28	J1-10	17	N					K1-4	18	Y				
10-2	21	J1-11	17	N					K1-8	18	Y				
11		J1-12	17	N					SR1-12						
71	25	J1-19	17	N					E72	25	Y				
72-1		SR1-14							E55	25	Y				
72-2		SR1-15							E56	25	Y				
73		SR1-16							E57	25	Y				
74-1		SR1-17							E58	25	Y				
74-2		SR1-18							E59	25	Y				

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CONDUCTOR FIND NUMBER	NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	CUT WIRE OR SHIELD	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	CUT WIRE OR SHIELD	TERMINATION FIND NO.	SPEC	NO.
12		J1-13	17	N					SR1-13						
13-1	37	J1-14	17	N					E55	25	Y				
13-2	36	J1-15	17	N					E56	25	Y				
13-3	37	J1-29	17	N					E55	25	Y				
13-4	36	J1-30	17	N					E56	25	Y				
14	24	J1-16	17	N					E57	25	Y				
15-1	25	J1-17	17	N					E58	25	Y				
15-2	26	J1-18	17	N					E59	25	Y				
15-3	25	J1-31	17	N					E58	25	Y				
15-4	26	J1-32	17	N					E59	25					
16		K1-5	18	Y					SR1-26						
17	21	J1-20	17	N					E70	25	Y				
18-1		J1-21	17	N					SR1-21						
18-2		J1-22	17						SR1-22						
18-3		J1-23	17	N					SR1-23						
18-4		J1-24	17	N					SR1-24						
18-5		J1-25	17	N					SR1-25						
19	24	J1-26	17	N					E57	25	Y				

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CONDUCTOR FIND NUMBER	NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	CUT WIRE OR SHIELD	TERMINATION FIND NO.	SPEC	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	CUT WIRE OR SHIELD	TERMINATION FIND NO.	SPEC	NO.
20-1	27	J1-27	17	N					A7-3	17	Y				
20-2	23	J1-28	17	N					A7-2	17	Y				
21-1		J1-33	17	N					SR1-33						
21-2		J1-34	17	N					SR1-34						
22-1		J1-35	17	N					SR1-35						
22-2		J1-36	17	N					SR1-36						
23-1		J1-37	17	N					SR1-37						
23-2		J1-38	17	N					SR1-38						
24-1		J1-39	17	N					SR1-39						
24-2		J1-40	17	N					SR1-40						
25-1		J1-41	17	N					SR1-41						
25-2		J1-42	17	N					SR1-42						
26-1		J1-43	17	N					SR1-43						
26-2		J1-44	17	N					SR1-44						
27-1		J1-45	17	N					SR1-45						
27-2		J1-46	17	N					SR1-46						

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO: CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
28-1			J1-47	17	N				SR1-47					
28-2			J1-48	17	N				SR1-48					
29-1			J1-51	17	N				B1A-S3					
29-2			J1-52	17	N				B1A-S1					
30-1			J1-53	17	N				B1A-S2					
30-2			J1-54	17	N				B1A-S4					
31-1			J1-55	17	N				B1B-S3					
31-2			J1-56	17	N				B1B-S1					
32-1			J1-57	17	N				B1B-S2					
32-2			J1-58	17	N				B1B-S4					
33-1			SR1-27						A7-3	17	Y			
33-2			SR1-28						A7-2	17	Y			
34-1			SR1-10						K1-4	18	Y			
34-2			SR1-11						K1-6	18	Y			

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO: CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
35-1			SR1-29						A7-6	17	Y			
35-2			SR1-30						A7-1	17	Y			
36-1			SR1-31						A7-6	17	Y			
36-2			SR1-32						A7-5	17	Y			
37-1			SR1-49						A7-6	17	Y			
37-2			SR1-50						A7-4	17	Y			
38			J5-A	17	Y	17			SR1-26					
38-1			J5-B	17	Y	18			SR1-27					
39-2			J5-C	17	Y	18			SR1-28					
40-1			J5-B	17	Y				B1A-P3					
40-2			J5-C	17	Y				B1A-P1					
41-1			J5-D	17	Y	17			SR1-29					
41-2			J5-E	17	Y	17			SR1-30					
42-1			J5-F	17	Y	17			SR1-31					
42-2			J5-H	17	Y	17			SR1-32					
43-1			J5-J	17	Y	17			SR1-33					
43-2			J5-K	17	Y	17			SR1-34					

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO: CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
44-1			J5-L	17	Y	17			SR1-35					
44-2			J5-M	17	Y	17			SR1-36					
45-1			J5-N	17	Y	17			SR1-37					
45-2			J5-P	17	Y	17			SR1-38					
46-1			J5-R	17	Y	17			SR1-39					
46-2			J5-S	17	Y	17			SR1-40					
47-1			J5-T	17	Y	17			SR1-41					
47-2			J5-U	17	Y	17			SR1-42					
48-1			J5-V	17	Y	17			SR1-43					
48-2			J5-W	17	Y	17			SR1-44					
49-1			J5-X	17	Y	17			SR1-45					
49-2			J5-Y	17	Y	17			SR1-46					
50-1			J5-Z	17	Y	17			SR1-47					
50-2			J5-a	17	Y	17			SR1-48					
51-1			J5-b	17	Y	18			SR1-49					
51-2			J5-c	17	Y	18			SR1-50					
52-1			J5-d	17	Y				B1A-P2					
52-2			J5-e	17	Y				B1A-P4					

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.	TO: CUT WIRE OR SHIELD / CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	SPEC	NO.
53			J6-A	17	Y	18			SR1-1					
54			J6-A	17	Y				E10	25	Y	31		
55						30								
55-A			SHLD-55						E10					
55-1			J6-B	17	Y	18			SR1-2					
55-2			J6-C	17	Y	18			SR1-3					
55-3			J6-D	17	Y	18			SR1-4					
55-4			J6-E	17	Y	18			SR1-5					
55-5			J6-W	17	Y	17			SR1-19					
55-6			J6-X	17	Y	17			SR1-20					
56-1			J6-F	17	Y	18			SR1-6					
56-2			J6-F	17	Y				SR1-7					
56-3			J6-J	17	Y	18			SR1-8					
56-4			J6-J	17	Y				SR1-9					

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Conductor Find Number	Find No.	Individual Length	From Circuit Point	Cut Wire or Shield / Strip Wire or Jacket Y/N	From Termination Find No.	Spec	No.	To Circuit Point	Cut Wire or Shield / Strip Wire or Jacket Y/N	To Termination Find No.	Spec	No.
57			J6-N	17Y	18			SR1-12				
58	22		J6-N	17Y				P3-C	17Y	18		
59	22		P3-C	17Y				P4-C	17Y			
60			P3-D	17Y	17			SR1-10				
61			P4-D	17Y	17			SR1-11				
62			J6-P	17Y	17			SR1-13				
63-1			J6-R	17Y	17			SR1-14				
63-2			J6-S	17Y	17			SR1-15				
64			J6-T	17Y	17			SR1-16				
65-1			J6-U	17Y	17			SR1-17				
65-2			J6-V	17Y	17			SR1-18				
66	23		J6-B	17Y	[illegible]			J6-C	17Y			
67	21		J6-H	17Y	17			J6-E	17Y			

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Conductor Find Number	Find No.	Individual Length	From Circuit Point	Cut Wire or Shield / Strip Wire or Jacket Y/N	From Termination Find No.	Spec	No.	To Circuit Point	Cut Wire or Shield / Strip Wire or Jacket Y/N	To Termination Find No.	Spec	No.
68-1			J6-Y	17Y	17			SR1-21				
68-2			J6-Z	17Y	17			SR1-22				
68-3			J6-a	17Y	17			SR1-23				
68-4			J6-b	17Y	17			SR1-24				
68-5			J6-c	17Y	17			SR1-25				
69	25		E73	25Y	-			K1-1	18Y			
70	21		K1-8	18Y				E71	25Y			

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Conductor Find Number	Find No.	Individual Length	From Circuit Point	Cut Wire or Shield / Strip Wire or Jacket Y/N	From Termination Find No.	Spec	No.	To Circuit Point	Cut Wire or Shield / Strip Wire or Jacket Y/N	To Termination Find No.	Spec	No.
1	21		J1-1	17N				E50	25Y			
2	21		E1	25Y	31			E50	25Y			
3			SR1-1					E50	25Y			
4	29			1 50 1 25	19				1 25 1 00	20		
4B	21		E50	25Y				SHLD 4	25Y			
4L			J1-2	17N				E51	25Y			
4K			J1-4	17N				E52	25Y			
5	29			1 50 1 25	19				1 25 1 00	20		
5B	21		E50	25Y				SHLD 5	25Y			
5L			J1-3	17N				E51	25Y			
5K			J1-5	17N				E52	25Y			
6-1			SR1-2					E51	25Y			
6-2			SR1-3					E51	25Y			
6-3			SR1-4					E52	25Y			
6-4			SR1-5					E52	25Y			
6-5			SR1-19					E73	25Y			
6-6			SR1-20					E52	25Y			
7	25		E73	16Y				E51	25Y			

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Conductor Find Number	Find No.	Individual Length	From Circuit Point	Cut Wire or Shield / Strip Wire or Jacket Y/N	From Termination Find No.	Spec	No.	To Circuit Point	Cut Wire or Shield / Strip Wire or Jacket Y/N	To Termination Find No.	Spec	No.
8-1	24		J1-6	17N				E53	25Y			
8-2	43		J1-8	17				E54	25Y			
8-3	25		J1-7	17				E53	25Y			
8-4	27		J1-9	17				E54	25Y			
9-1			SR1-6					E53	25Y			
9-2			SR1-7					E53	25Y			
9-3			SR1-8					E54	25Y			
9-4			SR1-9					E54	25Y			
~~10-1~~	~~20~~		~~J1-10~~	~~17N~~				~~K1-4~~	~~18Y~~			
10-	21		J1-11	17				K1-8	18Y			
11			J1-12	17				SR1-12				
12	25		J1-19	17				E72	25Y			
13-1			SR1-14					E55	25Y			
13-2			SR1-15					E56	25Y			
14			SR1-16					E57	25Y			
15-1			SR1-17					E58	25Y			
15-2			SR1-18					E59	25Y			

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
16			J1-13	17N				SR1-13				
17-1	37		J1-14	17N				E55	25Y			
17-2	36		J1-15	17N				E56	25Y			
17-3	37		J1-29	17N				E55	25Y			
17-4	36		J1-30	17N				E56	25Y			
18	24		J1-16	17N				E57	25Y			
19-1	25		J1-17	17N				E58	25Y			
19-2	26		J1-18	17N				E59	25Y			
19-3	25		J1-31	17N				E58	25Y			
19-4	26		J1-32	17N				E59	25Y			
20			K1-5	18Y				SR1-26				
21	21		J1-20	17N				E70	25Y			
22-1			J1-21	17N				SR1-21				
22-2			J1-22	17N				SR1-22				
22-3			J1-23	17N				SR1-23				
22-4			J1-24	17N				SR1-24				
22-5			J1-25	17N				SR1-25				
23	24		J1-26	17N				E57	25Y			

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
24-1	27		J1-27	17N				A7-3	17Y			
24-2	23		J1-28	17N				A7-2	17Y			
25-1			J1-33	17N				SR1-33				
25-2			J1-34	17N				SR1-34				
26-1			J1-35	17N				SR1-35				
26-2			J1-36	17N				SR1-36				
27-1			J1-37	17N				SR1-37				
27-2			J1-38	17N				SR1-38				
28-1			J1-39	17N				SR1-39				
28-2			J1-40	17N				SR1-40				
29-1			J1-41	17N				SR1-41				
29-2			J1-42	17N				SR1-42				
30-1			J1-43	17N				SR1-43				
30-2			J1-44	17N				SR1-44				
31-1			J1-45	17N				SR1-45				
31-2			J1-46	17N				SR1-46				

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
32-1			J1-47	17N				SR1-47				
32-2			J1-48	17N				SR1-48				
33-1			J1-51	17N				B1A-S3				
33-2			J1-52	17N				B1A-S1				
34-1			J1-53	17N				B1A-S2				
34-2			J1-54	17N				B1A-S4				
35-1			J1-55	17N				B1B-S3				
35-2			J1-56	17N				B1B-S1				
36-1			J1-57	17N				B1B-S2				
36-2			J1-58	17N				B1B-S4				
37-1			SR1-27					A7-3	17Y			
37-2			SR1-28					A7-2	17Y			
38-1			SR1-10					K1-6	18Y			
38-2			SR1-11					K1-2	18Y			
39	26		J1-59	17N				K1-1	18Y			

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CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
40-1			SR1-29					A7-6	17Y			
40-2			SR1-30					A7-1	17Y			
41-1			SR1-31					A7-6	17Y			
41-2			SR1-32					A7-5	17Y			
42-1			SR1-49					A7-6	17Y			
42-2			SR1-50					A7-4	17Y			
43			J5-A	17Y		17		SR1-26				
44-1			J5-B	17Y		18		SR1-27				
44-2			J5-C	17Y		18		SR1-28				
45-1			J5-B	17Y				B1A-P3				
45-2			J5-C	17Y				B1A-P1				
46-1			J5-D	17Y		17		SR1-29				
46-2			J5-E	17Y		17		SR1-30				
47-1			J5-F	17Y		17		SR1-31				
47-2			J5-H	17Y		17		SR1-32				
48-1			J5-J	17Y		17		SR1-33				
48-2			J5-K	17Y		17		SR1-34				

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
58		J6-A	17Y		18		SR1-1				
59		J6-A	17Y				E10	25Y	31		
60					30						
61 A		SHLD-55					E10				
61-1		J6-B	17Y		18		SR1-2				
61-2		J6-C	17Y		18		SR1-3				
61-3		J6-D	17Y		18		SR1-4				
61-4		J6-E	17Y		18		SR1-5				
61-5		J6-W	17Y		17		SR1-19				
61-6		J6-X	17Y		17		SR1-20				
62-1		J6-F	17Y		18		SR1-6				
62-2		J6-F	17Y				SR1-7				
62-3		J6-J	17Y		18		SR1-8				
62-4		J6-J	17Y				SR1-9				

MANNED SPACECRAFT CENTER HOUSTON TEXAS
REVISION Y
NASA DRAWING NO. 2018612-021
SHEET 18 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
49-1		J5-L	17Y		17		SR1-35				
49-2		J5-M	17Y		17		SR1-36				
50-1		J5-N	17Y		17		SR1-37				
50-2		J5-P	17Y		17		SR1-38				
51-1		J5-R	17Y		17		SR1-39				
51-2		J5-S	17Y		17		SR1-40				
52-1		J5-T	17Y		17		SR1-41				
52-2		J5-U	17Y		17		SR1-42				
53-1		J5-V	17Y		17		SR1-43				
53-2		J5-W	17Y		17		SR1-44				
54-1		J5-X	17Y		17		SR1-45				
54-2		J5-Y	17Y		17		SR1-46				
55-1		J5-Z	17Y		17		SR1-47				
55-2		J5-a	17Y		17		SR1-48				
56-1		J5-b	17Y		18		SR1-49				
56-2		J5-c	17Y		18		SR1-50				
57-1		J5-b	17Y				B1A-P2				
57-2		J5-c	17Y				B1A-P4				

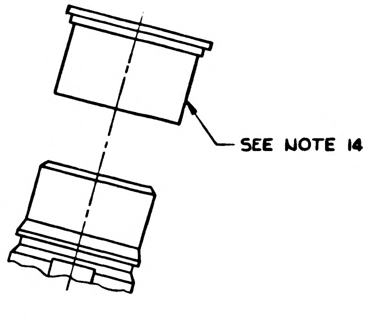
MANNED SPACECRAFT CENTER HOUSTON TEXAS
REVISION Y
NASA DRAWING NO. 2018612-021
SHEET 20 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
63		J6-N	17Y		18		SR1-12				
64	22	J6-N	17Y				P3-C	17Y	18		
65	22	P3-C	17Y				P4-C	17Y			
66		P3-D	17Y		17		SR1-10				
67		P4-D	17Y		17		SR1-11				
68		J6-P	17Y		17		SR1-13				
69-1		J6-R	17Y		17		SR1-14				
69-2		J6-S	17Y		17		SR1-15				
70		J6-T	17Y		17		SR1-16				
71-1		J6-U	17Y		17		SR1-17				
71-2		J6-V	17Y		17		SR1-18				
72		J6-B	17Y				J6-C	17Y			
73		J6-D	17Y				J6-E	17Y			

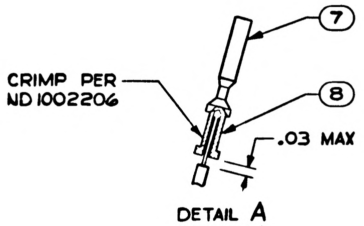
MANNED SPACECRAFT CENTER HOUSTON TEXAS
REVISION Y
NASA DRAWING NO. 2018612-021
SHEET 21 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y/N	TO TERMINATION FIND NO.	SPEC	NO.
74-1		J6-Y	17Y		17		SR1-21				
74-2		J6-Z	17Y		17		SR1-22				
74-3		J6-a	17Y		17		SR1-23				
74-4		J6-b	17Y		17		SR1-24				
74-5		J6-c	17Y		17		SR1-25				
75	21	K1-3	18Y				E71	25Y			
76	28	K1-4	18Y				K1-8	18Y			

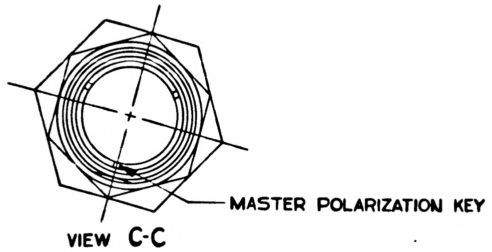
TABLE I	
CABLE CLAMP (34)	
PART NO.	DIA REF
1000220 - 1	1/16
- 2	3/32
- 3	1/8
-13	5/32
- 4	3/16
-14	7/32
- 5	1/4
-15	9/32
1000220 - 6	5/16



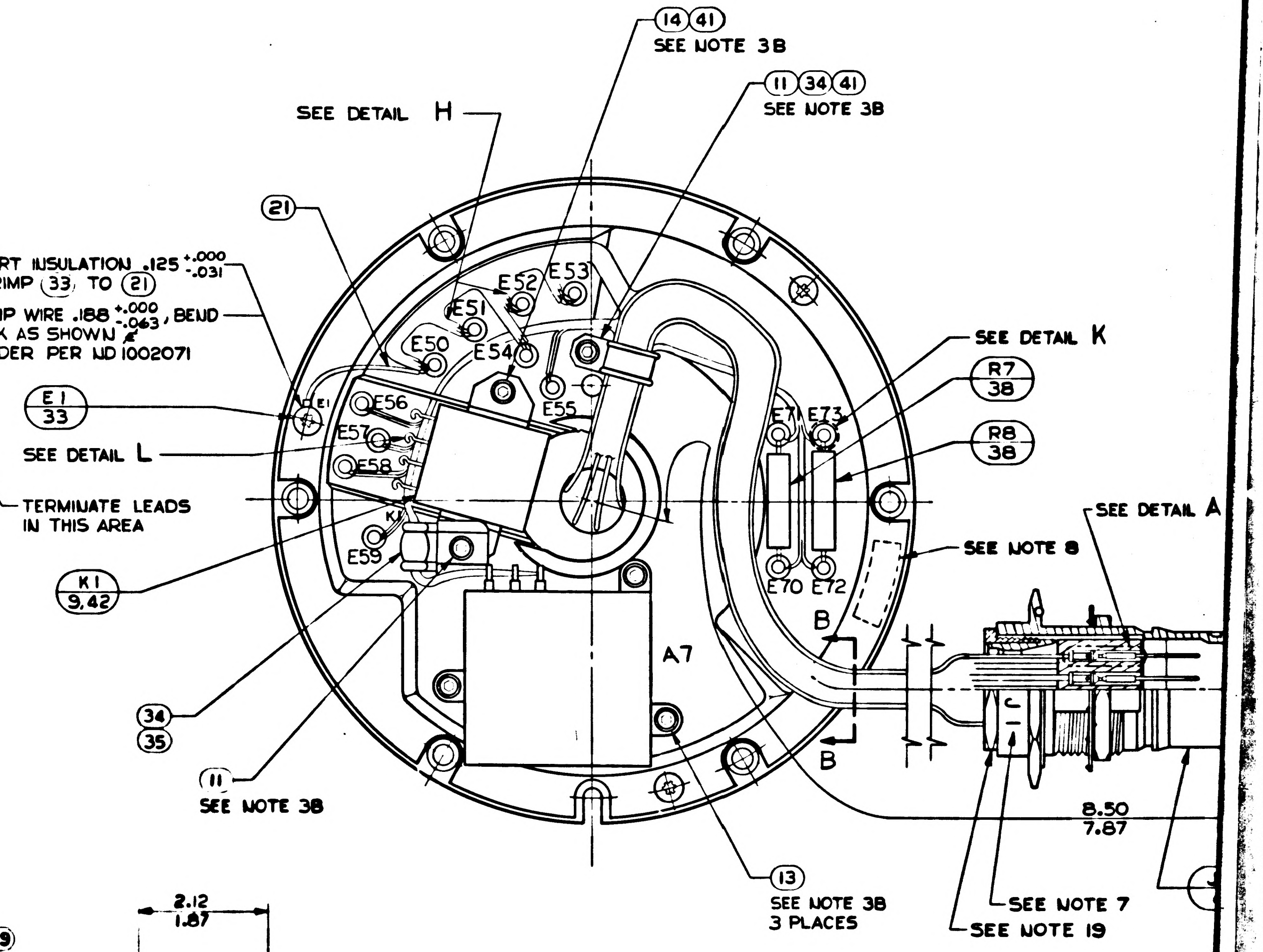
DETAIL J


7
CRIMP PER ND 1002206
8
.03 MAX

DETAIL A
SCALE 4/1

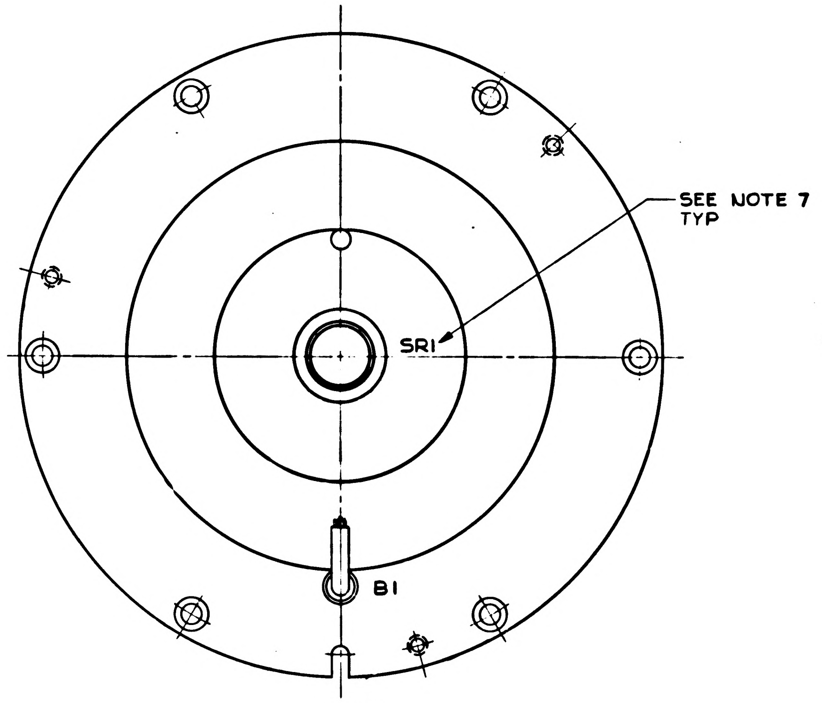

MASTER POLARIZATION KEY

VIEW C-C

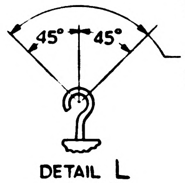

(14)(41)
SEE NOTE 3B
(11)(34)(41)
SEE NOTE 3B
SEE DETAIL H
21
INSERT INSULATION .125 +.000 -.031 & CRIMP (33) TO (21)
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E1/33
SEE DETAIL L
K1/9,42
34
35
11
SEE NOTE 38
E1
E50
E51
E52
E53
E54
E55
E56
E57
E58
E59
K1
E71
E73
E70
E72
A7
B
B
SEE DETAIL K
R7/38
R8/38
SEE DETAIL A
SEE NOTE 8
8.50
7.87
13
SEE NOTE 38
3 PLACES
SEE NOTE 7
SEE NOTE 19

NOTES:

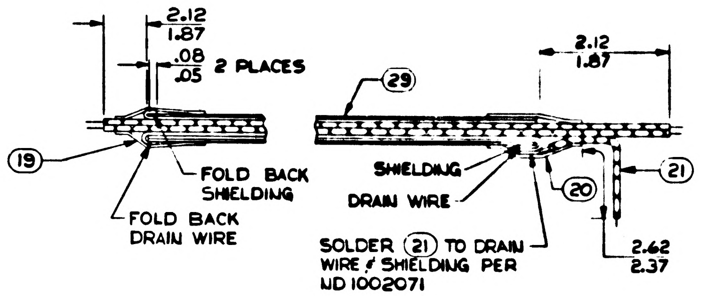
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS PER TABLE I.
3. SCREW TORQUE REQUIREMENTS ±7%.
   - A. 3.5 IN.-LB.
   - B. 5.0 IN.-LB.
   - C. 10.0 IN.-LB.
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032.
7. MARK CHARACTERS .10-.14 HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND1002019.
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURER'S SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO.
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND1002032.
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS.
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
   - A. = SHIELD GROUND ON "FROM END"
   - B. = SHIELD GROUND ON "TO END"
   - K. = BLACK
   - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-16S, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J.
15. ITEM (34) TO BE SELECTED FROM TABLE I AT ASSEMBLY CLAMP TO PREVENT CABLE MOVEMENT, BUT MUST NOT PINCH WIRES.
16. ENCAPSULATE TERMINALS E70, E71, E72 & E73 WITH ITEMS (39) & (40) PER ND1002009 METHOD B.
17. TAPE HARNESS IN AREA INDICATED USING ITEM (43) TO MAINTAIN HARNESS CONFIGURATION PER SECTION F-F AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM (43).
18. TAPE (44) SHALL BE USED AS REQUIRED TO RESTRICT MOVEMENT IN THE CABLE CLAMPS.
19. TORQUE RETAINING NUT TO 45-55 IN.-LB.


SEE NOTE 7
TYP
SR1
B1

VIEW D-D

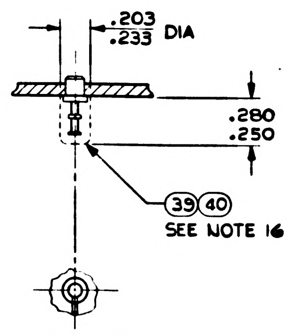

45°
45°
TERMINATE LEADS IN THIS AREA

DETAIL L
7 PLACES


2.12
1.87
.08
.05
2 PLACES
19
FOLD BACK SHIELDING
FOLD BACK DRAIN WIRE
29
2.12
1.87
SHIELDING
DRAIN WIRE
20
21
SOLDER (21) TO DRAIN WIRE & SHIELDING PER ND 1002071
2.62
2.37

DETAIL H
SCALE NONE

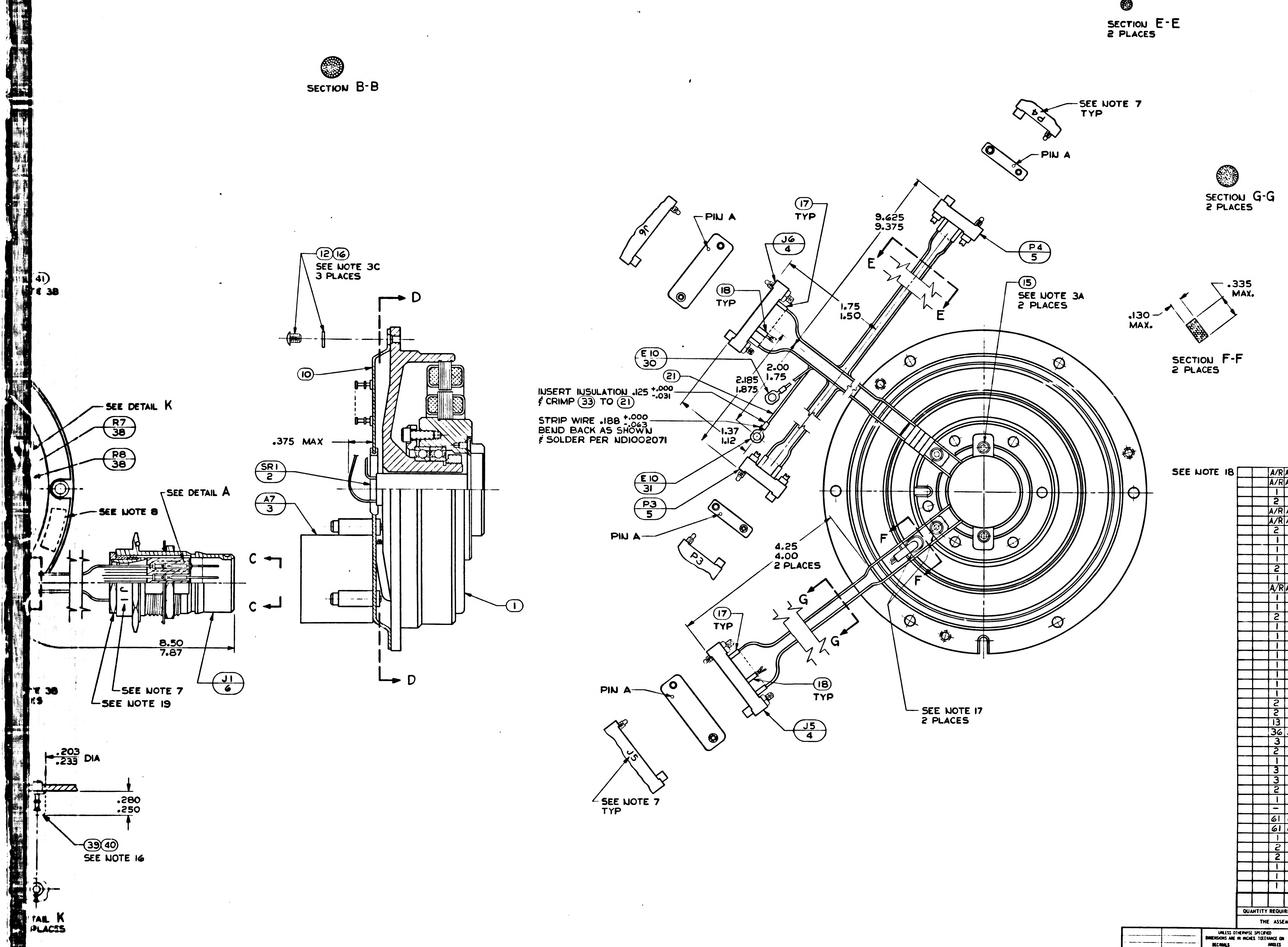
TABLE I	
ASSEMBLY NO.	P.S. NUMBER
2018612-011	PS 2018612
2018612-021	PS 2016143


.203
.233 DIA
.280
.250
(39)(40)
SEE NOTE 16

DETAIL K
4 PLACES

	REV LTR	SHEET
2018612	Z	1

REVISIONS					
ZONE	LTR	DESCRIPTION		DATE	APPROVED
	Z	① REPLACES REV 1 WITHOUT CHANGE PER TDRR 39582	CHG NO	28 APR 67	DG



SECTION B-B
SECTION E-E
2 PLACES
SEE NOTE 7
TYP
PIN A
SECTION G-G
2 PLACES
(41)
TE 38
(12)(16)
SEE NOTE 3C
3 PLACES
D
(10)
SEE DETAIL K
R7
38
R8
38
SEE DETAIL A
SEE NOTE 8
.375 MAX
SR1
2
A7
3
C
C
8.50
7.87
J1
6
(1)
D
SEE NOTE 7
SEE NOTE 19
TE 38
ES
.203
.233 DIA
.280
.250
(39)(40)
SEE NOTE 16
TAIL K
PLACES
J6
PIN A
(17)
TYP
J6
4
(18)
TYP
E10
30
(21)
INSERT INSULATION .125 +.000 -.031
& CRIMP (33) TO (21)
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN
& SOLDER PER ND1002071
2.185
1.875
2.00
1.75
1.37
1.12
E10
31
P3
5
PIN A
P3
9.625
9.375
1.75
1.50
E
E
P4
5
(15)
SEE NOTE 3A
2 PLACES
.335
MAX.
.130
MAX.
SECTION F-F
2 PLACES
F
F
4.25
4.00
2 PLACES
G
G
(17)
TYP
(19)
TYP
PIN A
J5
4
J5
SEE NOTE 7
TYP
SEE NOTE 17
2 PLACES
SEE NOTE 18

		A/R	A/R	44	MIL-I-151-26 TYPE ACT	TAPE, ADH, ELEC. PRESS SENSITIVE ½ WIDE	
		A/R	A/R	43	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION ¼ WIDTH	
		1	–	42	1010353-13	RELAY ELECTRO MAG SENSITIVE	
		2	1	41	MS15795-803	WASHER, FLAT METAL ROUND	
		A/R	A/R	40	1006835	CURING AGENT	
		A/R	A/R	39	1006834	RESIN	
		2	2	38	2021504-44	RESISTOR	
		1	1	37	1010416-4	WIRE AWG 28E ORN 10" LONG	
		1	1	36	1010416-5	WIRE AWG 28E YEL 10" LONG	
		1	1	35	1000223	WASHER, CABLE CLAMP	
		2	2	34	1000220 SEE NOTE 15	CLAMP, CABLE	
		1	1	33	1010717-3	TERMINAL, LUG	
		A/R	A/R	32	MIL-T-713 TYPE P, CLASS 2	TAPE, NYLON, WAXED	
		1	1	31	1010717-1	TERMINAL, LUG	
		1	1	30	1000020-11	SHEILD & GROUND ASSY	
		2	2	29	1010778-2	WIRE, SHIELED, TEFLON, MULTICOND 11" LONG	
		1	1	28	1010416-10	WIRE AWG 28E WHT 16" LONG	
		1	1	27	1010416-9	WIRE AWG 28E GY 30" LONG	
		1	1	26	1010416-8	WIRE AWG 28E VIO 25" LONG	
		1	1	25	1010416-7	WIRE AWG 28E BLU 18" LONG	
		1	1	24	1010416-6	WIRE AWG 28E GRN 15" LONG	
		1	1	23	1010416-3	WIRE AWG 28E RED 20" LONG	
		1	1	22	1010416-2	WIRE AWG 28E BRN 20" LONG	
		1	1	21	1010416-1	WIRE AWG 28E BLK 42" LONG	
		2	2	20	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	
		2	2	19	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	
		13	13	18	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	
		36	36	17	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	
		3	3	16	MS15795-705	WASHER, FLAT, METAL, ROUND	
		2	2	15	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	
		1	1	14	1001488-1	SCREW, HEX SOC HD, SELF-LKG	
		3	3	13	1001488-8	SCREW, HEX SOC HD, SELF-LKG	
		3	3	12	1010891-23	SCREW, BUTTON HD SELF-LKG SOC SPLINE	
		2	2	11	1001488-2	SCREW, HEX SOC HD, SELF-LKG	
		1	1	10	2018792	GUIDE, WIRE ASSEMBLY	
		–	1	9	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	
		61	61	8	1010862	BUSHING, SLEEVE	
		61	61	7	1010781-1	CONTACT ELEC	
		1	1	6	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	
		2	2	5	1010917-901	CONNECTOR, ELEC, RECP, 7 PINS	
		2	2	4	1010917-106	CONNECTOR, ELEC, RECP, 26 PINS	
		1	1	3	2007204-011	PRECISION RESOLVER ALIGNMENT ASSY	
		1	1	2	2018625	SLIP RING ASSEMBLY, 50 CONTACT	
		1	1	1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	
			011	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	CODE IDENT
QUANTITY REQUIRED				LIST OF PARTS AND MATERIALS			

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCE ON
DECIMALS ANGLES
.XX ± — ± —
.XXX ± —
.XXXX ± —
DO NOT SCALE THIS DRAWING
MATERIAL
—

DRAWN DTB 1/8/65
CHECKED G Quinn 3/8/65
DESIGNER
ENGINEER S.A. Hoff ENGINEER
CONTR NO
RELEASE
PROJECT APPROVAL W. KUPFER 3/9/65

INSTRUMENTATION LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASS.

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

SIZE J2 CODE IDENT NO. 80230 2018612
SCALE 2/1 SHEET 1 OF 21

2018612 REV Z SHEET 1

2/2018612

TDRR 17167 MAR 9 1965

O.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION Z

NASA DRAWING NO. 2018612-011
SHEET 2 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	T/N	FROM CUT WIRE OR SHIELD	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	FROM TERMINATION NO.	TO CIRCUIT POINT	T/N	TO CUT WIRE OR SHIELD	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC FIND NO.	TO TERMINATION NO.
1	21	J1-1	17N					E50	25Y				
2	21	E1	25Y			31		E50	25Y				
3		SR1-1						E50	25Y				
4	29			1 50	1 25	19				1 25	1 00	20	
4A	21	E50	25Y					SHLD 4	25Y				
4B		J1-2	17N					E51	25Y				
4C		J1-4	17N					E52	25Y				
5	29			1 50	1 25	19				1 25	1 00	20	
5A	21	E50	25Y					SHLD 5	25Y				
5B		J1-3	17N					E51	25Y				
5C		J1-5	17N					E52	25Y				
6-1		SR1-2						E51	25Y				
6-2		SR1-3						E51	25Y				
6-3		SR1-4						E52	25Y				
6-4		SR1-5						E52	25Y				
6-5		[illegible]	17Y					[illegible]	18Y				
6-6		SR1-20						E52	25Y				
7	25	[illegible]	18Y					E51	25Y				

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HOUSTON TEXAS

REVISION Z

NASA DRAWING NO. 2018612-011
SHEET 3 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	T/N	FROM CUT WIRE OR SHIELD	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	FROM TERMINATION NO.	TO CIRCUIT POINT	T/N	TO CUT WIRE OR SHIELD	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC FIND NO.	TO TERMINATION NO.
8-1	24	J1-6	17N					E53	25Y				
8-2	26	J1-8	17N					E54	26Y				
8-3	25	J1-7	17N					E53	25Y				
8-4	27	J1-9	17N					E54	25Y				
9-1		SR1-6						E53	25Y				
9-2		SR1-7						E53	25Y				
9-3		SR1-8						E54	25Y				
9-4		SR1-9						E54	25Y				
10-1	28	J1-10	17N					K1-4	18Y				
10-2	21	J1-11	17N					K1-8	18Y				
11		J1-12	17N					SR1-12					
71	25	J1-19	17N					E72	25Y				
72-1		SR1-14						E55	25Y				
72-2		SR1-15						E56	25Y				
73		SR1-16						E57	25Y				
74-1		SR1-17						E58	25Y				
74-2		SR1-18						E59	25Y				

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HOUSTON TEXAS

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NASA DRAWING NO. 2018612-011
SHEET 4 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	T/N	FROM CUT WIRE OR SHIELD	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	FROM TERMINATION NO.	TO CIRCUIT POINT	T/N	TO CUT WIRE OR SHIELD	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC FIND NO.	TO TERMINATION NO.
12		J1-13	17N					SR1-13					
13-1	37	J1-14	17N					E55	25Y				
13-2	36	J1-15	17N					E56	25Y				
13-3	37	J1-29	17N					E55	25Y				
13-4	36	J1-30	17N					E56	25Y				
14	24	J1-16	17N					E57	25Y				
15-1	25	J1-17	17N					E58	25Y				
15-2	26	J1-18	17N					E59	25Y				
15-3	25	J1-31	17N					E58	25Y				
15-4	26	J1-32	17N					E59	25Y				
16		K1-5	18Y					SR1-26					
17	21	J1-20	17N					E70	25Y				
18-1		J1-21	17N					SR1-21					
18-2		J1-22	17N					SR1-22					
18-3		J1-23	17N					SR1-23					
18-4		J1-24	17N					SR1-24					
18-5		J1-25	17N					SR1-25					
19	24	J1-26	17N					E57	25Y				

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION Z

NASA DRAWING NO. 2018612-011
SHEET 5 of 21

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	T/N	FROM CUT WIRE OR SHIELD	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	FROM TERMINATION NO.	TO CIRCUIT POINT	T/N	TO CUT WIRE OR SHIELD	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC FIND NO.	TO TERMINATION NO.
20-1	27	J1-27	17N					A7-3	17Y				
20-2	23	J1-28	17N					A7-2	17Y				
21-1		J1-33	17N					SR1-33					
21-2		J1-34	17N					SR1-34					
22-1		J1-35	17N					SR1-35					
22-2		J1-36	17N					SR1-36					
23-1		J1-37	17N					SR1-37					
23-2		J1-38	17N					SR1-38					
24-1		J1-39	17N					SR1-39					
24-2		J1-40	17N					SR1-40					
25-1		J1-41	17N					SR1-41					
25-2		J1-42	17N					SR1-42					
26-1		J1-43	17N					SR1-43					
26-2		J1-44	17N					SR1-44					
27-1		J1-45	17N					SR1-45					
27-2		J1-46	17N					SR1-46					

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CONDUCTOR FIND NUMBER	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.
28-1	J1-47	17	N		SR1-47			
28-2	J1-48	17	N		SR1-48			
29-1	J1-51	17	N		E1A-S3			
29-2	J1-52	17	N		E1A-S1			
30-1	J1-53	17	N		E1A-S2			
30-2	J1-54	17	N		E1A-S4			
31-1	J1-55	17	N		E1B-S3			
31-2	J1-56	17	N		E1B-S1			
32-1	J1-57	17	N		E1B-S2			
32-2	J1-58	17	N		E1B-S4			
33-1	SR1-27				A7-3	17	Y	
33-2	SR1-28				A7-2	17	Y	
34-1	SR1-10				K1-4	18	Y	
34-2	SR1-11				K1-[illegible]	18	Y	

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CONDUCTOR FIND NUMBER	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.
35-1	SR1-29				A7-6	17	Y	
35-2	SR1-30				A7-1	17	Y	
36-1	SR1-31				A7-6	17	Y	
36-2	SR1-32				A7-5	17	Y	
37-1	SR1-49				A7-6	17	Y	
37-2	SR1-50				A7-4	17	Y	
38	J5-A	17	Y	17	SR1-26			
38-1	J5-B	17	Y	18	SR1-27			
39-2	J5-C	17	Y	18	SR1-28			
40-1	J5-B	17	Y		E1A-P3			
40-2	J5-C	17	Y		E1A-P1			
41-1	J5-D	17	Y	17	SR1-29			
41-2	J5-E	17	Y	17	SR1-30			
42-1	J5-F	17	Y	17	SR1-31			
42-2	J5-H	17	Y	17	SR1-32			
43-1	J5-J	17	Y	17	SR1-33			
43-2	J5-K	17	Y	17	SR1-34			

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CONDUCTOR FIND NUMBER	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.
44-1	J5-L	17	Y	17	SR1-35			
44-2	J5-M	17	Y	17	SR1-36			
45-1	J5-N	17	Y	17	SR1-37			
45-2	J5-P	17	Y	17	SR1-38			
46-1	J5-R	17	Y	17	SR1-39			
46-2	J5-S	17	Y	17	SR1-40			
47-1	J5-T	17	Y	17	SR1-41			
47-2	J5-U	17	Y	17	SR1-42			
48-1	J5-V	17	Y	17	SR1-43			
48-2	J5-W	17	Y	17	SR1-44			
49-1	J5-X	17	Y	17	SR1-45			
49-2	J5-Y	17	Y	17	SR1-46			
50-1	J5-Z	17	Y	17	SR1-47			
50-2	J5-a	17	Y	17	SR1-48			
51-1	J5-b	17	Y	18	SR1-49			
51-2	J5-c	17	Y	18	SR1-50			
52-1	J5-d	17	Y		E1A-P2			
52-2	J5-e	17	Y		E1A-P4			

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CONDUCTOR FIND NUMBER	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	Y/N	TERMINATION FIND NO.
53	J6-A	17	Y	18	SR1-1			
54	J6-A	17	Y		E10	25	Y	31
55				30				
55-A	SHLD-55				E10			
55-1	J6-B	17	Y	18	SR1-2			
55-2	J6-C	17	Y	18	SR1-3			
55-3	J6-D	17	Y	18	SR1-4			
55-4	J6-E	17	Y	18	SR1-5			
55-5	J6-W	17	Y	17	SR1-19			
55-6	J6-X	17	Y	17	SR1-20			
56-1	J6-F	17	Y	18	SR1-6			
56-2	J6-F	17	Y		SR1-7			
56-3	J6-J	17	Y	18	SR1-8			
56-4	J6-J	17	Y		SR1-9			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.
1	21	J1-1	17 N		E50	25Y	
2	21	E1	25Y	31	E50	25Y	
3		SR1-1			E50	25Y	
4	29		1 50 1 25	19		1 25 1 00	20
4B	21	E50	25 Y		SHLD 4	25Y	
4L		J1-2	17N		E51	25Y	
4K		J1-4	17N		E52	25Y	
5	29		1 50 1 25	19		1 25 1 00	20
5B	21	E50	25Y		SHLD 5	25Y	
5L		J1-3	17N		E51	25Y	
5K		J1-5	17N		E52	25Y	
6-1		SR1-2			E51	25Y	
6-2		SR1-3			E51	25Y	
6-3		SR1-4			E52	25Y	
6-4		SR1-5			E52	25Y	
6-5		SR1-19			E73	25Y	
6-6		SR1-20			E52	25Y	
7	25	E73	16Y		E51	25Y	

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.
57		J6-N	17Y	18	SR1-12		
58	22	J6-M	17Y		P3-C	17Y	18
59	22	P3-C	17Y		P4-C	17Y	
60		P3-D	17Y	17	SR1-10		
61		P4-D	17Y	17	SR1-11		
62		J6-P	17Y	17	SR1-13		
63-1		J6-R	17Y	17	SR1-14		
63-2		J6-S	17Y	17	SR1-15		
64		J6-T	17Y	17	SR1-16		
65-1		J6-U	17Y	17	SR1-17		
65-2		J6-V	17Y	17	SR1-18		
66	23	J6-B	17Y	17	J6-C	17Y	
67	21	J6-E	17Y	17	[illegible]	17Y	

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.
8-1	24	J1-6	17N		E53	25Y	
8-2	43	J1-8	17N		E54	25Y	
8-3	25	J1-7	17N		E53	25Y	
8-4	27	J1-9	17N		E54	25Y	
9-1		SR1-6			E53	25Y	
9-2		SR1-7			E53	25Y	
9-3		SR1-8			E54	25Y	
9-4		SR1-9			E54	25Y	
~~10-1~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~		~~[illegible]~~	~~[illegible]~~	
10-2	21	J1-11	17N		K1-8	18Y	
11		J1-12	17N		SR1-12		
12	25	J1-19	17N		E72	25Y	
13-1		SR1-14			E55	25Y	
13-2		SR1-15			E56	25Y	
14		SR1-16			E57	25Y	
15-1		SR1-17			E58	25Y	
15-2		SR1-18			E59	25Y	

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.
68-1		J6-Y	17Y	17	SR1-21		
68-2		J6-Z	17Y	17	SR1-22		
68-3		J6-a	17Y	17	SR1-23		
68-4		J6-b	17Y	17	SR1-24		
68-5		J6-c	17Y	17	SR1-25		
69	25	E73	25Y		K1-1	18Y	
70	21	K1-8	18Y		E71	25Y	

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.
16		J1-13	17N		SR1-13		
17-1	37	J1-14	17N		E55	25Y	
17-2	36	J1-15	17N		E56	25Y	
17-3	37	J1-29	17N		E55	25Y	
17-4	36	J1-30	17N		E56	25Y	
18	24	J1-16	17N		E57	25Y	
19-1	25	J1-17	17N		E58	25Y	
19-2	26	J1-18	17N		E59	25Y	
19-3	25	J1-31	17N		E58	25Y	
19-4	26	J1-32	17N		E59	25Y	
20		K1-5	18		SR1-26		
21	21	J1-20	17N		E70	25Y	
22-1		J1-21	17N		SR1-21		
22-2		J1-22	17N		SR1-22		
22-3		J1-23	17N		SR1-23		
22-4		J1-24	17N		SR1-24		
22-5		J1-25	17N		SR1-25		
23	24	J1-26	17N		E57	25Y	

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.
24-1	27	J1-27	17N		A7-3	17Y	
24-2	23	J1-28	17N		A7-2	17Y	
25-1		J1-33	17N		SR1-33		
25-2		J1-34	17N		SR1-34		
26-1		J1-35	17N		SR1-35		
26-2		J1-36	17N		SR1-36		
27-1		J1-37	17N		SR1-37		
27-2		J1-38	17N		SR1-38		
28-1		J1-39	17N		SR1-39		
28-2		J1-40	17N		SR1-40		
29-1		J1-41	17N		SR1-41		
29-2		J1-42	17N		SR1-42		
30-1		J1-43	17N		SR1-43		
30-2		J1-44	17N		SR1-44		
31-1		J1-45	17N		SR1-45		
31-2		J1-46	17N		SR1-46		

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.
32-1		J1-47	17N		SR1-47		
32-2		J1-48	17N		SR1-48		
33-1		J1-51	17N		B1A-S3		
33-2		J1-52	17N		B1A-S1		
34-1		J1-53	17N		B1A-S2		
34-2		J1-54	17N		B1A-S4		
35-1		J1-55	17N		B1B-S3		
35-2		J1-56	17N		B1B-S1		
36-1		J1-57	17N		B1B-S2		
36-2		J1-58	17N		B1B-S4		
37-1		SR1-27			A7-3	17Y	
37-2		SR1-28			A7-2	17Y	
38-1		SR1-10			K1-6	18Y	
38-2		SR1-11			K1-2	18Y	
39	26	J1-59	17N		K1-1	18Y	

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.
40-1		SR1-29			A7-6	17Y	
40-2		SR1-30			A7-1	17Y	
41-1		SR1-31			A7-6	17Y	
41-2		SR1-32			A7-5	17Y	
42-1		SR1-49			A7-6	17Y	
42-2		SR1-50			A7-4	17Y	
43		J5-A	17Y	17	SR1-26		
44-1		J5-B	17Y	18	SR1-27		
44-2		J5-C	17Y	18	SR1-28		
45-1		J5-B	17Y		B1A-P3		
45-2		J5-C	17Y		B1A-P1		
46-1		J5-D	17Y	17	SR1-29		
46-2		J5-E	17Y	17	SR1-30		
47-1		J5-F	17Y	17	SR1-31		
47-2		J5-H	17Y	17	SR1-32		
48-1		J5-J	17Y	17	SR1-33		
48-2		J5-K	17Y	17	SR1-34		

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
49-1		J5-L	17Y		17		SR1-35				
49-2		J5-M	17Y		17		SR1-36				
50-1		J5-N	17Y		17		SR1-37				
50-2		J5-P	17Y		17		SR1-38				
51-1		J5-R	17Y		17		SR1-39				
51-2		J5-S	17Y		17		SR1-40				
52-1		J5-T	17Y		17		SR1-41				
52-2		J5-U	17Y		17		SR1-42				
53-1		J5-V	17Y		17		SR1-43				
53-2		J5-W	17Y		17		SR1-44				
54-1		J5-X	17Y		17		SR1-45				
54-2		J5-Y	17Y		17		SR1-46				
55-1		J5-Z	17Y		17		SR1-47				
55-2		J5-a	17Y		17		SR1-48				
56-1		J5-b	17Y		18		SR1-49				
56-2		J5-c	17Y		18		SR1-50				
57-1		J5-b	17Y				B1A-P2				
57-2		J5-c	17Y				B1A-P4				

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
58		J6-A	17Y		18		SR1-1				
59		J6-A	17Y				E10	25Y		31	
60					30						
61 A		SHLD-55					E10				
61-1		J6-B	17Y		18		SR1-2				
61-2		J6-C	17Y		18		SR1-3				
61-3		J6-D	17Y		18		SR1-4				
61-4		J6-E	17Y		18		SR1-5				
61-5		J6-W	17Y		17		SR1-19				
61-6		J6-X	17Y		17		SR1-20				
62-1		J6-F	17Y		18		SR1-6				
62-2		J6-F	17Y				SR1-7				
62-3		J6-J	17Y		18		SR1-8				
62-4		J6-K	17Y				SR1-9				

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
63		J6-M	17Y		18		SR1-12				
64	22	J6-N	17Y				P3-C	17Y		18	
65	22	P3-C	17Y				P4-C	17Y			
66		P3-D	17Y		17		SR1-10				
67		P4-D	17Y		17		SR1-11				
68		J6-P	17Y		17		SR1-13				
69-1		J6-R	17Y		17		SR1-14				
69-2		J6-S	17Y		17		SR1-15				
70		J6-T	17Y		17		SR1-16				
71-1		J6-U	17Y		17		SR1-17				
71-2		J6-V	17Y		17		SR1-18				
72		J6-B	17Y				J6-C	17Y			
73		J6-D	17Y				J6-E	17Y			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET Y/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM TERMINATION NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET Y/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO TERMINATION NO.
74-1		J6-Y	17Y		17		SR1-21				
74-2		J6-Z	17Y		17		SR1-22				
74-3		J6-a	17Y		17		SR1-23				
74-4		J6-b	17Y		17		SR1-24				
74-5		J6-c	17Y		17		SR1-25				
75	21	K1-3	18Y				E11	25Y			
76	28	K1-4	18Y				K1-8	18Y			

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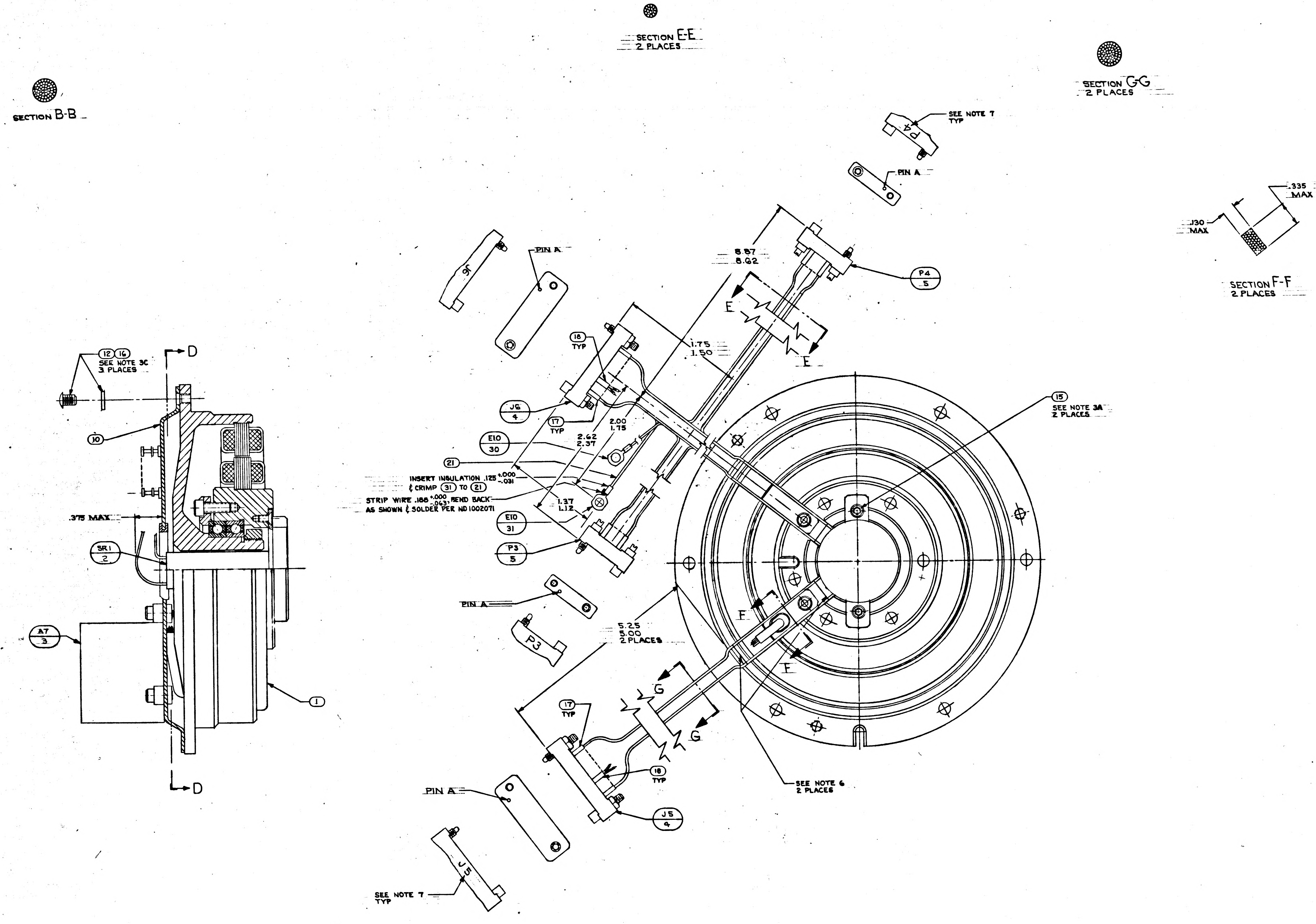
SYM	DESCRIPTION	DATE	APPROVAL


SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SEE NOTE 7
TYP
P4
PIN A
.335
MAX
.130
MAX
SECTION F-F
2 PLACES
J6
PIN A
8.87
8.62
P4
5
E
E
1.75
1.50
18
TYP
J6
4
17
TYP
2.00
1.75
E10
30
2.62
2.37
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 31 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
15
SEE NOTE 3A
2 PLACES
12 16
SEE NOTE 3C
3 PLACES
D
10
.375 MAX
SR1
2
A7
3
1
D
PIN A
P3
5.25
5.00
2 PLACES
F
F
G
G
17
TYP
18
TYP
SEE NOTE 6
2 PLACES
PIN A
J5
4
J5
SEE NOTE 7
TYP

A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	32
2	1010717-1	TERMINAL, LUG	31
1	1000020-8	SHIELD & GROUND ASSY	30
2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG	29
1	1010416-10	WIRE AWG 28E WHT 16" LONG	28
1	1010416-9	WIRE AWG 28E GY 30" LONG	27
1	1010416-8	WIRE AWG 28E VIO 15" LONG	26
1	1010416-7	WIRE AWG 28E BLU 18" LONG	25
1	1010416-6	WIRE AWG 28E GRN 15" LONG	24
1	1010416-3	WIRE AWG 28E RED 18" LONG	23
1	1010416-2	WIRE AWG 28E BRN 20" LONG	22
1	1010416-1	WIRE AWG 28E BLK 40" LONG	21
2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK	20
2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK	19
11	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	18
36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	17
3	MS15795-705	WASHER, FLAT, METAL, ROUND	16
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE	15
4	1001488-1	SCREW, HEX SOC HD, SELF-LKG	14
3	1001488-4	SCREW, HEX SOC HD, SELF-LKG	13
3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	2018799	CLAMP, WIRE	11
1	2018792	GUIDE, WIRE ASSEMBLY	10
1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE	9
61	1010862	BUSHING, SLEEVE	8
61	1010781-1	CONTACT ELEC	7
1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS	6
2	1011757-000	CONNECTOR, ELEC, RECP, 7 PINS	5
2	1000122	CONNECTOR, ELEC, RECP, 26 PINS	4
1	2007001-011	PRECISION RESOLVER ALIGNMENT ASSY	3
1	2018625	SLIP RING ASSEMBLY, 50 CONTACT	2
1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
011	LIST OF MATERIALS		

2018612

2018601	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DTB DATE 1/8/65
CHECKED G QUINN 3/8/65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL W Kupfer 9 Mar

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

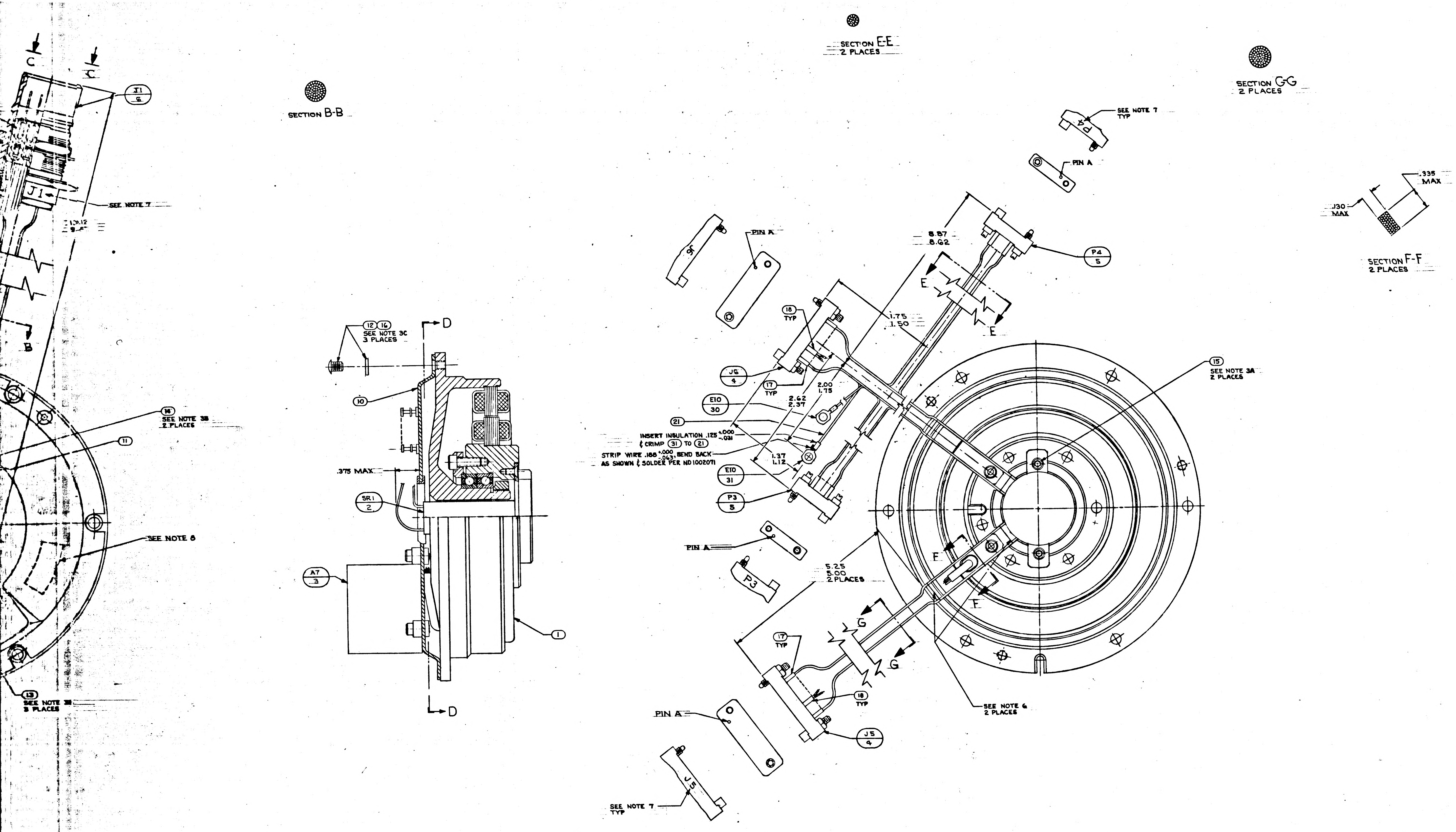
CODE IDENT NO. SIZE J NASA DRAWING NO. 2018612
SCALE 2/1 WT SHEET 1 OF II

20 612 REV SHT 1

F-3

REVISION DRR 17167

SYM	DESCRIPTION	DATE	APPROVAL


C
C
J1
6
J1
SEE NOTE 7
B
SECTION B-B
SECTION E-E
2 PLACES
SECTION G-G
2 PLACES
SEE NOTE 7
TYP
PIN A
.335
MAX
.130
MAX
SECTION F-F
2 PLACES
J6
PIN A
5.87
5.62
P4
5
E
E
1.75
1.50
18
TYP
12 16
SEE NOTE 3C
3 PLACES
D
10
J6
4
17
TYP
2.00
1.75
E10
30
2.62
2.37
21
INSERT INSULATION .125 +.000 -.031
& CRIMP 31 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK
AS SHOWN & SOLDER PER ND1002071
1.37
1.12
E10
31
P3
5
15
SEE NOTE 3A
2 PLACES
16
SEE NOTE 3B
2 PLACES
11
.375 MAX
SR1
2
SEE NOTE 8
PIN A
P3
A7
3
5.25
5.00
2 PLACES
F
F
1
17
TYP
G
G
18
TYP
J5
4
SEE NOTE 6
2 PLACES
13
SEE NOTE 3B
3 PLACES
D
PIN A
J5
SEE NOTE 7
TYP

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
A/R	MIL-T-713 TYPE P CLASS 2	TAPE NYLON, WAXED
2	1010717-1	TERMINAL, LUG
1	1000020-8	SHIELD & GROUND ASSY
2	1010778-2	WIRE, SHIELDED, TEFLON, MULTICOND 11" LONG
1	1010416-10	WIRE AWG 28E WHT 16" LONG
1	1010416-9	WIRE AWG 28E GY 30" LONG
1	1010416-8	WIRE AWG 28E VIO 15" LONG
1	1010416-7	WIRE AWG 28E BLU 18" LONG
1	1010416-6	WIRE AWG 28E GRN 15" LONG
1	1010416-3	WIRE AWG 28E RED 18" LONG
1	1010416-2	WIRE AWG 28E BRN 20" LONG
1	1010416-1	WIRE AWG 28E BLK 40" LONG
2	1010490-112	INSULATION SLEEVING ELEC HEAT SHRINK
2	1010490-052	INSULATION SLEEVING ELEC HEAT SHRINK
11	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG
36	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG
3	MS15795-705	WASHER, FLAT, METAL, ROUND
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC SPLINE
4	1001488-1	SCREW, HEX SOC HD, SELF-LKG
3	1001488-4	SCREW, HEX SOC HD, SELF-LKG
3	1010891-23	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE
1	2018799	CLAMP, WIRE
1	2018792	GUIDE, WIRE ASSEMBLY
1	1010353-10	RELAY, ELECTRO MAG, SENSITIVE
61	1010862	BUSHING, SLEEVE
61	1010781-1	CONTACT ELEC
1	1010783-1	CONNECTOR, ELEC, RECP, 61 PINS
2	1011757-000	CONNECTOR, ELEC, RECP, 7 PINS
2	1000122	CONNECTOR, ELEC, RECP, 26 PINS
1	2007001-011	PRECISION RESOLVER ALIGNMENT ASSY
1	2018625	SLIP RING ASSEMBLY, 50 CONTACT
1	2018606-011	RESOLVER ASSEMBLY, OUTER AXIS

011 LIST OF MATERIALS

NEXT ASSY	USED ON
2018601	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

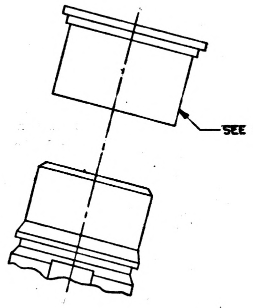
DRAWN DTB DATE 1/8/65
CHECKED G Quinn 3/8/65
APPROVAL 8 Mar 65
APPROVAL
NASA APPROVAL 3-9-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

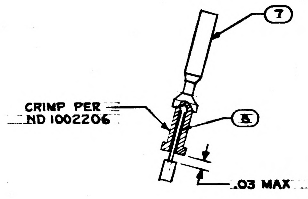
INTERGIMBAL SUB-ASSEMBLY
RESOLVER
OUTER AXIS

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018612
SCALE 2/1
WT
SHEET 1

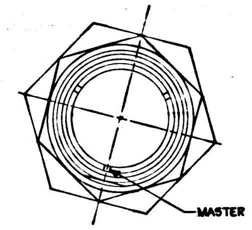
2018612 REV SHT 1



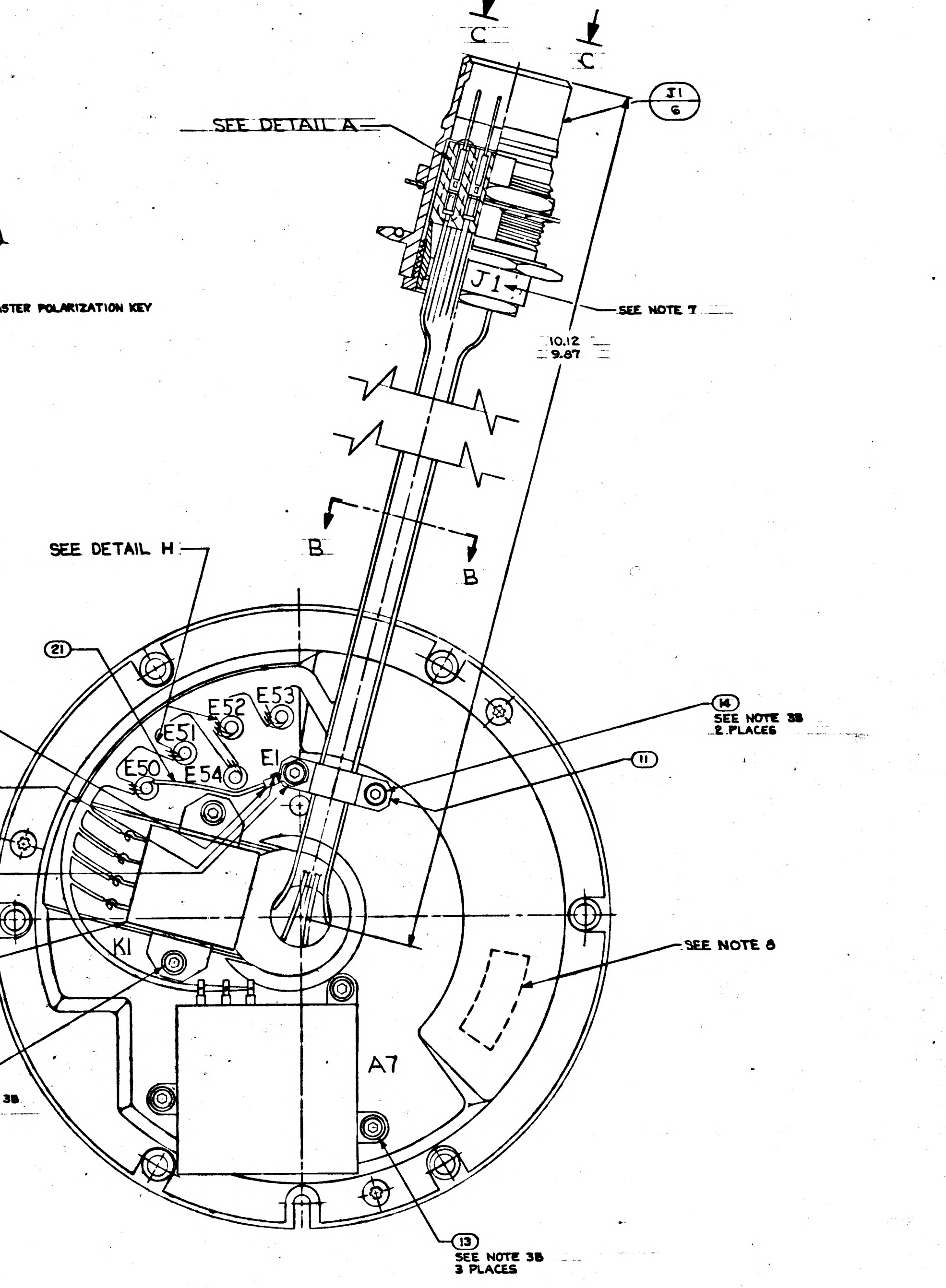
DETAIL J

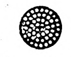

7
CRIMP PER ND 1002206
8
.03 MAX

DETAIL A
SCALE 4/1

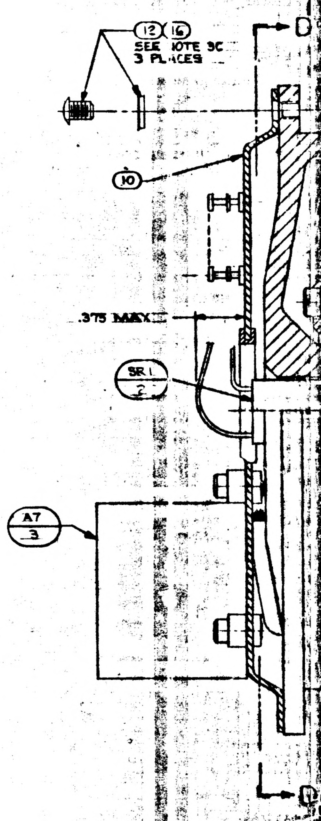

MASTER POLARIZATION KEY

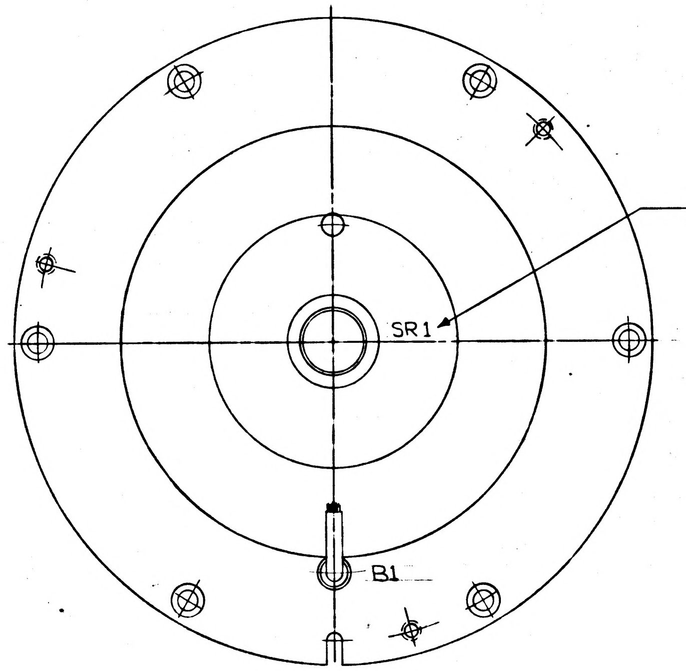
VIEW C-C


C
C
J1
6
SEE DETAIL A
J1
SEE NOTE 7
10.12
9.87
SEE DETAIL H
B
B
21
INSERT INSULATION .125 +.000 -.031 & CRIMP 31 TO 21
STRIP WIRE .188 +.000 -.063, BEND BACK AS SHOWN & SOLDER PER ND 1002071
E52
E53
E51
E50
E54
E1
14
SEE NOTE 3B
2 PLACES
11
E1
31
K1
9
K1
SEE NOTE 8
A7
14
SEE NOTE 3B
2 PLACES
13
SEE NOTE 3B
3 PLACES

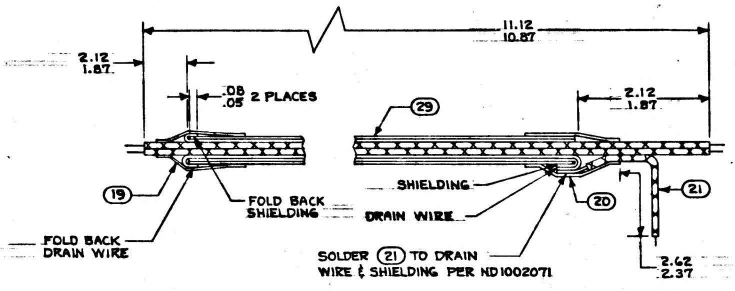


SECTION B-B


12
16
SEE NOTE 3C
3 PLACES
D
10
.375 MAX
SR1
2
A7
3
D


SEE NOTE 7
TYP
SR1
B1

VIEW D-D


11.12
10.87
2.12
1.87
.08
.05
2 PLACES
29
2.12
1.87
SHIELDING
19
FOLD BACK SHIELDING
DRAIN WIRE
20
21
FOLD BACK DRAIN WIRE
SOLDER 21 TO DRAIN WIRE & SHIELDING PER ND1002071
2.62
2.37

DETAIL H
SCALE: NONE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS2007203
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
   - C. 10.0 IN-LB
4. SOLDER LEADS TO (3), (4), (5), (9) & E50 THRU E54 PER ND 1002071.
5. HEAT SHRINK SLEEVING ON (30) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATIONS SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO., REVISION LETTER, & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 11 INDICATES YES OR NO
11. CONDUTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032
12. DIMENSIONS ON SHEETS 2 THRU 11 ARE IN INCHES AND ARE 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 11 INDICATES THE FOLLOWING
    - A. = SHIELD GROUND ON "FROM END"
    - B. = SHIELD GROUND ON "TO END"
    - K. = BLACK
    - L. = BLUE
14. PROTECTIVE COVER, PART NO. NAS-820-16-168, TO BE REMOVED ONLY AS NECESSARY FOR TEST & INSPECTION. SEE DETAIL J

3H

2018612	REV	SHT 1

TDRR 17167 MAR 9 1965

O.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612
SHEET 4 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CIRCUIT POINT	FROM T/N	TO CIRCUIT POINT	TO T/N
12		J1-13	13N	SR1-13	
13-1		J1-14	13N	SR1-14	
13-2		J1-15	13N	SR1-15	
14		J1-16	13N	SR1-16	
15-1		J1-17	13N	SR1-17	
15-2		J1-18	13N	SR1-18	
16		K1-5	13Y	SR1-19	
17		J1-20	13N	SR1-20	
18-1		J1-21	13N	SR1-21	
18-2		J1-22	13N	SR1-22	
18-3		J1-23	13N	SR1-23	
18-4		J1-24	13N	SR1-24	
18-5		J1-25	13N	SR1-25	
19		J1-26	13N	SR1-26	
20-1	27	J1-27	13N	A7-3	13Y
20-2	23	J1-28	13N	A7-2	13Y

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REVISION —

NASA DRAWING NO. 2018612
SHEET 2 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CIRCUIT POINT	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	FROM T/N	FROM TERMINATION SPEC NO.	TO CIRCUIT POINT	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET	TO T/N	TO TERMINATION SPEC NO.
1	21	J1-1		13N		E50		16Y	
2	21	E1		19Y	31	E50		16Y	
3		SR1-1				E50		16Y	
4	29		1 50 1 25		19		1 25 1 00		20
4B	21	E50		16Y		SHLD 4		16Y	
4L		J1-2		13N		E51		16Y	
4K		J1-4		13N		E52		16Y	
5	29		1 50 1 25		19		1 25 1 00		20
5B	21	E50		16Y		SHLD 5		16Y	
5L		J1-3		13N		E51		16Y	
5K		J1-5		13N		E52		16Y	
6-1		SR1-2				E51		16Y	
6-2		SR1-3				E51		16Y	
6-3		SR1-4				E52		16Y	
6-4		SR1-5				E52		16Y	
7	25	K1-1		13Y		E51		16Y	

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REVISION —

NASA DRAWING NO. 2018612
SHEET 5 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CIRCUIT POINT	FROM T/N	TO CIRCUIT POINT	TO T/N
21-1		J1-33	13N	SR1-33	
21-2		J1-34	13N	SR1-34	
22-1		J1-35	13N	SR1-35	
22-2		J1-36	13N	SR1-36	
23-1		J1-37	13N	SR1-37	
23-2		J1-38	13N	SR1-38	
24-1		J1-39	13N	SR1-39	
24-2		J1-40	13N	SR1-40	
25-1		J1-41	13N	SR1-41	
25-2		J1-42	13N	SR1-42	
26-1		J1-43	13N	SR1-43	
26-2		J1-44	13N	SR1-44	
27-1		J1-45	13N	SR1-45	
27-2		J1-46	13N	SR1-46	

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HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612
SHEET 3 of 11

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CIRCUIT POINT	FROM T/N	TO CIRCUIT POINT	TO T/N
8-1	24	J1-6	13N	E53	16Y
8-2	26	J1-8	13N	E54	16Y
8-3	25	J1-7	13N	E53	16Y
8-4	27	J1-9	13N	E54	16Y
9-1		SR1-6		E53	16Y
9-2		SR1-7		E53	16Y
9-3		SR1-8		E54	16Y
9-4		SR1-9		E54	16Y
10-1	28	J1-10	13N	K1-4	13Y
10-2	21	J1-11	13N	K1-8	13Y
11		J1-12	13N	SR1-12	

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REVISION —

NASA DRAWING NO. 2018612 SHEET 8 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
44-1			J5-L	13	Y	17			SR1-35					
44-2			J5-M	13	Y	17			SR1-36					
45-1			J5-N	13	Y	17			SR1-37					
45-2			J5-P	13	Y	17			SR1-38					
46-1			J5-R	13	Y	17			SR1-39					
46-2			J5-S	13	Y	17			SR1-40					
47-1			J5-T	13	Y	17			SR1-41					
47-2			J5-U	13	Y	17			SR1-42					
48-1			J5-V	13	Y	17			SR1-43					
48-2			J5-W	13	Y	17			SR1-44					
49-1			J5-X	13	Y	17			SR1-45					
49-2			J5-Y	13	Y	17			SR1-46					
50-1			J5-Z	13	Y	17			SR1-47					
50-2			J5-a	13	Y	17			SR1-48					
51-1			J5-b	13	Y	18			SR1-49					
51-2			J5-c	13	Y	18			SR1-50					
52-1			J5-b	13	Y				B1A-P2					
52-2			J5-c	13	Y				B1A-P4					

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612 SHEET 6 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
28-1			J1-47	13	N				SR1-47					
28-2			J1-48	13	N				SR1-48					
29-1			J1-51	13	N				B1A-S3					
29-2			J1-52	13	N				B1A-S1					
30-1			J1-53	13	N				B1A-S2					
30-2			J1-54	13	N				B1A-S4					
31-1			J1-55	13	N				B1B-S3					
31-2			J1-56	13	N				B1B-S1					
32-1			J1-57	13	N				B1B-S2					
32-2			J1-58	13	N				B1B-S4					
33-1			SR1-27						A7-3	13	Y			
33-2			SR1-28						A7-2	13	Y			
34-1			SR1-10						K1-6	13	Y			
34-2			SR1-11						K1-2	13	Y			

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REVISION —

NASA DRAWING NO. 2018612 SHEET 9 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
53			J6-A	13	Y	18			SR1-1					
54			J6-A	13	Y				E10	19	Y	31		
55						30								
55-A			SHLD-55						E10					
55-1			J6-B	13	Y	18			SR1-2					
55-2			J6-B	13	Y				SR1-3					
55-3			J6-D	13	Y	18			SR1-4					
55-4			J6-D	13	Y				SR1-5					
56-1			J6-F	13	Y	18			SR1-6					
56-2			J6-F	13	Y				SR1-7					
56-3			J6-J	13	Y	18			SR1-8					
56-4			J6-J	13	Y				SR1-9					

TDRR 17167 MAR 9 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION —

NASA DRAWING NO. 2018612 SHEET 7 of 11

CONDUCTOR			FROM						TO					
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TERMINATION FIND NO.	SPEC	NO.
35-1			SR1-29						A7-6	13	Y			
35-2			SR1-30						A7-1	13	Y			
36-1			SR1-31						A7-6	13	Y			
36-2			SR1-32						A7-5	13	Y			
37-1			SR1-49						A7-6	13	Y			
37-2			SR1-50						A7-4	13	Y			
38			J5-A	13	Y	17			SR1-26					
38-1			J5-B	13	Y	18			SR1-27					
39-2			J5-C	13	Y	18			SR1-28					
40-1			J5-B	13	Y				B1A-P3					
40-2			J5-C	13	Y				B1A-P1					
41-1			J5-D	13	Y	17			SR1-29					
41-2			J5-E	13	Y	17			SR1-30					
42-1			J5-F	13	Y	17			SR1-31					
42-2			J5-H	13	Y	17			SR1-32					
43-1			J5-J	13	Y	17			SR1-33					
43-2			J5-K	13	Y	17			SR1-34					

TDRR 17167 MAR 9 1965

O.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION —

NASA DRAWING NO.
2018612
SHEET 10 of 11

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM T/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO T/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO NO.
57			J6-N	13	Y	18			SR1-12					
58	22		J6-N	13	Y				P3-C	13	Y	18		
59	22		P3-C	13	Y				P4-C	13	Y			
60			P3-D	13	Y	17			SR1-10					
61			P4-D	13	Y	17			SR1-11					
62			J6-P	13	Y	17			SR1-13					
63-1			J6-R	13	Y	17			SR1-14					
63-2			J6-S	13	Y	17			SR1-15					
64			J6-T	13	Y	17			SR1-16					
65-1			J6-U	13	Y	17			SR1-17					
65-2			J6-V	13	Y	17			SR1-18					
66			J6-W	13	Y	17			SR1-19					
67			J6-X	13	Y	17			SR1-20					

TDRR 17167 MAR 9 1965

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NASA DRAWING NO.
2018612
SHEET 11 of 11

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM T/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO T/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO NO.
68-1			J6-Y	13	Y	17			SR1-21					
68-2			J6-Z	13	Y	17			SR1-22					
68-3			J6-a	13	Y	17			SR1-23					
68-4			J6-b	13	Y	17			SR1-24					
68-5			J6-d	13	Y	17			SR1-25					

APOLLO G&N Specification
PS2018612 Rev -
Original Issue Date: 6/28/65
Release Authority: TDRR 20443
Class A Release

PROCUREMENT SPECIFICATION
PRODUCT CONFIGURATION AND ACCEPTANCE TEST REQUIREMENTS
INTERGIMBAL SUBASSEMBLY, RESOLVER, OUTER AXIS
Drawing No. 2018612

Record of Revisions

Date	Revision Letter	TDRR No.	Pages Revised	Approvals	
				MIT	NASA

This specification consists of page 1 to 7 inclusive.

APPROVALS	NASA/MSC	28 June 65 MIT/IL	ACSP

1. SCOPE

1.1 PURPOSE. This specification establishes the detail requirements for complete identification and acceptance of the Intergimbal Subassembly, Resolver, Outer Axis, Part Number 2018612.

2. APPLICABLE DOCUMENTS

2.1 EFFECTIVE ISSUES. The following documents form a part of this specification to the extent specified herein.

a. Unless otherwise specified, Military Standards and Specifications shall be the issue in effect on the date of request for proposal or invitation to bid.

SPECIFICATIONS

APOLLO G&N

ND1002214	General Specification for Preservation, Packaging, Packing and Container Markings of APOLLO Guidance and Navigation Major Assemblies, Assemblies, Subassemblies, Parts and Associated Ground Support Equipment

STANDARDS

Military

MIL-STD-202	Test methods for electronics and electrical component parts.

DRAWINGS

APOLLO G&N

2018612	Intergimbal Subassembly, Resolver, Outer Axis

(Copies of specifications, standards, drawings, bulletins, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 CONFLICTING REQUIREMENTS. In the event of a conflict between the requirements of the contract, this specification, and the documents listed in this section, the contractor shall notify MIT/IL Management and the following order of precedence shall apply:

a. The contract

b. This specification

c. Documents listed in this section.

TABLE II

CONTINUITY AND DC RESISTANCE

FROM	TO	RESISTANCE (ohms)
J1-1	E50	<0.1
↕	E1	<0.2
↕	J6-A	<0.4
J1-1	E10	<0.5
J1-2	E51	<0.1
↕	J6-B	<0.2
↕	K1-1	<0.1
↕	J6-W	2790 to 3410
J1-2	J1-3	<0.1
J1-3	J6-B	<0.2
J1-4	E52	<0.1
J1-4	J6-D	<0.2
J1-4	J1-5	<0.1
J1-5	J6-D	<0.2
J1-6	E53	<0.1
J1-6	J6-F	<0.2
J1-6	J1-7	<0.1
J1-7	J6-F	<0.2
J1-8	E54	<0.1
J1-8	J6-J	<0.2
J1-8	J1-9	<0.1
J1-9	J6-J	<0.2
J1-10	K1-4	<0.1
J1-10	P3-D	<0.5
J1-11	K1-8	<0.1
J1-11	P4-D	<0.5
J1-12	J6-N	<0.4
J1-12	P3-C	<0.5
J1-12	P4-C	<0.5
J1-13	J6-P	<0.4
J1-14	J6-R	<0.4
J1-15	J6-S	<0.4
J1-16	J6-T	<0.4
J1-17	J6-U	<0.4
J1-18	J6-V	<0.4
J1-20	J6-X	<0.4
J1-21	J6-Y	<0.4
J1-22	J6-Z	<0.4
J1-28	J5-C	<0.4
J1-28	B1-P1	<0.5
J1-27	J1-28	45 to 78
J1-33	J5-J	<0.4
J1-34	J5-K	<0.4
J1-35	J5-L	<0.4
J1-36	J5-M	<0.4
J1-37	J5-N	<0.4
J1-38	J5-P	<0.4
J1-39	J5-R	<0.4
J1-40	J5-S	<0.4
J1-41	J5-T	<0.4
J1-42	J5-U	<0.4
J1-43	J5-V	<0.4
J1-44	J5-W	<0.4
J1-45	J5-X	<0.4
J1-46	J5-Y	<0.4
J1-47	J5-Z	<0.4
J1-48	J5-a	<0.4
J1-51	J1-52	39 to 65
J1-53	J1-54	39 to 65
J1-55	J1-56	60 to 100
J1-57	J1-58	60 to 100
A7-1	J5-E	<0.4
A7-6	J5-b	<0.4
A7-6	J5-D	<0.4
A7-6	J5-F	<0.4
A7-5	J5-H	<0.4
A7-4	J5-c	<0.4
J5-b	J5-c	160 to 269
SHLD on J1-2, 4 & J1-3, 5	E1	<0.2
J1-23	J6-a	<0.4
J1-24	J6-b	<0.4
J1-25	J6-c	<0.4
J1-26	J5-A	<0.4
J1-27	A7-3	<0.1
J1-27	J5-B	<0.4
J1-27	B1-P3	<0.5
J1-28	A7-2	<0.1
SHLD on J6-B, D	E10	<0.2

TABLE III

INSULATION RESISTANCE

FROM	TO	RESISTANCE (Megohms)
All pins on J1 except J1-1	Chassis	≥ 100
J6-B, D	E10	↕
Between all pins on J1 except J1-2 to J1-3, J1-4 to J1-5, J1-6 to J1-7, J1-8 to J1-9, J1-27 to J1-28, J1-51 to J1-52, J1-53 to J1-54, J1-55 to J1-56, & J1-57 to J1-58		≥ 100

4. QUALITY ASSURANCE PROVISIONS

4.1 GENERAL. The contractor responsible for the manufacture of the assembly shall be responsible for the accomplishment of each test required herein.

4.1.1 Test Conditions

4.1.1.1 Environmental. Unless otherwise specified, the assembly shall be tested under the following ambient conditions:

a. Temperature: 75° ± 5° F

b. Relative Humidity: 50% max

c. Pressure Differential: Internal positive pressure of 0.01 inch H_2O.

d. Particle Count Tolerance: Maximum of 100,000 particles, from 1 to 10 microns in size, per cubic foot of air. Maximum of 25,000 particles, greater than 10 microns in size, per cubic foot of air.

4.1.2 Nonconforming Units. Failure of the unit to pass any examination or test of this specification shall automatically classify the unit as nonconforming. Each nonconforming unit corrected by the contractor shall be reinspected. Reinspection may be limited to the test or examination which defined the nonconformance, or, when directed by the cognizant inspector, a complete retest and reexamination may be required. Nonconforming units which have not been corrected will be considered for acceptance only upon formal application by the contractor to the cognizant NASA representative.

4.2 TESTS

4.2.1 Drawing Compliance. The assembly shall be visually examined for compliance to the requirements of APOLLO G&N Drawing 2018612. Particular attention shall be given to inspection for nicks, scratches, burrs, dents, encapsulant defects, contaminants, unacceptable soldering, pin misalignment, and legibility and appearance of markings.

4.2.2 Torque. The torque required to just begin rotation of the assembly (breakaway torque) at eight equally spaced positions in both the cw and ccw directions shall be 5.0 inch-ounce maximum.

4.2.3 Continuity and DC Resistance. The resistance between each pair of terminals shall be as specified in Table II when measured with an ohmmeter limited to an open circuit voltage of 10 mv maximum in accordance with MIL-STD-202 method 303.

4.2.4 Insulation Resistance. Insulation Resistance shall be checked between the points specified in Table III with 500 vdc applied and limited to a short circuit current of 1 ma. The indicated resistance shall be as specified in Table III.

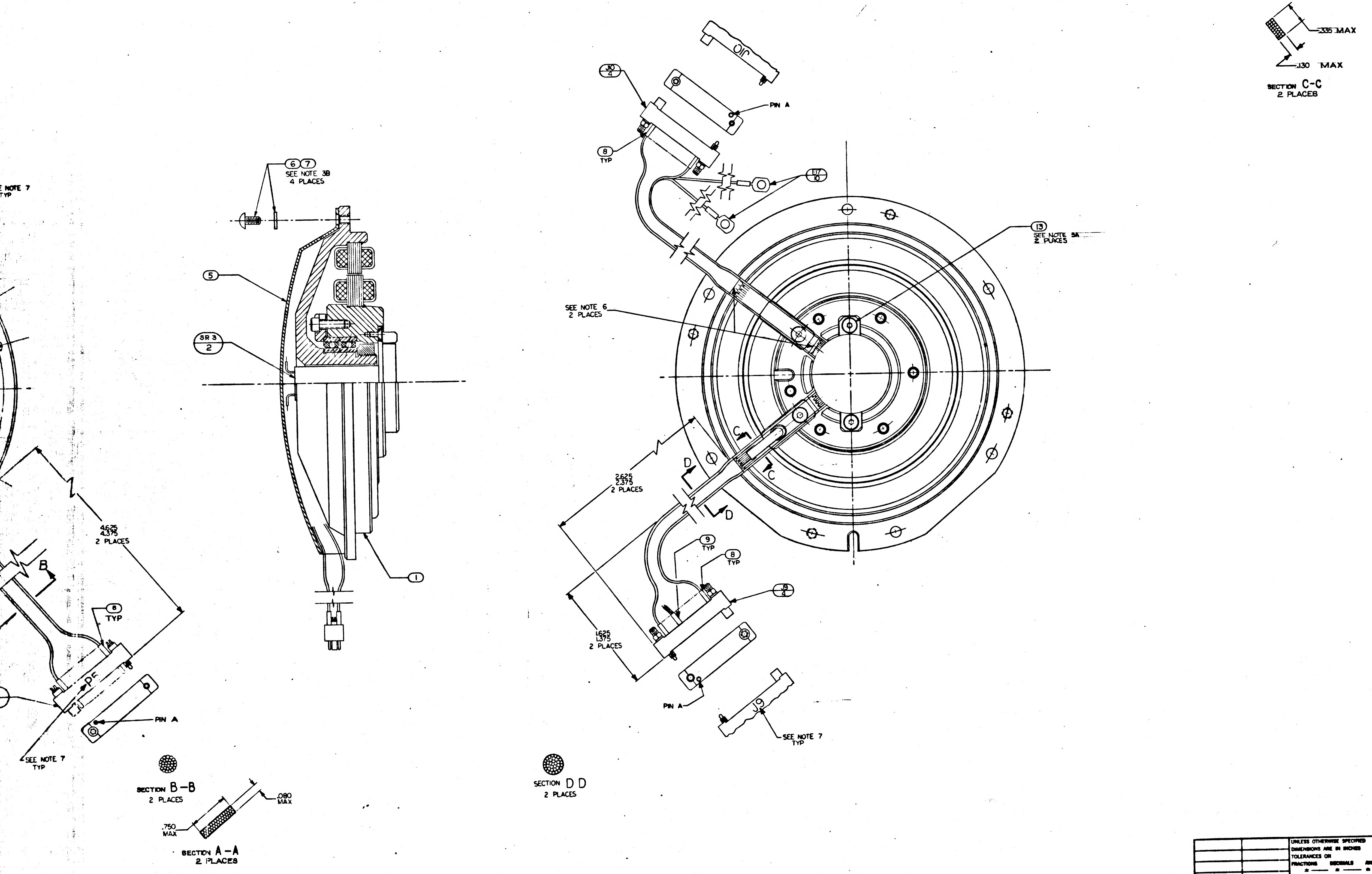
4.2.5 Resolver Phasing. With 28 ± 3V rms, 800 ± 80 cps applied as specified in Table I and the assembly set to within one degree of electrical zero as shown on drawing no. 2018606, the measured output of the resolver shall be as specified in Table I as the bearing housing is rotated 4° max cw as viewed from the bearing housing end.

5. PREPARATION FOR DELIVERY

5.1 GENERAL. Preparation for delivery shall be in accordance with Specification ND1002214.

6. NOTES: None.

SYM	DESCRIPTION	DATE	APPROVAL
	REVISION TDRR 17101		
A	REVISED TDRR 17687	3 MAR 66	



SEE NOTE 7
TYP
6 7
SEE NOTE 38
4 PLACES
5
SR 3
2
1
4.625
4.375
2 PLACES
B
8
TYP
PIN A
SEE NOTE 7
TYP
SECTION B-B
2 PLACES
.080
MAX
.750
MAX
SECTION A-A
2 PLACES
10
4
8
TYP
PIN A
117
10
13
SEE NOTE 3A
2 PLACES
SEE NOTE 6
2 PLACES
C
C
D
D
2.625
2.375
2 PLACES
9
TYP
8
TYP
9
4
1.625
1.375
2 PLACES
PIN A
SEE NOTE 7
TYP
SECTION D D
2 PLACES
.335 MAX
.130 MAX
SECTION C-C
2 PLACES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-T-713 TYPEP CLASS 2	TAPE, NYLON, WAXED	14
2	1010867-2	SCREW, SELF-LKG. FLAT HD, SOC-SPLINE	13
1	1010416-4	WIRE AWG 28E ORN 3" LONG	12
2	1000020-4	SHIELD & GROUND ASS'Y	11
2	1000020-6	SHIELD AND GROUND ASS'Y	10
4	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
86	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER, FLAT, METAL, ROUND	7
4	1010891-12	SCREW, BUTTON HD., SELF-LKG, SOC-SPLINE	6
1	2018784	WIRE GUIDE, BRG. HSG. M.A. RSVR	5
2	1000122	CONNECTOR, ELEC, RECEP 26 PINS	4
2	1000123	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018624	SLIP RING ASS'Y 40 CONTACT	2
1	2018607-011	RESOLVER ASS'Y MIDDLE AXIS	1
011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018603	DL 2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R. Caramanz DATE 1-11-66
CHECKED G. QUINN 2-26-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

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HOUSTON, TEXAS

INTERGIMBAL SUB ASSEMBLY
RESOLVER MIDDLE AXIS

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018613
SCALE 2-1
WT
SHEET 1 OF 7

2018613 A

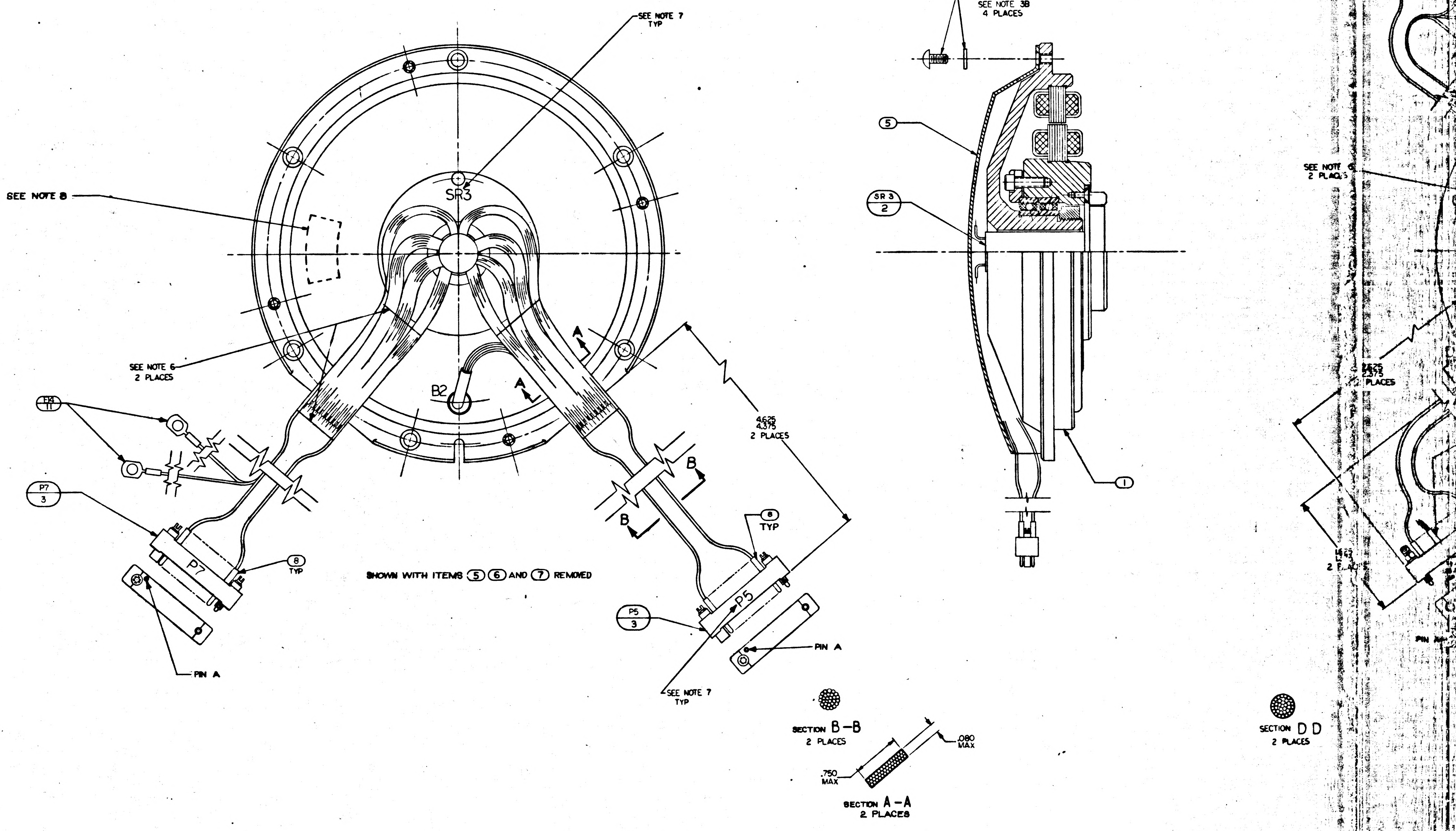
2018613 REV A 1

F-2

3H

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS 2007203
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑩ & ⑪ AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATION SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT INDICATED LOCATION PER NOTE 7 & SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (13-1, 13-2, 13-3), (19-1, 19-2, 19-3), (38-1, 38-2, 38-3) & (44-1, 44-2, 44-3) WHICH ARE SHIELDED BUT NOT TWISTED
12. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES & 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON " TO END"


SEE NOTE 7 TYP
SR3
SEE NOTE 8
SEE NOTE 6 2 PLACES
B2
A
A
B
B
4.625 4.375 2 PLACES
P8 11
P7 3
P7
8 TYP
P5
P5 3
8 TYP
PIN A
PIN A
SEE NOTE 7 TYP
SHOWN WITH ITEMS 5 6 AND 7 REMOVED
6 7 SEE NOTE 3B 4 PLACES
5
SR 3 2
1
SEE NOTE 6 2 PLACES
2.625 2.375 2 PLACES
8
SECTION B-B 2 PLACES
.750 MAX
.080 MAX
SECTION A-A 2 PLACES
SECTION D D 2 PLACES

2H

2018613	REV	SHEET
	A	1

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TIN	TO TERMINATION SPEC FIND NO.	NO.
1			P5-A	13	Y	8		SR3-26			
2-1			P5-B	13	Y	8		SR3-27			
2-2			P5-C	13	Y	8		SR3-28			
3-1			P5-D	13	Y	8		SR3-29			
3-2			P5-E	13	Y	8		SR3-30			
4-1			P5-F	13	Y	8		SR3-31			
4-2			P5-H	13	Y	8		SR3-32			
5-1			P5-J	13	Y	8		SR3-33			
5-2			P5-K	13	Y	8		SR3-34			
6-1			P5-L	13	Y	8		SR3-35			
6-2			P5-M	13	Y	8		SR3-36			
7-1			P5-N	13	Y	8		SR3-37			
7-2			P5-P	13	Y	8		SR3-38			
8-1			P5-R	13	Y	8		SR3-39			
8-2			P5-S	13	Y	8		SR3-40			
9-1			P5-T	13	Y	8		B2A-S3			
9-2			P5-U	13	Y	8		B2A-S1			

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SHEET 2 of 7

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TIN	TO TERMINATION SPEC FIND NO.	NO.
10-1			P5-V	13	Y	8		B2A-S2			
10-2			P5-W	13	Y	8		B2A-S4			
11-1			P5-X	13	Y	8		B2B-S3			
11-2			P5-Y	13	Y	8		B2B-S1			
12-1			P5-Z	13	Y	8		B2B-S2			
12-2			P5-a	13	Y	8		B2B-S4			
13						11					
13A			SHLD 13					E14			
13-1			P7-A	13	Y	8		SR3-1			
13-2			P7-B	13	Y	8		SR3-2			
13-3			P7-C	13	Y	8		SR3-3			
14			P7-D	13	Y	8		SR3-4			
15			P7-E	13	Y	8		SR3-5			
16-1			P7-F	13	Y	8		SR3-6			
16-2			P7-H	13	Y	8		SR3-7			
17-1			P7-J	13	Y	8		SR3-8			
17-2			P7-K	13	Y	8		SR3-9			

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SHEET 3 of 7

TDRR. 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TIN	TO TERMINATION SPEC FIND NO.	NO.
18-1			P7-L	13	Y	8		SR3-10			
18-2			P7-M	13	Y	8		SR3-11			
19						11					
19A			SHLD-19					E14			
19-1			P7-N	13	Y	8		SR3-12			
19-2			P7-P	13	Y	8		SR3-13			
19-3			P7-R	13	Y	8		SR3-14			
20			P7-S	13	Y	8		SR3-15			
21			P7-T	13	Y	8		SR3-16			
22-1			P7-U	13	Y	8		SR3-17			
22-2			P7-V	13	Y	8		SR3-18			
23-1			P7-W	13	Y	8		SR3-19			
23-2			P7-X	13	Y	8		SR3-20			
23-3			P7-Y	13	Y	8		SR3-21			
23-4			P7-Z	13	Y	8		SR3-22			
23-5			P7-a	13	Y	8		SR3-23			
23-6			P7-b	13	Y	8		SR3-24			
24			P7-c	13	Y	8		SR3-25			

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SHEET 4 of 7

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TIN	TO TERMINATION SPEC FIND NO.	NO.
25			J9-A	13	Y	8		SR3-26			
26-1			J9-B	13	Y	9		SR3-27			
26-2			J9-C	13	Y	9		SR3-28			
27-1			J9-B	13	Y			B2A-P3			
27-2			J9-C	13	Y			B2A-P1			
28-1			J9-D	13	Y	8		SR3-29			
28-2			J9-E	13	Y	8		SR3-30			
29-1			J9-F	13	Y	9		SR3-31			
29-2			J9-H	13	Y	9		SR3-32			
30-1			J9-F	13	Y			B2A-P2			
30-2			J9-H	13	Y			B2A-P4			
31-1			J9-J	13	Y	8		SR3-33			
31-2			J9-K	13	Y	8		SR3-34			
32-1			J9-L	13	Y	8		SR3-35			
32-2			J9-M	13	Y	8		SR3-36			
33-1			J9-N	13	Y	8		SR3-37			
33-2			J9-P	13	Y	8		SR3-38			

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NASA DRAWING NO. 201863
SHEET 6 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.		NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.		NO.
34-1		J9-R	13Y		8			SR3-39					
34-2		J9-S	13Y		8			SR3-40					
35-1		J9-W	13Y		8			SR3-23					
35-2		J9-X	13Y		8			SR3-24					
35-3		J9-Y	13Y		8			SR3-21					
35-4		J9-Z	13Y		8			SR3-22					
36	12	J9-a	13Y		8			J9-b	13Y		8		
37		J9-c	13Y		8			SR3-25					
38					10								
38-A		SHLD-38						E17					
38-1		J10-A	13Y		8			SR3-1					
38-2		J10-B	13Y		8			SR3-2					
38-3		J10-C	13Y		8			SR3-3					
39		J10-D	13Y		8			SR3-4					
40		J10-E	13Y		8			SR3-5					
41-1		J10-F	13Y		8			SR3-6					
41-2		J10-H	13Y		8			SR3-7					

TDRR 17101 MAR 2 1965

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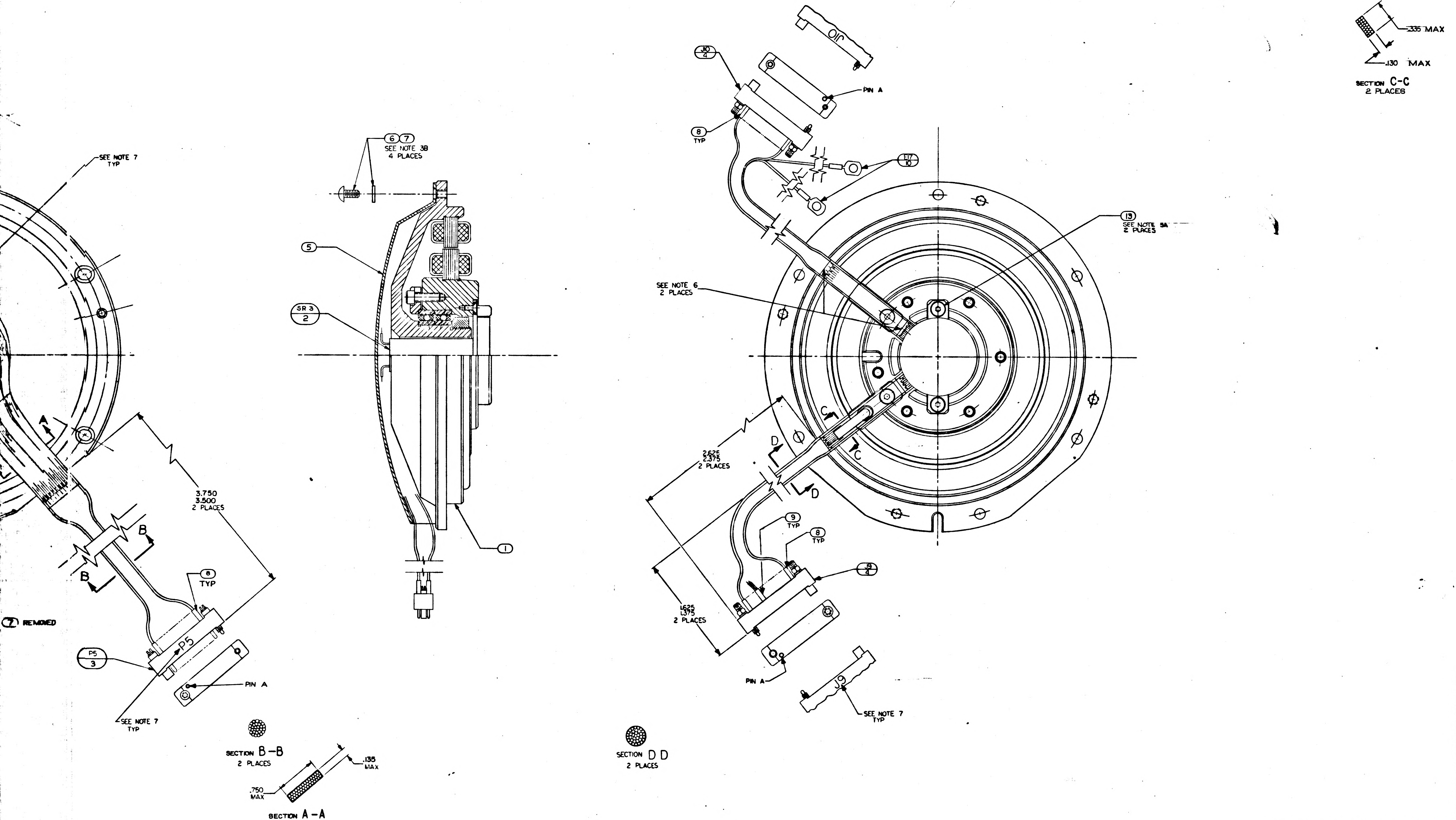
NASA DRAWING NO. 201863
SHEET 7 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.		NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.		NO.
42-1		J10-J	13Y		8			SR3-8					
42-2		J10-K	13Y		8			SR3-9					
43-1		J10-L	13Y		8			SR3-10					
43-2		J10-M	13Y		8			SR3-11					
44					10								
44-A		SHLD-44						E17					
44-1		J10-N	13Y		8			SR3-12					
44-2		J10-P	13Y		8			SR3-13					
44-3		J10-R	13Y		8			SR3-14					
45		J10-S	13Y		8			SR3-15					
46		J10-T	13Y		8			SR3-16					
47-1		J10-U	13Y		8			SR3-17					
47-2		J10-V	13Y		8			SR3-18					
48-1		J10-W	13Y		8			SR3-19					
48-2		J10-X	13Y		8			SR3-20					

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 1710			
A	REVISED TDRR 17687	18MAR65		WK
B	REVISED PER TDRR 19280	25May65		



.335 MAX
.130 MAX
SECTION C-C
2 PLACES
J10
4
PIN A
8
TYP
J17
10
13
SEE NOTE 5A
2 PLACES
SEE NOTE 6
2 PLACES
6 7
SEE NOTE 3B
4 PLACES
5
SR 3
2
1
SEE NOTE 7
TYP
A
3.750
3.500
2 PLACES
B
B
8
TYP
7 REMOVED
P5
3
P5
PIN A
SEE NOTE 7
TYP
2.625
2.375
2 PLACES
C
C
D
D
9
TYP
8
TYP
J9
4
1.625
1.375
2 PLACES
PIN A
J9
SEE NOTE 7
TYP
SECTION B-B
2 PLACES
.135
MAX
.750
MAX
SECTION A-A
2 PLACES
SECTION D D
2 PLACES

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	14
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC-SPLINE	13
1	1010416-4	WIRE AWG 28E ORN 3" LONG	12
2	1000020-8	SHIELD & GROUND ASS'Y	11
2	1000020-6	SHIELD AND GROUND ASS'Y	10
4	1006776-14	INSULATION SLEEVING ELEC 3/16 LONG	9
86	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER, FLAT, METAL, ROUND	7
4	1010891-12	SCREW, BUTTON HD., SELF-LKG, SOC-SPLINE	6
1	2018784	WIRE GUIDE, BRG HSG, M.A. RSVR	5
2	1000122	CONNECTOR, ELEC. RECEP 26 PINS	4
2	1000123	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018624	SLIP RING ASS'Y 40 CONTACT	2
1	2018607-011	RESOLVER ASS'Y MIDDLE AXIS	1
011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018603	DL 2018601
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Bob Carpenter DATE 1-11-65
CHECKED G. QUINN 2-26-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL W. J. Klein 3-2-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

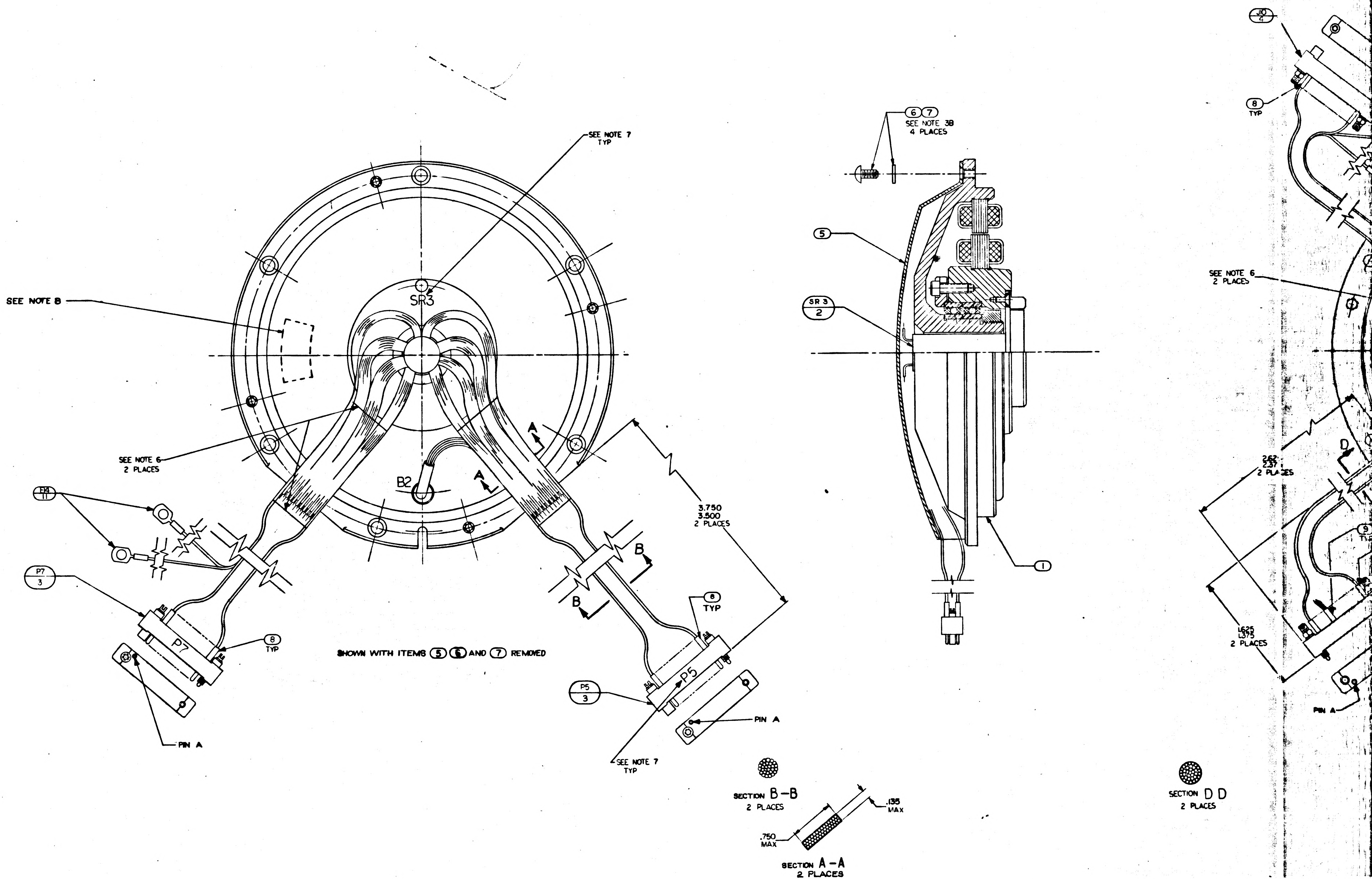
INTERGIMBAL SUB ASSEMBLY
RESOLVER MIDDLE AXIS

CODE IDENT NO. SIZE J NASA DRAWING NO. 2018613
SCALE 2-1 WT SHEET 1 OF 7

2018613 REV B SHEET 1

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS2018613
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑩ & ⑪ AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\substack{.10\\.14}$ HIGH COLOR BLACK AT LOCATION SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT INDICATED LOCATION PER NOTE 7 & SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (13-1, 13-2, 13-3), (19-1, 19-2, 19-3), (38-1, 38-2, 38-3) & (44-1, 44-2, 44-3) WHICH ARE SHIELDED BUT NOT TWISTED
12. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES & 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON " TO END"


SEE NOTE 7
TYP
SEE NOTE 8
SR3
SEE NOTE 6
2 PLACES
B2
A
A
B
B
3.750
3.500
2 PLACES
P4
11
P7
3
P7
8
TYP
PIN A
SHOWN WITH ITEMS ⑤ ⑥ AND ⑦ REMOVED
P5
3
P5
8
TYP
PIN A
SEE NOTE 7
TYP
6 7
SEE NOTE 3B
4 PLACES
5
SR 3
2
1
SECTION B-B
2 PLACES
.135
MAX
.750
MAX
SECTION A-A
2 PLACES
10
4
8
TYP
SEE NOTE 6
2 PLACES
D
2.62
2.37
2 PLACES
9
1.625
1.375
2 PLACES
PIN A
SECTION D D
2 PLACES

2018613 | REV B | SHEET 1

TDRR 17101 MAR 2 1965

M. A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018613

SHEET 3 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TO TERMINATION FIND NO.	SPEC	NO.
10-1			P5-V	13	Y	8			B2A-S2				
10-2			P5-W	13	Y	8			B2A-S4				
11-1			P5-X	13	Y	8			B2B-S3				
11-2			P5-Y	13	Y	8			B2B-S1				
12-1			P5-Z	13	Y	8			B2B-S2				
12-2			P5-a	13	Y	8			B2B-S4				
13						11							
13A			SHLD 13						E14				
13-1			P7-A	13	Y	8			SR3-1				
13-2			P7-B	13	Y	8			SR3-2				
13-3			P7-C	13	Y	8			SR3-3				
14			P7-D	13	Y	8			SR3-4				
15			P7-E	13	Y	8			SR3-5				
16-1			P7-F	13	Y	8			SR3-6				
16-2			P7-H	13	Y	8			SR3-7				
17-1			P7-J	13	Y	8			SR3-8				
17-2			P7-K	13	Y	8			SR3-9				

TDRR 17101 MAR 2 1965

M. A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018613

SHEET 2 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TO TERMINATION FIND NO.	SPEC	NO.
1			P5-A	13	Y	8			SR3-26				
2-1			P5-B	13	Y	8			SR3-27				
2-2			P5-C	13	Y	8			SR3-28				
3-1			P5-D	13	Y	8			SR3-29				
3-2			P5-E	13	Y	8			SR3-30				
4-1			P5-F	13	Y	8			SR3-31				
4-2			P5-H	13	Y	8			SR3-32				
5-1			P5-J	13	Y	8			SR3-33				
5-2			P5-K	13	Y	8			SR3-34				
6-1			P5-L	13	Y	8			SR3-35				
6-2			P5-M	13	Y	8			SR3-36				
7-1			P5-N	13	Y	8			SR3-37				
7-2			P5-P	13	Y	8			SR3-38				
8-1			P5-R	13	Y	8			SR3-39				
8-2			P5-S	13	Y	8			SR3-40				
9-1			P5-T	13	Y	8			B2A-S3				
9-2			P5-U	13	Y	8			B2A-S1				

TDRR 17101 MAR 2 1965

M.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018613

SHEET 7 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.	NO.
42-1		J10-J	13Y	8		SR3-8			
42-2		J10-K	13Y	8		SR3-9			
43-1		J10-L	13Y	8		SR3-10			
43-2		J10-M	13Y	8		SR3-11			
44				10					
44-A		SHLD-44				E17			
44-1		J10-N	13Y	8		SR3-12			
44-2		J10-P	13Y	8		SR3-13			
44-3		J10-R	13Y	8		SR3-14			
45		J10-S	13Y	8		SR3-15			
46		J10-T	13Y	8		SR3-16			
47-1		J10-U	13Y	8		SR3-17			
47-2		J10-V	13Y	8		SR3-18			
48-1		J10-W	13Y	8		SR3-19			
48-2		J10-X	13Y	8		SR3-20			

TDRR 17101 MAR 2 1965

M.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018613

SHEET 6 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.	NO.
34-1		J9-R	13Y	8		SR3-39			
34-2		J9-S	13Y	8		SR3-40			
35-1		J9-W	13Y	8		SR3-23			
35-2		J9-X	13Y	8		SR3-24			
35-3		J9-Y	13Y	8		SR3-21			
35-4		J9-Z	13Y	8		SR3-22			
36	12	J9-a	13Y	8		J9-b	13Y	8	
37		J9-c	13Y	8		SR3-25			
38				10					
38-A		SHLD-38				E17			
38-1		J10-A	13Y	8		SR3-1			
38-2		J10-B	13Y	8		SR3-2			
38-3		J10-C	13Y	8		SR3-3			
39		J10-D	13Y	8		SR3-4			
40		J10-E	13Y	8		SR3-5			
41-1		J10-F	13Y	8		SR3-6			
41-2		J10-H	13Y	8		SR3-7			

TDRR 17101 MAR 2 1965

M. A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018613

SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.	NO.
25		J9-A	13Y	8		SR3-26			
26-1		J9-B	13Y	9		SR3-27			
26-2		J9-C	13Y	9		SR3-28			
27-1		J9-B	13Y			B2A-P3			
27-2		J9-C	13Y			B2A-P1			
28-1		J9-D	13Y	8		SR3-29			
28-2		J9-E	13Y	8		SR3-30			
29-1		J9-F	13Y	9		SR3-31			
29-2		J9-H	13Y	9		SR3-32			
30-1		J9-F	13Y			B2A-P2			
30-2		J9-H	13Y			B2A-P4			
31-1		J9-J	13Y	8		SR3-33			
31-2		J9-K	13Y	8		SR3-34			
32-1		J9-L	13Y	8		SR3-35			
32-2		J9-M	13Y	8		SR3-36			
33-1		J9-N	13Y	8		SR3-37			
33-2		J9-P	13Y	8		SR3-38			

TDRR 17101 MAR 2 1965

M.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

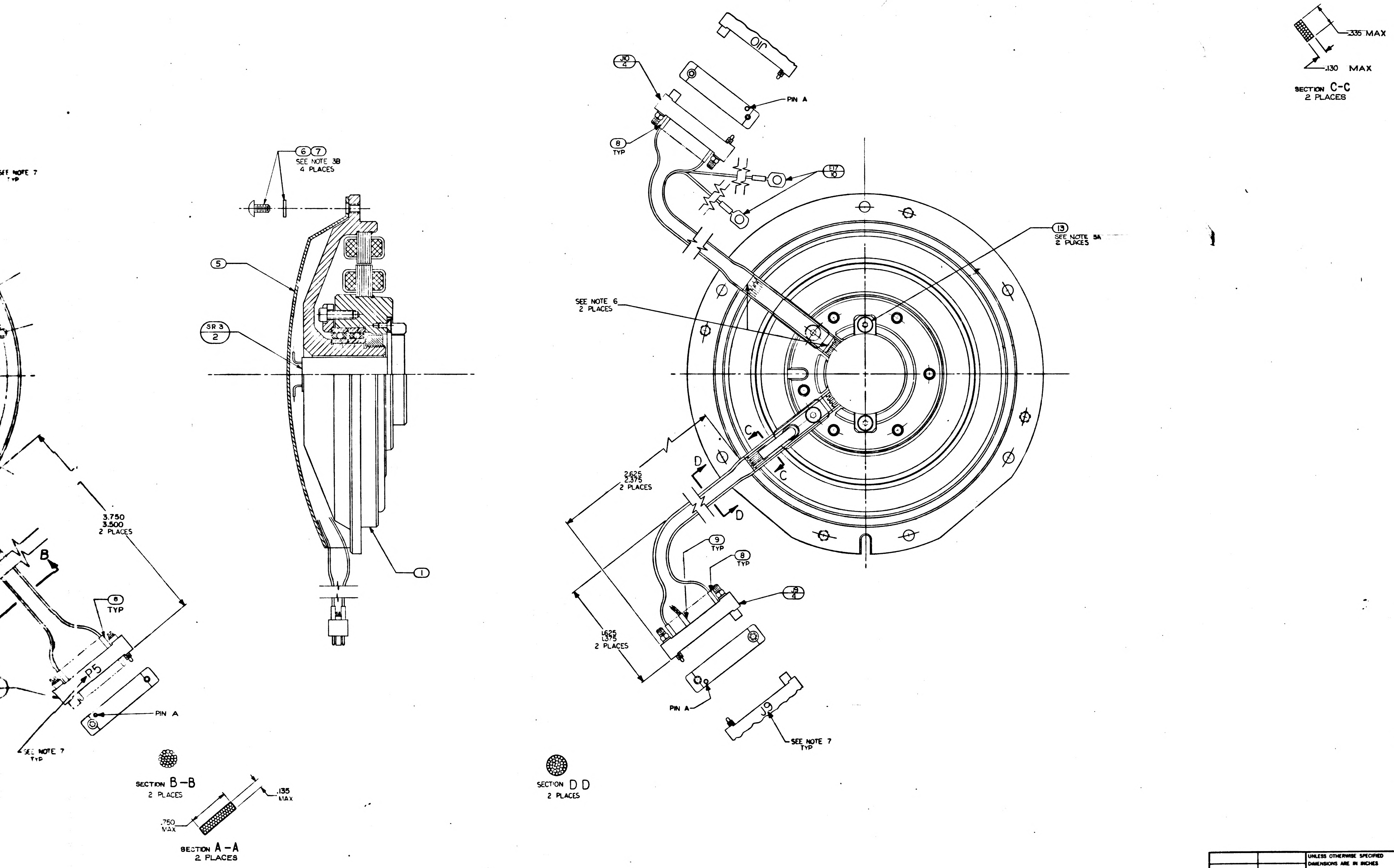
REVISION B

NASA DRAWING NO. 2018613

SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T I N	TO TERMINATION SPEC FIND NO.	NO.
18-1		P7-L	13Y	8		SR3-10			
18-2		P7-M	13Y	8		SR3-11			
19				11					
19A		SHLD-19				E14			
19-1		P7-N	13Y	8		SR3-12			
19-2		P7-P	13Y	8		SR3-13			
19-3		P7-R	13Y	8		SR3-14			
20		P7-S	13Y	8		SR3-15			
21		P7-T	13Y	8		SR3-16			
22-1		P7-U	13Y	8		SR3-17			
22-2		P7-V	13Y	8		SR3-18			
23-1		P7-W	13Y	8		SR3-19			
23-2		P7-X	13Y	8		SR3-20			
23-3		P7-Y	13Y	8		SR3-21			
23-4		P7-Z	13Y	8		SR3-22			
23-5		P7-a	13Y	8		SR3-23			
23-6		P7-b	13Y	8		SR3-24			
24		P7-c	13Y	8		SR3-25			

REVISIONS TDRR 1710				
SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 17687	18MAR65		
B	REVISED PER TDRR 19280	25Mar65		
C	REVISED TDRR 21677	31Aug65		



.335 MAX
.130 MAX
SECTION C-C
2 PLACES
J10
4
PIN A
8
TYP
6 7
SEE NOTE 3B
4 PLACES
SEE NOTE 7
TYP
5
SR 3
2
FLT
10
13
SEE NOTE 5A
2 PLACES
SEE NOTE 6
2 PLACES
C
D
2.625
2.375
2 PLACES
3.750
3.500
2 PLACES
1.625
1.375
2 PLACES
9
TYP
8
TYP
4
PIN A
J9
SEE NOTE 7
TYP
1
B
P5
PIN A
SEE NOTE 7
TYP
SECTION B-B
2 PLACES
.135
MAX
.750
MAX
SECTION A-A
2 PLACES
SECTION D D
2 PLACES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	14
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC-SPLINE	13
1	1010416-4	WIRE AWG 28E ORN 3" LONG	12
2	1000020-8	SHIELD & GROUND ASS'Y	11
2	1000020-6	SHIELD AND GROUND ASS'Y	10
4	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
86	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER, FLAT, METAL, ROUND	7
4	1010891-12	SCREW, BUTTON HD., SELF-LKG, SOC-SPLINE	6
1	2018784	WIRE GUIDE, BRG, HSG, M.A. RSVR	5
2	1010917-106	CONNECTOR, ELEC RECEP 26 PINS	4
2	1010917-806	CONNECTOR ELEC, PLUG, 26 PINS	3
1	2018624	SLIP RING ASS'Y 40 CONTACT	2
1	2018607-011	RESOLVER ASS'Y MIDDLE AXIS	1
011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018603	DL 2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DATE 1-11-65
CHECKED G. QUINN 2-26-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL W. J. Kline 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB ASSEMBLY
RESOLVER MIDDLE AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018613
SCALE 2-1
WT
SHEET 1 OF 7

2018613 C

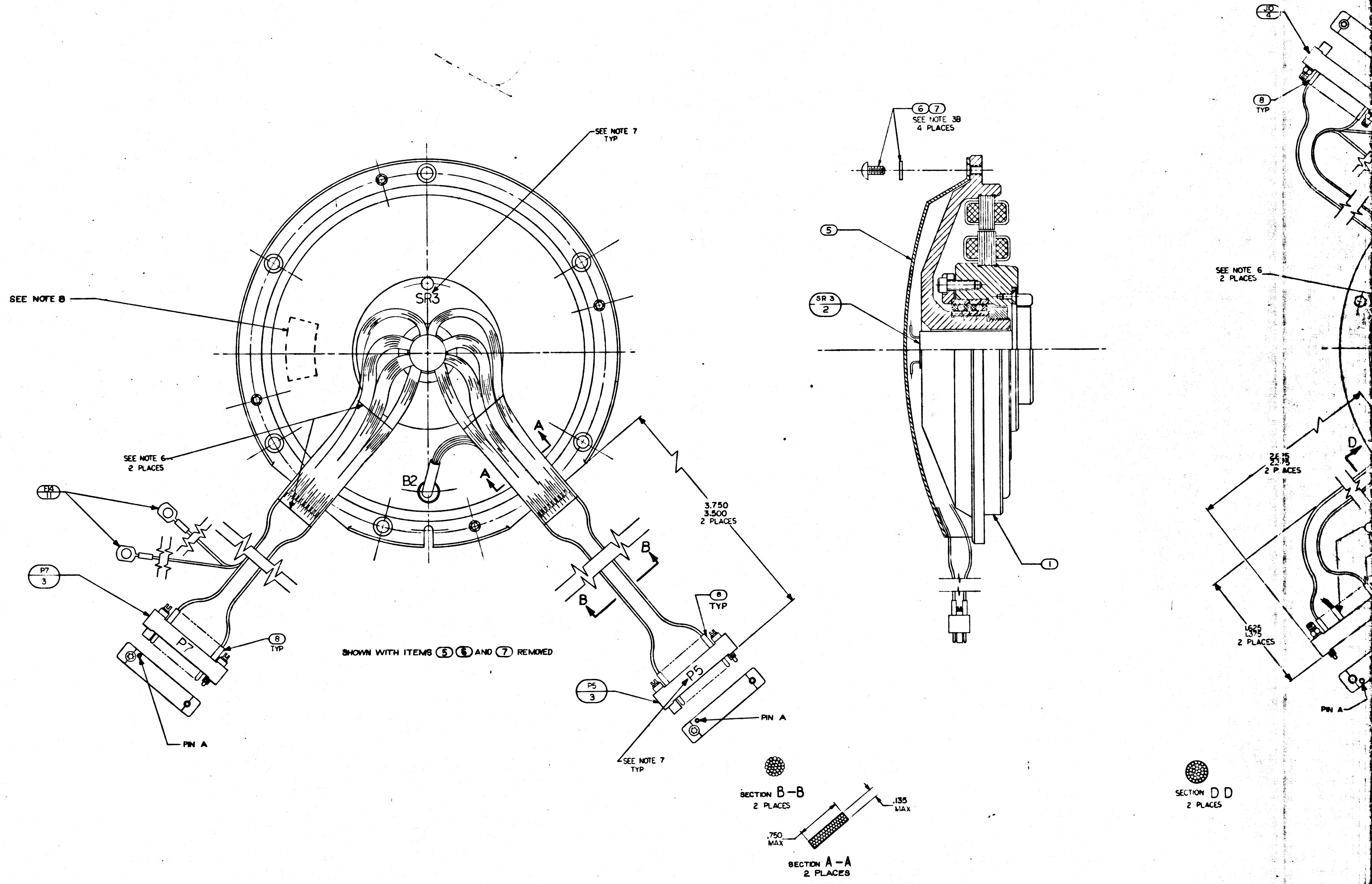
MASTER

F-2

3H

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS2018613
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑩ & ⑪ AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH COLOR BLACK AT LOCATION SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT INDICATED LOCATION PER NOTE 7 & SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (13-1, 13-2, 13-3), (19-1, 19-2, 19-3), (38-1, 38-2, 38-3) & (44-1, 44-2, 44-3) WHICH ARE SHIELDED BUT NOT TWISTED
12. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES & 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
   - A = SHIELD GROUND ON "FROM END"
   - B = SHIELD GROUND ON "TO END"


SEE NOTE 7 TYP
SR3
SEE NOTE 8
SEE NOTE 6 2 PLACES
B2
A
A
P4 11
P7 3
P7
8 TYP
3.750
3.500
2 PLACES
B
B
8 TYP
P5
P5 3
PIN A
PIN A
SEE NOTE 7 TYP
SHOWN WITH ITEMS 5 6 AND 7 REMOVED
6 7 SEE NOTE 3B 4 PLACES
5
SR 3 2
1
SECTION B-B 2 PLACES
.135 MAX
.750 MAX
SECTION A-A 2 PLACES
J10 4
8 TYP
SEE NOTE 6 2 PLACES
D
2.625
2.375
2 PLACES
1.625
1.375
2 PLACES
PIN A
SECTION D D 2 PLACES

2018613 REV C SHEET 1

F-1

TDRR 17101 MAR 2 1965

M. A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 201863 SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION FIND NO.	SPEC NO.
1		P5-A	13	Y	8		SR3-26			
2-1		P5-B	13	Y	8		SR3-27			
2-2		P5-C	13	Y	8		SR3-28			
3-1		P5-D	13	Y	8		SR3-29			
3-2		P5-E	13	Y	8		SR3-30			
4-1		P5-F	13	Y	8		SR3-31			
4-2		P5-H	13	Y	8		SR3-32			
5-1		P5-J	13	Y	8		SR3-33			
5-2		P5-K	13	Y	8		SR3-34			
6-1		P5-L	13	Y	8		SR3-35			
6-2		P5-M	13	Y	8		SR3-36			
7-1		P5-N	13	Y	8		SR3-37			
7-2		P5-P	13	Y	8		SR3-38			
8-1		P5-R	13	Y	8		SR3-39			
8-2		P5-S	13	Y	8		SR3-40			
9-1		P5-T	13	Y	8		B2A-S3			
9-2		P5-U	13	Y	8		B2A-S1			

TDRR 17101 MAR 2 1965

M. A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 201863 SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION FIND NO.	SPEC NO.
10-1		P5-V	13	Y	8		B2A-S2			
10-2		P5-W	13	Y	8		B2A-S4			
11-1		P5-X	13	Y	8		B2B-S3			
11-2		P5-Y	13	Y	8		B2B-S1			
12-1		P5-Z	13	Y	8		B2B-S2			
12-2		P5-a	13	Y	8		B2B-S4			
13					11					
13A		SHLD 13					E14			
13-1		P7-A	13	Y	8		SR3-1			
13-2		P7-B	13	Y	8		SR3-2			
13-3		P7-C	13	Y	8		SR3-3			
14		P7-D	13	Y	8		SR3-4			
15		P7-E	13	Y	8		SR3-5			
16-1		P7-F	13	Y	8		SR3-6			
16-2		P7-H	13	Y	8		SR3-7			
17-1		P7-J	13	Y	8		SR3-8			
17-2		P7-K	13	Y	8		SR3-9			

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M.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 201863 SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION FIND NO.	SPEC NO.
18-1		P7-L	13	Y	8		SR3-10			
18-2		P7-M	13	Y	8		SR3-11			
19					11					
19A		SHLD-19					E14			
19-1		P7-N	13	Y	8		SR3-12			
19-2		P7-P	13	Y	8		SR3-13			
19-3		P7-R	13	Y	8		SR3-14			
20		P7-S	13	Y	8		SR3-15			
21		P7-T	13	Y	8		SR3-16			
22-1		P7-U	13	Y	8		SR3-17			
22-2		P7-V	13	Y	8		SR3-18			
23-1		P7-W	13	Y	8		SR3-19			
23-2		P7-X	13	Y	8		SR3-20			
23-3		P7-Y	13	Y	8		SR3-21			
23-4		P7-Z	13	Y	8		SR3-22			
23-5		P7-a	13	Y	8		SR3-23			
23-6		P7-b	13	Y	8		SR3-24			
24		P7-c	13	Y	8		SR3-25			

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 201863 SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION FIND NO.	SPEC NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TO TERMINATION FIND NO.	SPEC NO.
25		J9-A	13	Y	8		SR3-26			
26-1		J9-B	13	Y	9		SR3-27			
26-2		J9-C	13	Y	9		SR3-28			
27-1		J9-B	13	Y			B2A-P3			
27-2		J9-C	13	Y			B2A-P1			
28-1		J9-D	13	Y	8		SR3-29			
28-2		J9-E	13	Y	8		SR3-30			
29-1		J9-F	13	Y	9		SR3-31			
29-2		J9-H	13	Y	9		SR3-32			
30-1		J9-F	13	Y			B2A-P2			
30-2		J9-H	13	Y			B2A-P4			
31-1		J9-J	13	Y	8		SR3-33			
31-2		J9-K	13	Y	8		SR3-34			
32-1		J9-L	13	Y	8		SR3-35			
32-2		J9-M	13	Y	8		SR3-36			
33-1		J9-N	13	Y	8		SR3-37			
33-2		J9-P	13	Y	8		SR3-38			

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018613
SHEET 6 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET T IN	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET T IN	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO NO.
34-1			J9-R	13Y	8			SR3-39				
34-2			J9-S	13Y	8			SR3-40				
35-1			J9-W	13Y	8			SR3-23				
35-2			J9-X	13Y	8			SR3-24				
35-3			J9-Y	13Y	8			SR3-21				
35-4			J9-Z	13Y	8			SR3-22				
36	12		J9-a	13Y	8			J9-b	13Y	8		
37			J9-c	13Y	8			SR3-25				
38					10							
38-A			SHLD-38					E17				
38-1			J10-A	13Y	8			SR3-1				
38-2			J10-B	13Y	8			SR3-2				
38-3			J10-C	13Y	8			SR3-3				
39			J10-D	13Y	8			SR3-4				
40			J10-E	13Y	8			SR3-5				
41-1			J10-F	13Y	8			SR3-6				
41-2			J10-H	13Y	8			SR3-7				

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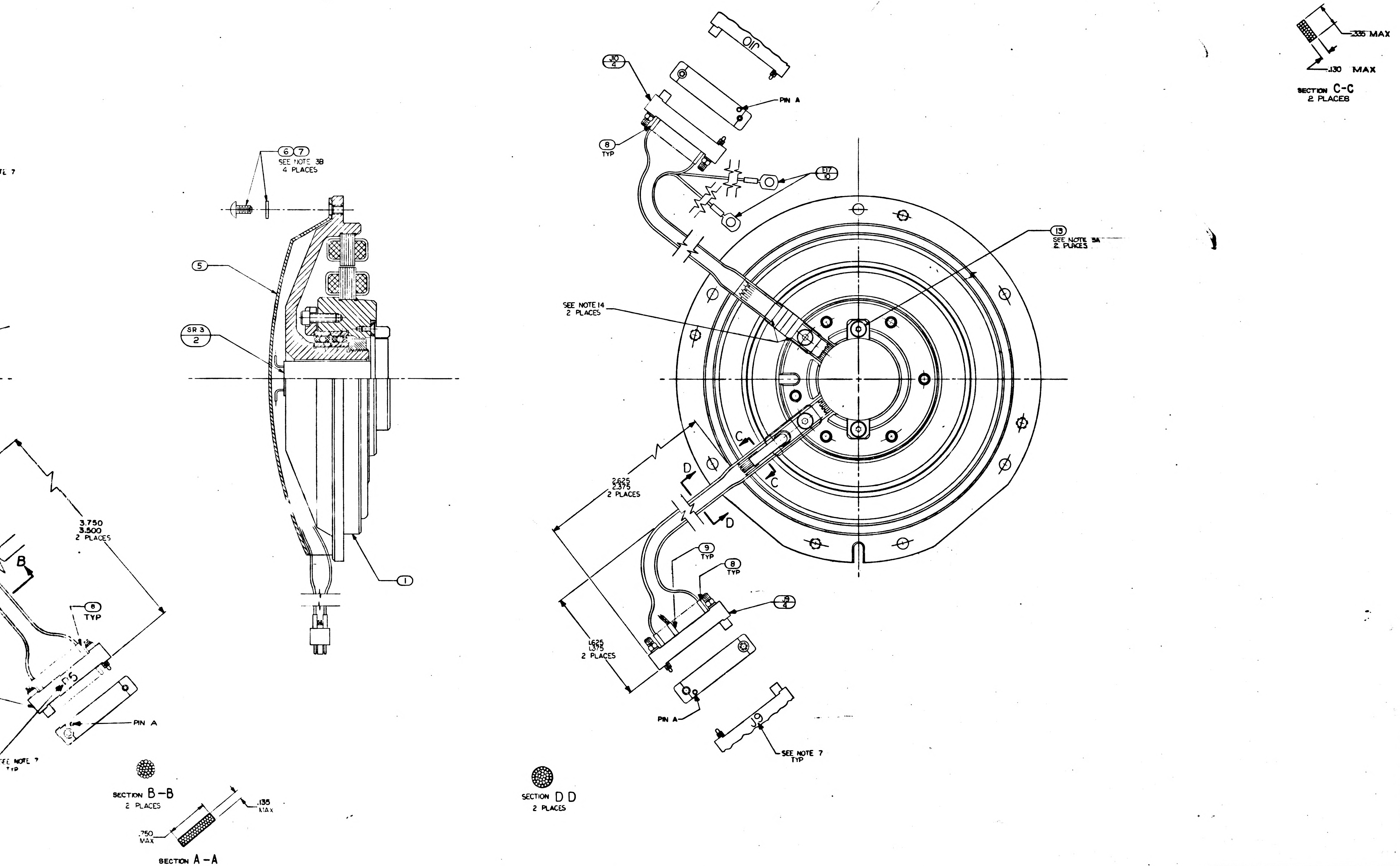
MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018613
SHEET 7 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET T IN	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET T IN	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO NO.
42-1			J10-J	13Y	8			SR3-8				
42-2			J10-K	13Y	8			SR3-9				
43-1			J10-L	13Y	8			SR3-10				
43-2			J10-M	13Y	8			SR3-11				
44					10							
44-A			SHLD-44					E17				
44-1			J10-N	13Y	8			SR3-12				
44-2			J10-P	13Y	8			SR3-13				
44-3			J10-R	13Y	8			SR3-14				
45			J10-S	13Y	8			SR3-15				
46			J10-T	13Y	8			SR3-16				
47-1			J10-U	13Y	8			SR3-17				
47-2			J10-V	13Y	8			SR3-18				
48-1			J10-W	13Y	8			SR3-19				
48-2			J10-X	13Y	8			SR3-20				

SYM	REVISIONS DESCRIPTION TDRR 1710	DATE	APPROVAL
A	REVISED TDRR 17687	18MAR65	WK
B	REVISED PER TDRR 19280	25May65	WK
C	REVISED TDRR 21677	31Aug65	WK
D	REVISED TDRR 26254	23Feb66	WK



6 7
SEE NOTE 3B
4 PLACES
5
SR 3
2
1
3.750
3.500
2 PLACES
B
8
TYP
PIN A
SEE NOTE 7
TYP
SECTION B-B
2 PLACES
.135
MAX
.750
MAX
SECTION A-A
2 PLACES
10
4
PIN A
8
TYP
12
10
13
SEE NOTE 3A
2 PLACES
SEE NOTE 14
2 PLACES
C
C
D
D
2.625
2.375
2 PLACES
9
TYP
8
TYP
11
4
1.625
1.375
2 PLACES
PIN A
SEE NOTE 7
TYP
SECTION D D
2 PLACES
.335 MAX
.130 MAX
SECTION C-C
2 PLACES

MASTER

A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	15
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	14
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC-SPLINE	13
1	1010416-4	WIRE AWG 28E ORN 3" LONG	12
2	1000020-8	SHIELD & GROUND ASS'Y	11
2	1000020-6	SHIELD AND GROUND ASS'Y	10
4	1006776-14	INSULATION SLEEVING ELEC 3/16 LONG	9
86	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER, FLAT, METAL, ROUND	7
4	1010831-12	SCREW, BUTTON HD., SELF-LKG. SOC-SPLINE	6
1	2018784	WIRE GUIDE, BRG HSG, M.A. RSVR	5
2	1010817-106	CONNECTOR, ELEC, RECEP 26 PINS	4
2	1010817-806	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018624	SLIP RING ASS'Y 40 CONTACT	2
1	2018607-011	RESOLVER ASS'Y MIDDLE AXIS	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

011 LIST OF MATERIALS

2018603	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.W. Carr DATE 2-11-65
CHECKED G. Quinn 2-26-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL W. J. Kline 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB ASSEMBLY
RESOLVER MIDDLE AXIS

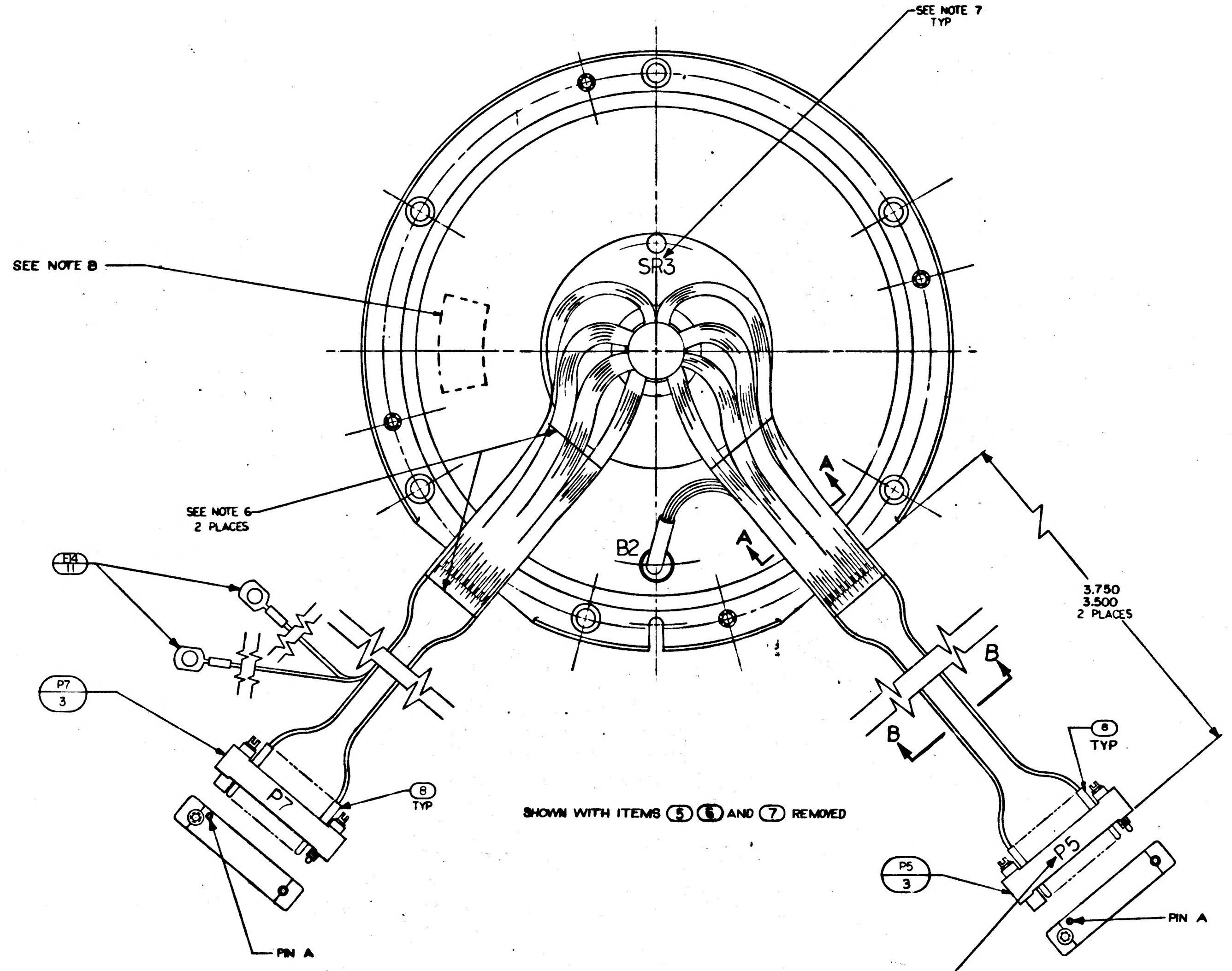
CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018613
SCALE 2-1 WT SHEET 1 OF 7

2018613 D

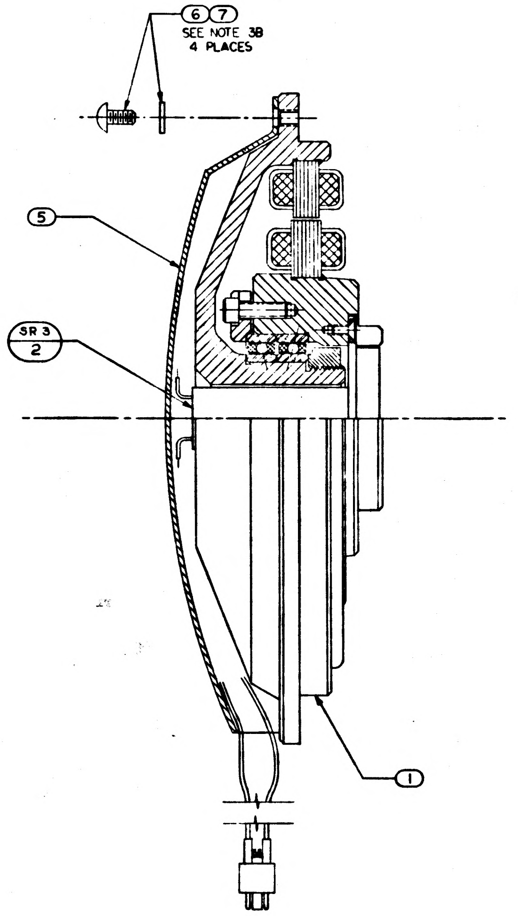
E-2

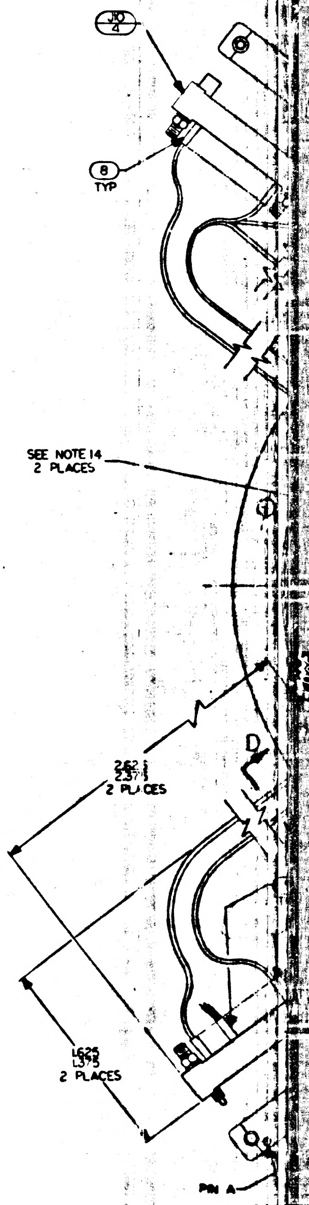
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS2018613
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑩ & ⑪ AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATION SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT INDICATED LOCATION PER NOTE 7 & SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (13-1, 13-2, 13-3), (19-1, 19-2, 19-3), (38-1, 38-2, 38-3) & (44-1, 44-2, 44-3) WHICH ARE SHIELDED BUT NOT TWISTED
12. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES & 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
   - A = SHIELD GROUND ON "FROM END"
   - B = SHIELD GROUND ON "TO END"
14. TAPE HARNESS IN AREA INDICATED USING ITEM ⑮ TO MAINTAIN HARNESS CONFIGURATION OF SECTION C-C AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM ⑮

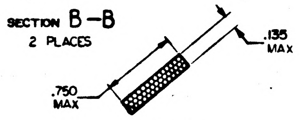

SEE NOTE 7
TYP
SR3
SEE NOTE 8
SEE NOTE 6
2 PLACES
E14
11
B2
A
A
B
B
3.750
3.500
2 PLACES
P7
3
P7
8
TYP
8
TYP
P5
P5
3
PIN A
PIN A
SEE NOTE 7
TYP

SHOWN WITH ITEMS ⑤ ⑥ AND ⑦ REMOVED

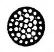

⑥ ⑦
SEE NOTE 3B
4 PLACES
⑤
SR 3
2
①


J10
4
8
TYP
SEE NOTE 14
2 PLACES
D
.262
.237
2 PLACES
1.625
1.375
2 PLACES
PIN A

SECTION B—B
2 PLACES


.135
MAX
.750
MAX

SECTION A—A
2 PLACES



SECTION D D
2 PLACES

2H

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REVISION D

NASA DRAWING NO. 201861 3

SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM: CIRCUIT POINT	FROM: STRIP WIRE OR JACKET	FROM: T/N	FROM: TERMINATION SPEC FIND NO.	FROM: NO.	TO: CIRCUIT POINT	TO: STRIP WIRE OR JACKET	TO: T/N	TO: TERMINATION SPEC FIND NO.	TO: NO.
1		P5-A	13	Y	8		SR3-26				
2-1		P5-B	13	Y	8		SR3-27				
2-2		P5-C	13	Y	8		SR3-28				
3-1		P5-D	13	Y	8		SR3-29				
3-2		P5-E	13	Y	8		SR3-30				
4-1		P5-F	13	Y	8		SR3-31				
4-2		P5-H	13	Y	8		SR3-32				
5-1		P5-J	13	Y	8		SR3-33				
5-2		P5-K	13	Y	8		SR3-34				
6-1		P5-L	13	Y	8		SR3-35				
6-2		P5-M	13	Y	8		SR3-36				
7-1		P5-N	13	Y	8		SR3-37				
7-2		P5-P	13	Y	8		SR3-38				
8-1		P5-R	13	Y	8		SR3-39				
8-2		P5-S	13	Y	8		SR3-40				
9-1		P5-T	13	Y	8		B2A-S3				
9-2		P5-U	13	Y	8		B2A-S1				

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 201861 3

SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM: CIRCUIT POINT	FROM: STRIP WIRE OR JACKET	FROM: T/N	FROM: TERMINATION SPEC FIND NO.	FROM: NO.	TO: CIRCUIT POINT	TO: STRIP WIRE OR JACKET	TO: T/N	TO: TERMINATION SPEC FIND NO.	TO: NO.
10-1		P5-V	13	Y	8		B2A-S2				
10-2		P5-W	13	Y	8		B2A-S4				
11-1		P5-X	13	Y	8		B2B-S3				
11-2		P5-Y	13	Y	8		B2B-S1				
12-1		P5-Z	13	Y	8		B2B-S2				
12-2		P5-a	13	Y	8		B2B-S4				
13					11						
13A		SHLD 13					E14				
13-1		P7-A	13	Y	8		SR3-1				
13-2		P7-B	13	Y	8		SR3-2				
13-3		P7-C	13	Y	8		SR3-3				
14		P7-D	13	Y	8		SR3-4				
15		P7-E	13	Y	8		SR3-5				
16-1		P7-F	13	Y	8		SR3-6				
16-2		P7-H	13	Y	8		SR3-7				
17-1		P7-J	13	Y	8		SR3-8				
17-2		P7-K	13	Y	8		SR3-9				

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 201861 3

SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM: CIRCUIT POINT	FROM: STRIP WIRE OR JACKET	FROM: T/N	FROM: TERMINATION SPEC FIND NO.	FROM: NO.	TO: CIRCUIT POINT	TO: STRIP WIRE OR JACKET	TO: T/N	TO: TERMINATION SPEC FIND NO.	TO: NO.
18-1		P7-L	13	Y	8		SR3-10				
18-2		P7-M	13	Y	8		SR3-11				
19					11						
19A		SHLD-19					E14				
19-1		P7-N	13	Y	8		SR3-12				
19-2		P7-P	13	Y	8		SR3-13				
19-3		P7-R	13	Y	8		SR3-14				
20		P7-S	13	Y	8		SR3-15				
21		P7-T	13	Y	8		SR3-16				
22-1		P7-U	13	Y	8		SR3-17				
22-2		P7-V	13	Y	8		SR3-18				
23-1		P7-W	13	Y	8		SR3-19				
23-2		P7-X	13	Y	8		SR3-20				
23-3		P7-Y	13	Y	8		SR3-21				
23-4		P7-Z	13	Y	8		SR3-22				
23-5		P7-a	13	Y	8		SR3-23				
23-6		P7-b	13	Y	8		SR3-24				
24		P7-c	13	Y	8		SR3-25				

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REVISION D

NASA DRAWING NO. 201861 3

SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM: CIRCUIT POINT	FROM: STRIP WIRE OR JACKET	FROM: T/N	FROM: TERMINATION SPEC FIND NO.	FROM: NO.	TO: CIRCUIT POINT	TO: STRIP WIRE OR JACKET	TO: T/N	TO: TERMINATION SPEC FIND NO.	TO: NO.
25		J9-A	13	Y	8		SR3-26				
26-1		J9-B	13	Y	9		SR3-27				
26-2		J9-C	13	Y	9		SR3-28				
27-1		J9-B	13	Y			B2A-P3				
27-2		J9-C	13	Y			B2A-P1				
28-1		J9-D	13	Y	8		SR3-29				
28-2		J9-E	13	Y	8		SR3-30				
29-1		J9-F	13	Y	9		SR3-31				
29-2		J9-H	13	Y	9		SR3-32				
30-1		J9-F	13	Y			B2A-P2				
30-2		J9-H	13	Y			B2A-P4				
31-1		J9-J	13	Y	8		SR3-33				
31-2		J9-K	13	Y	8		SR3-34				
32-1		J9-L	13	Y	8		SR3-35				
32-2		J9-M	13	Y	8		SR3-36				
33-1		J9-N	13	Y	8		SR3-37				
33-2		J9-P	13	Y	8		SR3-38				

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018613
SHEET 6 of 7

CONDUCTOR	INDIVIDUAL LENGTH	FROM			TO		
FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.
34-1		J9-R	13Y	8	SR3-39		
34-2		J9-S	13Y	8	SR3-40		
35-1		J9-W	13Y	8	SR3-23		
35-2		J9-X	13Y	8	SR3-24		
35-3		J9-Y	13Y	8	SR3-21		
35-4		J9-Z	13Y	8	SR3-22		
36	12	J9-a	13Y	8	J9-b	13Y	8
37		J9-c	13Y	8	SR3-25		
38				10			
38-A		SHLD-38			E17		
38-1		J10-A	13Y	8	SR3-1		
38-2		J10-B	13Y	8	SR3-2		
38-3		J10-C	13Y	8	SR3-3		
39		J10-D	13Y	8	SR3-4		
40		J10-E	13Y	8	SR3-5		
41-1		J10-F	13Y	8	SR3-6		
41-2		J10-H	13Y	8	SR3-7		

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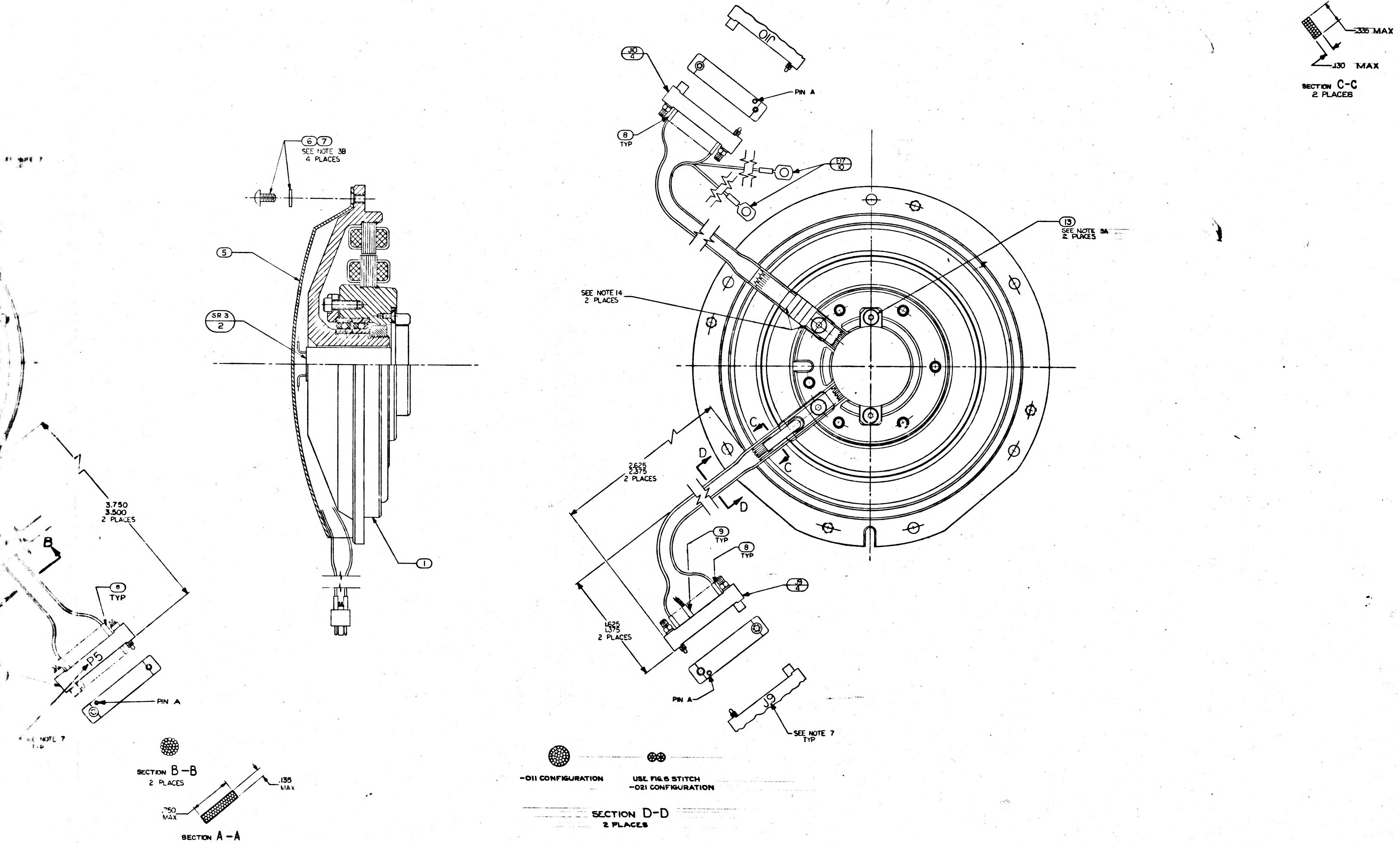
HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018613
SHEET 7 of 7

CONDUCTOR	INDIVIDUAL LENGTH	FROM			TO		
FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.
42-1		J10-J	13Y	8	SR3-8		
42-2		J10-K	13Y	8	SR3-9		
43-1		J10-L	13Y	8	SR3-10		
43-2		J10-M	13Y	8	SR3-11		
44				10			
44-A		SHLD-44			E17		
44-1		J10-N	13Y	8	SR3-12		
44-2		J10-P	13Y	8	SR3-13		
44-3		J10-R	13Y	8	SR3-14		
45		J10-S	13Y	8	SR3-15		
46		J10-T	13Y	8	SR3-16		
47-1		J10-U	13Y	8	SR3-17		
47-2		J10-V	13Y	8	SR3-18		
48-1		J10-W	13Y	8	SR3-19		
48-2		J10-X	13Y	8	SR3-20		

REVISIONS TDRR 17101				
SYM	DESCRIPTION	DATE	APPROVED	
A	REVISED TDRR 17687	18 Aug 65		WK
B	REVISED PER TDRR 19280	25 May 65		WK
C	REVISED TDRR 21677	31 Aug 65		WK
D	REVISED TDRR 26254	23 Feb 66		WK
E	REVISED PER TDRR 26597	7 Mar 66		



.335 MAX
.130 MAX
SECTION C-C
2 PLACES
6
7
SEE NOTE 3B
4 PLACES
5
SR 3
2
1
3.750
3.500
2 PLACES
B
8
TYP
P5
PIN A
SEE NOTE 7
TYP
SECTION B-B
2 PLACES
.135
MAX
.750
MAX
SECTION A-A
2 PLACES
J10
J10
4
PIN A
8
TYP
E17
10
13
SEE NOTE 3A
2 PLACES
SEE NOTE 14
2 PLACES
C
C
D
D
2.625
2.375
2 PLACES
9
TYP
8
TYP
J9
4
1.625
1.375
2 PLACES
PIN A
J9
SEE NOTE 7
TYP
-011 CONFIGURATION
USE FIG.8 STITCH
-021 CONFIGURATION
SECTION D-D
2 PLACES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	15
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	14
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC-SPLINE	13
1	1010416-4	WIRE AWG 28E ORN 3" LONG	12
2	1000020-8	SHIELD & GROUND ASS'Y	11
2	1000020-6	SHIELD AND GROUND ASS'Y	10
4	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
86	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER, FLAT, METAL, ROUND	7
4	1010891-12	SCREW, BUTTON HD., SELF-LKG, SOC-SPLINE	6
1	2018784	WIRE GUIDE, BRG HSG, M.A. RSVR	5
2	1010917-106	CONNECTOR, ELEC, RECEP, 26 PINS	4
2	1010917-806	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018624	SLIP RING ASS'Y 40 CONTACT	2
1	2018607-011	RESOLVER ASS'Y MIDDLE AXIS	1
011	LIST OF MATERIALS		

2018603	DL 2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DRAWN [illegible] DATE 1-11-65 CHECKED G. GUINN 2-26-65 APPROVAL 2 Mar 65 APPROVAL NASA APPROVAL 3-2-65 MIT APPROVAL 2 Mar 65	MANNED SPACECRAFT CENTER HOUSTON, TEXAS INTERGIMBAL SUB ASSEMBLY RESOLVER MIDDLE AXIS
NEXT ASSY	USED ON			CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018613 SCALE 2-1 WT SHEET OF 7
APPLICATION				

2018613 E

MASTER

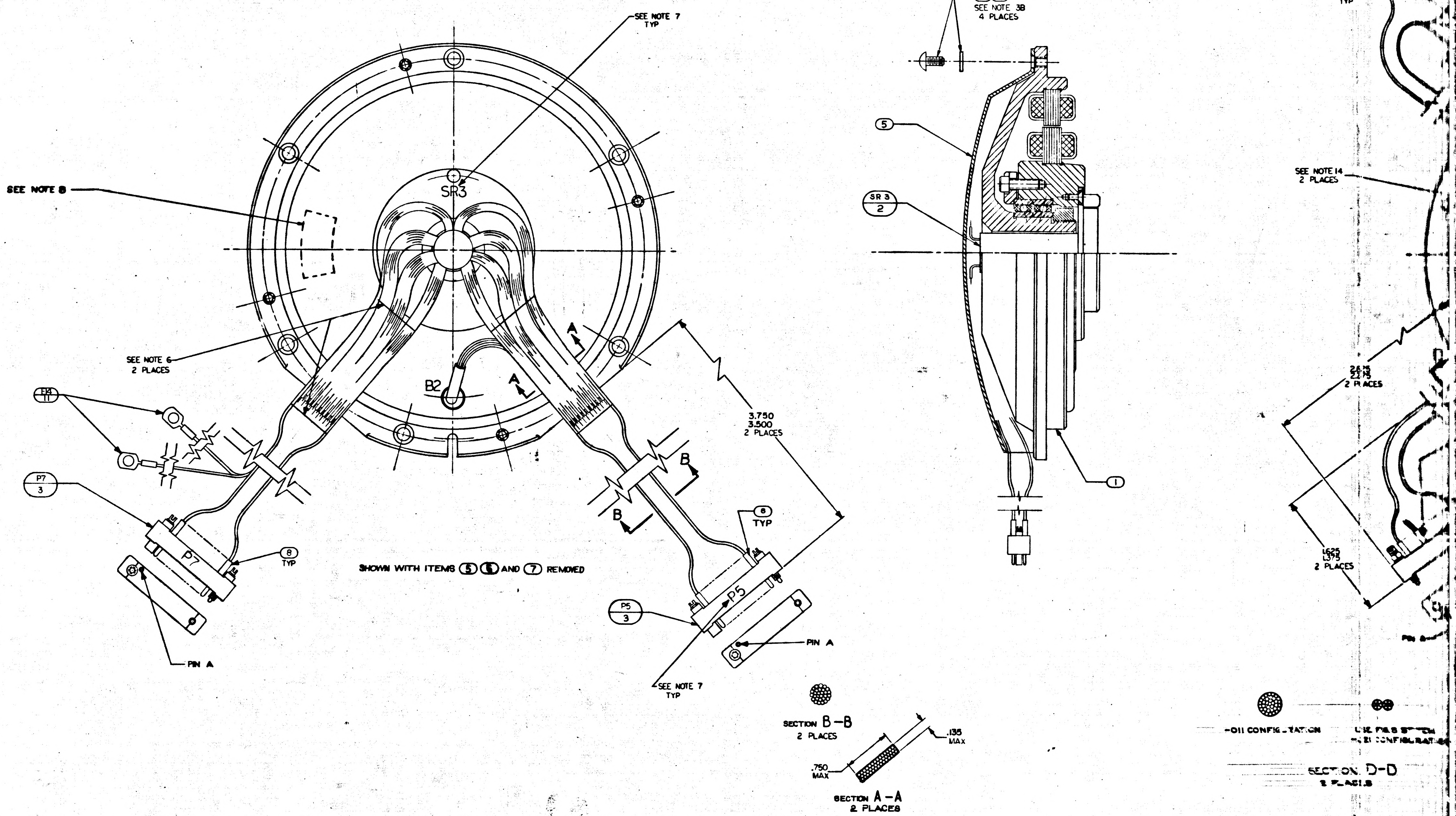
2018613 REV E SHEET 1

2H

F-2

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. **COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS2018613**
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
4. SOLDER LEADS TO (3) & (4) PER ND 1002071
5. HEAT SHRINK SLEEVING ON (10) & (11) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATION SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT INDICATED LOCATION PER NOTE 7 & SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (13-1, 13-2, 13-3), (19-1, 19-2, 19-3), (38-1, 38-2, 38-3) & (44-1, 44-2, 44-3) WHICH ARE SHIELDED BUT NOT TWISTED
12. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES & 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"
14. TAPE HARNESS IN AREA INDICATED USING ITEM (15) TO MAINTAIN HARNESS CONFIGURATION OF SECTION C-C AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM (15)


SEE NOTE 7
TYP
SEE NOTE 8
SR3
B2
SEE NOTE 6
2 PLACES
E4
11
P7
3
P7
8
TYP
PIN A
A
A
B
B
3.750
3.500
2 PLACES
8
TYP
P5
3
P5
PIN A
SEE NOTE 7
TYP
SHOWN WITH ITEMS (5) (6) AND (7) REMOVED
SECTION B-B
2 PLACES
.135
MAX
.750
MAX
SECTION A-A
2 PLACES
6
7
SEE NOTE 3B
4 PLACES
5
SR 3
2
1
J6
4
8
TYP
SEE NOTE 14
2 PLACES
2.625
2.375
2 PLACES
1.625
1.375
2 PLACES
-011 CONFIGURATION
SECTION D-D
2 PLACES

TDRR 17101 MAR 2 1965

M. A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION
D

NASA DRAWING NO.
2018613
SHEET 2 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
1			P5-A	13	Y	8		SR3-26			
2-1			P5-B	13	Y	8		SR3-27			
2-2			P5-C	13	Y	8		SR3-28			
3-1			P5-D	13	Y	8		SR3-29			
3-2			P5-E	13	Y	8		SR3-30			
4-1			P5-F	13	Y	8		SR3-31			
4-2			P5-H	13	Y	8		SR3-32			
5-1			P5-J	13	Y	8		SR3-33			
5-2			P5-K	13	Y	8		SR3-34			
6-1			P5-L	13	Y	8		SR3-35			
6-2			P5-M	13	Y	8		SR3-36			
7-1			P5-N	13	Y	8		SR3-37			
7-2			P5-P	13	Y	8		SR3-38			
8-1			P5-R	13	Y	8		SR3-39			
8-2			P5-S	13	Y	8		SR3-40			
9-1			P5-T	13	Y	8		B2A-S3			
9-2			P5-U	13	Y	8		B2A-S1			

TDRR 17101 MAR 2 1965

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HOUSTON TEXAS

REVISION
D

NASA DRAWING NO.
2018613
SHEET 3 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
10-1			P5-V	13	Y	8		B2A-S2			
10-2			P5-W	13	Y	8		B2A-S4			
11-1			P5-X	13	Y	8		B2B-S3			
11-2			P5-Y	13	Y	8		B2B-S1			
12-1			P5-Z	13	Y	8		B2B-S2			
12-2			P5-a	13	Y	8		B2B-S4			
13						11					
13A			SHLD 13					E14			
13-1			P7-A	13	Y	8		SR3-1			
13-2			P7-B	13	Y	8		SR3-2			
13-3			P7-C	13	Y	8		SR3-3			
14			P7-D	13	Y	8		SR3-4			
15			P7-E	13	Y	8		SR3-5			
16-1			P7-F	13	Y	8		SR3-6			
16-2			P7-H	13	Y	8		SR3-7			
17-1			P7-J	13	Y	8		SR3-8			
17-2			P7-K	13	Y	8		SR3-9			

TDRR 17101 MAR 2 1965

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HOUSTON TEXAS

REVISION
D

NASA DRAWING NO.
2018613
SHEET 4 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
18-1			P7-L	13	Y	8		SR3-10			
18-2			P7-M	13	Y	8		SR3-11			
19						11					
19A			SHLD-19					E14			
19-1			P7-N	13	Y	8		SR3-12			
19-2			P7-P	13	Y	8		SR3-13			
19-3			P7-R	13	Y	8		SR3-14			
20			P7-S	13	Y	8		SR3-15			
21			P7-T	13	Y	8		SR3-16			
22-1			P7-U	13	Y	8		SR3-17			
22-2			P7-V	13	Y	8		SR3-18			
23-1			P7-W	13	Y	8		SR3-19			
23-2			P7-X	13	Y	8		SR3-20			
23-3			P7-Y	13	Y	8		SR3-21			
23-4			P7-Z	13	Y	8		SR3-22			
23-5			P7-a	13	Y	8		SR3-23			
23-6			P7-b	13	Y	8		SR3-24			
24			P7-c	13	Y	8		SR3-25			

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION
D

NASA DRAWING NO.
2018613
SHEET 5 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
25			J9-A	13	Y	8		SR3-26			
26-1			J9-B	13	Y	9		SR3-27			
26-2			J9-C	13	Y	9		SR3-28			
27-1			J9-B	13	Y			B2A-P3			
27-2			J9-C	13	Y			B2A-P1			
28-1			J9-D	13	Y	8		SR3-29			
28-2			J9-E	13	Y	8		SR3-30			
29-1			J9-F	13	Y	9		SR3-31			
29-2			J9-H	13	Y	9		SR3-32			
30-1			J9-F	13	Y			B2A-P2			
30-2			J9-H	13	Y			B2A-P4			
31-1			J9-J	13	Y	8		SR3-33			
31-2			J9-K	13	Y	8		SR3-34			
32-1			J9-L	13	Y	8		SR3-35			
32-2			J9-M	13	Y	8		SR3-36			
33-1			J9-N	13	Y	8		SR3-37			
33-2			J9-P	13	Y	8		SR3-38			

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION D

NASA DRAWING NO. 2018613
SHEET 6 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD CIRCUIT POINT	FROM: STRIP WIRE OR JACKET	FROM: TIN	FROM: TERMINATION FIND NO.	FROM: TERMINATION SPEC NO.	TO: CUT WIRE OR SHIELD CIRCUIT POINT	TO: STRIP WIRE OR JACKET	TO: TIN	TO: TERMINATION FIND NO.	TO: TERMINATION SPEC NO.
34-1			J9-R	13Y		8		SR3-39				
34-2			J9-S	13Y		8		SR3-40				
35-1			J9-W	13Y		8		SR3-23				
35-2			J9-X	13Y		8		SR3-24				
35-3			J9-Y	13Y		8		SR3-21				
35-4			J9-Z	13Y		8		SR3-22				
36	12		J9-a	13Y		8		J9-b	13Y		8	
37			J9-c	13Y		8		SR3-25				
38						10						
38-A			SHLD-38					E17				
38-1			J10-A	13Y		8		SR3-1				
38-2			J10-B	13Y		8		SR3-2				
38-3			J10-C	13Y		8		SR3-3				
39			J10-D	13Y		8		SR3-4				
40			J10-E	13Y		8		SR3-5				
41-1			J10-F	13Y		8		SR3-6				
41-2			J10-H	13Y		8		SR3-7				

TDRR 17101 MAR 2 1965

M.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

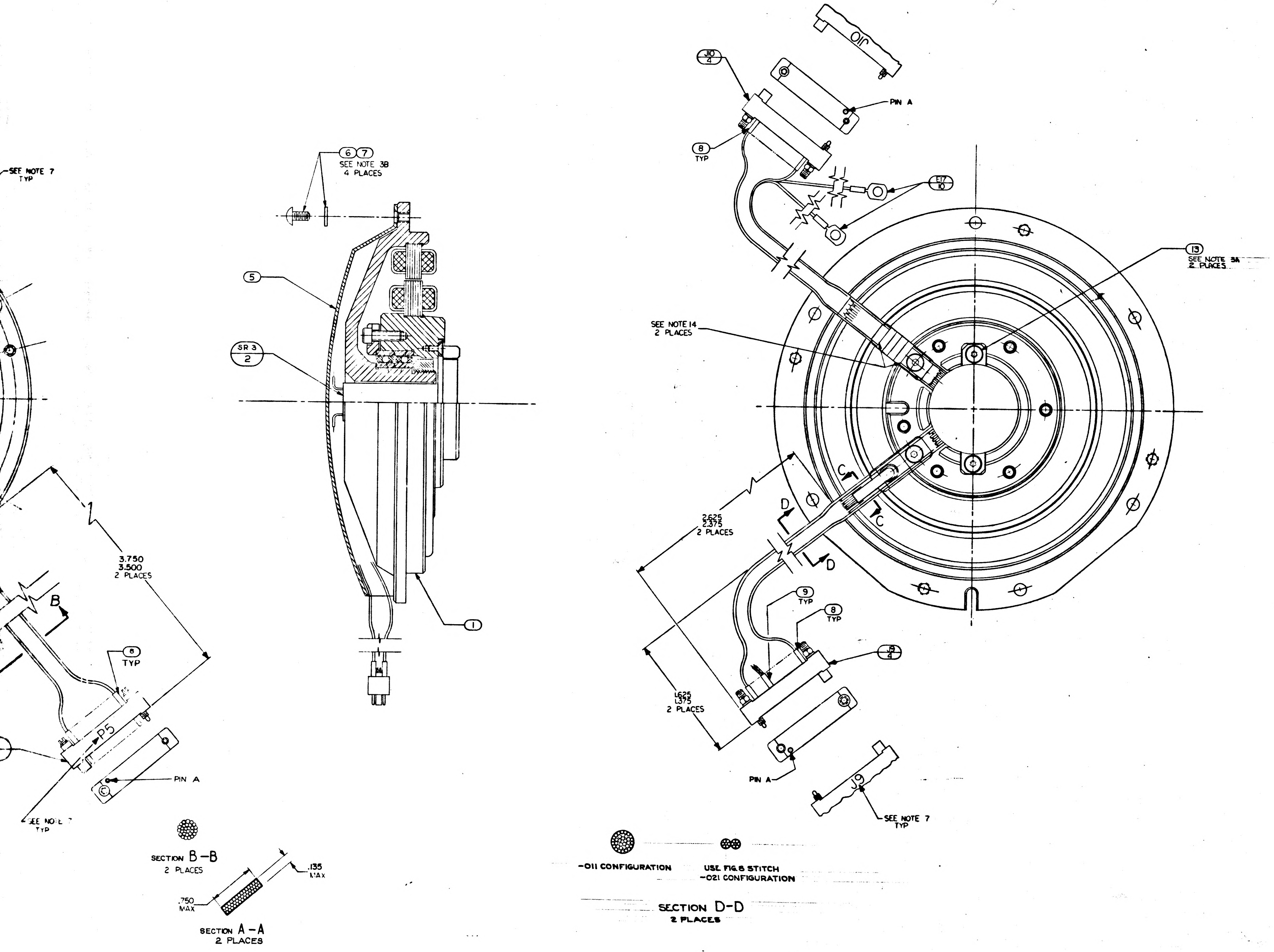
REVISION D

NASA DRAWING NO. 2018613
SHEET 7 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD CIRCUIT POINT	FROM: STRIP WIRE OR JACKET	FROM: TIN	FROM: TERMINATION FIND NO.	FROM: TERMINATION SPEC NO.	TO: CUT WIRE OR SHIELD CIRCUIT POINT	TO: STRIP WIRE OR JACKET	TO: TIN	TO: TERMINATION FIND NO.	TO: TERMINATION SPEC NO.
42-1			J10-J	13Y		8		SR3-8				
42-2			J10-K	13Y		8		SR3-9				
43-1			J10-L	13Y		8		SR3-10				
43-2			J10-M	13Y		8		SR3-11				
44						10						
44-A			SHLD-44					E17				
44-1			J10-N	13Y		8		SR3-12				
44-2			J10-P	13Y		8		SR3-13				
44-3			J10-R	13Y		8		SR3-14				
45			J10-S	13Y		8		SR3-15				
46			J10-T	13Y		8		SR3-16				
47-1			J10-U	13Y		8		SR3-17				
47-2			J10-V	13Y		8		SR3-18				
48-1			J10-W	13Y		8		SR3-19				
48-2			J10-X	13Y		8		SR3-20				

REVISIONS TDRR 1710

SYM	DESCRIPTION	DATE		
A	REVISED TDRR 17687	18MAR65		WK
B	REVISED PER TDRR 19280	25MAY65		WK
C	REVISED TDRR 21677	31AUG65		WK
D	REVISED TDRR 26254	23FEB66		WK
E	REVISED PER TDRR 26597	7MAR66		WK
F	REVISED TDRR 27774			WK



SEE NOTE 7
TYP
6 7
SEE NOTE 3B
4 PLACES
5
SR 3
2
1
3.750
3.500
2 PLACES
B
8
TYP
P5
PIN A
SEE NOTE 7
TYP
10
4
PIN A
8
TYP
11
12
13
SEE NOTE 5A
2 PLACES
SEE NOTE 14
2 PLACES
C
C
D
D
2.625
2.375
2 PLACES
9
TYP
8
TYP
1.625
1.375
2 PLACES
PIN A
SEE NOTE 7
TYP

SECTION B-B
2 PLACES

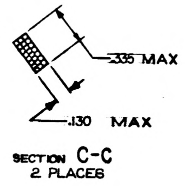
.750
MAX
.135
MAX

SECTION A-A
2 PLACES

-011 CONFIGURATION

USE FIG.8 STITCH
-021 CONFIGURATION

SECTION D-D
2 PLACES



.335 MAX
.130 MAX

SECTION C-C
2 PLACES

021	011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	15
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	14
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC-SPLINE	13
1	1	1010416-4	WIRE AWG 28E ORN 3" LONG	12
2	2	1000020-8	SHIELD & GROUND ASS'Y	11
2	2	1000020-6	SHIELD AND GROUND ASS'Y	10
4	4	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
86	86	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	4	MS15795-703	WASHER, FLAT, METAL, ROUND	7
4	4	1010891-12	SCREW, BUTTON HD., SELF-LKG, SOC-SPLINE	6
1	1	2018784	WIRE GUIDE, BRG. HSG. M.A. RSVR	5
2	2	1010917-106	CONNECTOR, ELEC, RECEP 26 PINS	4
2	2	1010917-806	CONNECTOR ELEC, PLUG, 26 PINS	3
1	1	2018624	SLIP RING ASS'Y 40 CONTACT	2
1	1	2018607-011	RESOLVER ASS'Y MIDDLE AXIS	1
	QTY REQD			

LIST OF MATERIALS

NEXT ASSY	USED ON
2018603	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DATE 1-11-65
CHECKED G. QUINN 2-26-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB ASSEMBLY
RESOLVER MIDDLE AXIS

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	J	2018613

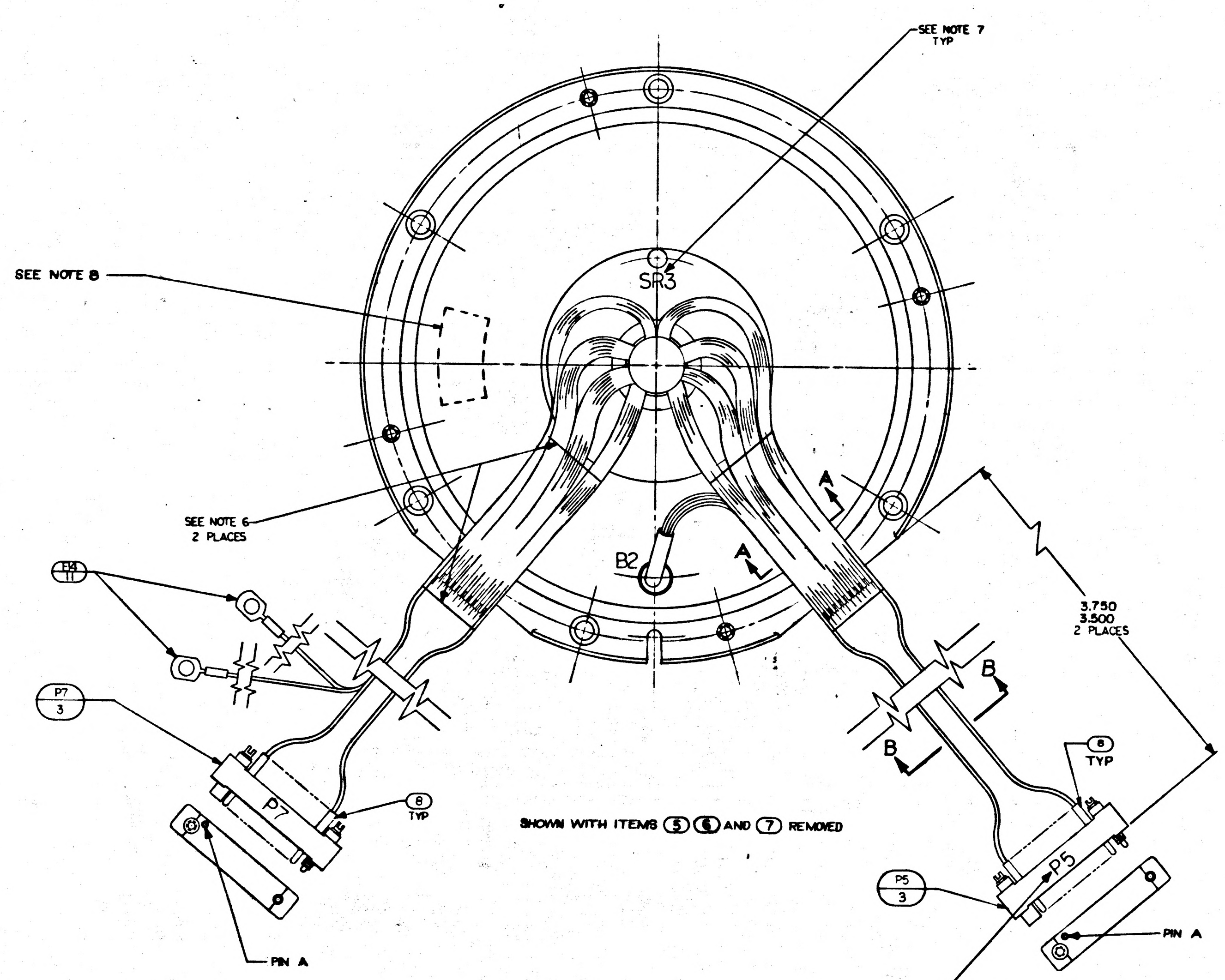
SCALE 2-1 WT SHEET 1 OF 7

MASTER

2018613 REV F SHEET 1

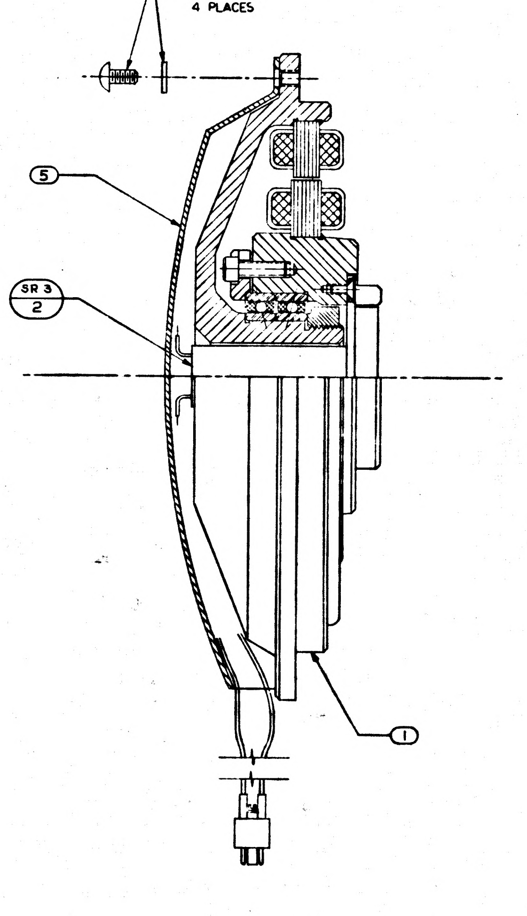
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. **COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS2018613**
3. SCREW TORQUE REQUIREMENTS ±7%
    - A. 3.5 IN-LB
    - B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑩ & ⑪ AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATION SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT INDICATED LOCATION PER NOTE 7 & SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (13-1, 13-2, 13-3), (19-1, 19-2, 19-3), (38-1, 38-2, 38-3) & (44-1, 44-2, 44-3) WHICH ARE SHIELDED BUT NOT TWISTED
12. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES & 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"
14. TAPE HARNESS IN AREA INDICATED USING ITEM ⑮ TO MAINTAIN HARNESS CONFIGURATION OF SECTION C-C AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM ⑮

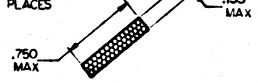

SEE NOTE 7
TYP
SEE NOTE 8
SR3
B2
A
A
B
B
SEE NOTE 6
2 PLACES
E14
11
P7
3
P7
8
TYP
PIN A
P5
3
P5
8
TYP
PIN A
3.750
3.500
2 PLACES

SEE NOTE 7
TYP

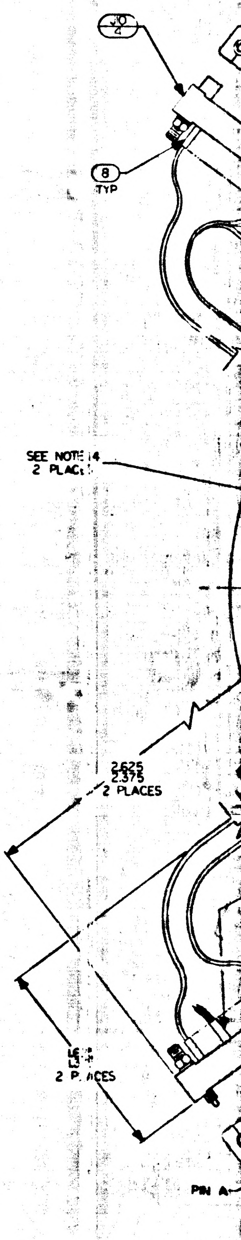
SHOWN WITH ITEMS ⑤ ⑥ AND ⑦ REMOVED

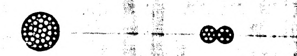

6 7
SEE NOTE 3B
4 PLACES
5
SR 3
2
1

SECTION B-B
2 PLACES


.135
MAX
.750
MAX

SECTION A-A
2 PLACES


10
4
8
TYP
SEE NOTE 14
2 PLACES
2.625
2.375
2 PLACES
2 PLACES
PIN A



-011 CONFIGURATION

USE FIG 8 STITCH
-021 CONFIGURAT

SECTION D-D
2 PLACES

2018613 REV F SHEET 1

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	NO.
1			P5-A	13	Y	8		SR3-26				
2-1			P5-B	13	Y	8		SR3-27				
2-2			P5-C	13	Y	8		SR3-28				
3-1			P5-D	13	Y	8		SR3-29				
3-2			P5-E	13	Y	8		SR3-30				
4-1			P5-F	13	Y	8		SR3-31				
4-2			P5-H	13	Y	8		SR3-32				
5-1			P5-J	13	Y	8		SR3-33				
5-2			P5-K	13	Y	8		SR3-34				
6-1			P5-L	13	Y	8		SR3-35				
6-2			P5-M	13	Y	8		SR3-36				
7-1			P5-N	13	Y	8		SR3-37				
7-2			P5-P	13	Y	8		SR3-38				
8-1			P5-R	13	Y	8		SR3-39				
8-2			P5-S	13	Y	8		SR3-40				
9-1			P5-T	13	Y	8		B2A-S3				
9-2			P5-U	13	Y	8		B2A-S1				

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REVISION F

NASA DRAWING NO.
2018613
SHEET 2 of 7

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	NO.
10-1			P5-V	13	Y	8		B2A-S2				
10-2			P5-W	13	Y	8		B2A-S4				
11-1			P5-X	13	Y	8		B2B-S3				
11-2			P5-Y	13	Y	8		B2B-S1				
12-1			P5-Z	13	Y	8		B2B-S2				
12-2			P5-a	13	Y	8		B2B-S4				
13						11						
13A			SHLD 13					E14				
13-1			P7-A	13	Y	8		SR3-1				
13-2			P7-B	13	Y	8		SR3-2				
13-3			P7-C	13	Y	8		SR3-3				
14			P7-D	13	Y	8		SR3-4				
15			P7-E	13	Y	8		SR3-5				
16-1			P7-F	13	Y	8		SR3-6				
16-2			P7-H	13	Y	8		SR3-7				
17-1			P7-J	13	Y	8		SR3-8				
17-2			P7-K	13	Y	8		SR3-9				

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REVISION F

NASA DRAWING NO.
2018613
SHEET 3 of 7

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	NO.
18-1			P7-L	13	Y	8		SR3-10				
18-2			P7-M	13	Y	8		SR3-11				
19						11						
19A			SHLD-19					E14				
19-1			P7-N	13	Y	8		SR3-12				
19-2			P7-P	13	Y	8		SR3-13				
19-3			P7-R	13	Y	8		SR3-14				
20			P7-S	13	Y	8		SR3-15				
21			P7-T	13	Y	8		SR3-16				
22-1			P7-U	13	Y	8		SR3-17				
22-2			P7-V	13	Y	8		SR3-18				
23-1			P7-W	13	Y	8		SR3-19				
23-2			P7-X	13	Y	8		SR3-20				
23-3			P7-Y	13	Y	8		SR3-21				
23-4			P7-Z	13	Y	8		SR3-22				
23-5			P7-a	13	Y	8		SR3-23				
23-6			P7-b	13	Y	8		SR3-24				
24			P7-c	13	Y	8		SR3-25				

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HOUSTON TEXAS

REVISION F

NASA DRAWING NO.
2018613
SHEET 4 of 7

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	CONDUCTOR FIND NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TIN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TO TERMINATION SPEC FIND NO.	NO.
25			J9-A	13	Y	8		SR3-26				
26-1			J9-B	13	Y	9		SR3-27				
26-2			J9-C	13	Y	9		SR3-28				
27-1			J9-B	13	Y			B2A-P3				
27-2			J9-C	13	Y			B2A-P1				
28-1			J9-D	13	Y	8		SR3-29				
28-2			J9-E	13	Y	8		SR3-30				
29-1			J9-F	13	Y	9		SR3-31				
29-2			J9-H	13	Y	9		SR3-32				
30-1			J9-F	13	Y			B2A-P2				
30-2			J9-H	13	Y			B2A-P4				
31-1			J9-J	13	Y	8		SR3-33				
31-2			J9-K	13	Y	8		SR3-34				
32-1			J9-L	13	Y	8		SR3-35				
32-2			J9-M	13	Y	8		SR3-36				
33-1			J9-N	13	Y	8		SR3-37				
33-2			J9-P	13	Y	8		SR3-38				

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REVISION F

NASA DRAWING NO.
2018613
SHEET 5 of 7

TDRR 17101 MAR 2 1965

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HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018613
SHEET 6 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC FIND NO.
34-1		J9-R	13Y	8	SR3-39		
34-2		J9-S	13Y	8	SR3-40		
35-1		J9-W	13Y	8	SR3-23		
35-2		J9-X	13Y	8	SR3-24		
35-3		J9-Y	13Y	8	SR3-21		
35-4		J9-Z	13Y	8	SR3-22		
36	12	J9-a	13Y	8	J9-b	13Y	8
37		J9-c	13Y	8	SR3-25		
38				10			
38-A		SHLD-38			E17		
38-1		J10-A	13Y	8	SR3-1		
38-2		J10-B	13Y	8	SR3-2		
38-3		J10-C	13Y	8	SR3-3		
39		J10-D	13Y	8	SR3-4		
40		J10-E	13Y	8	SR3-5		
41-1		J10-F	13Y	8	SR3-6		
41-2		[illegible]	13Y	8	SR3-7		

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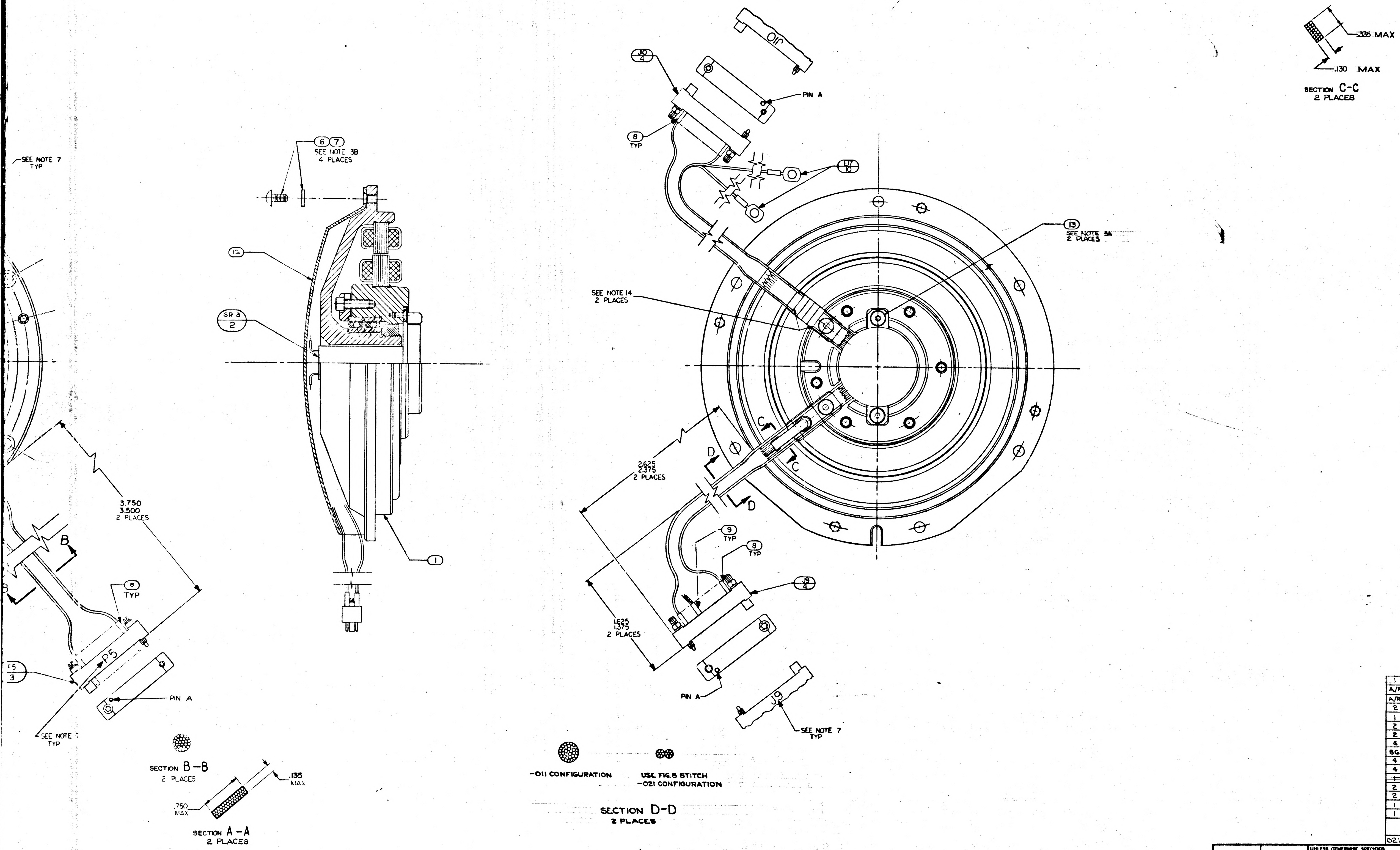
REVISION F

NASA DRAWING NO. 2018613
SHEET 7 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION SPEC FIND NO.
42-1		J10-J	13Y	8	SR3-8		
42-2		J10-K	13Y	8	SR3-9		
43-1		J10-L	13Y	8	SR3-10		
43-2		J10-M	13Y	8	SR3-11		
44				10			
44-A		SHLD-44			E17		
44-1		J10-N	13Y	8	SR3-12		
44-2		J10-P	13Y	8	SR3-13		
44-3		J10-R	13Y	8	SR3-14		
45		J10-S	13Y	8	SR3-15		
46		J10-T	13Y	8	SR3-16		
47-1		J10-U	13Y	8	SR3-17		
47-2		J10-V	13Y	8	SR3-18		
48-1		J10-W	13Y	8	SR3-19		
48-2		J10-X	13Y	8	SR3-20		

4 3 2

SYM	DESCRIPTION	DATE		
		TDRR 1710		
A	REVISED TDRR 17687	18 MAR 65		WK
B	REVISED PER TDRR 13280	25 May 65		WK
C	REVISED TDRR 21677	31 Aug 65		WK
D	REVISED TDRR 26254	23 Feb 66		WK
E	REVISED PER TDRR 26597	7 Mar 66		WK
F	REVISED TDRR 27774	12 Apr 66		WK
G	REVISED TDRR 28289	2 May 66		WK


SEE NOTE 7
TYP
⑥⑦
SEE NOTE 3B
4 PLACES
⑫
SR 3
2
①
3.750
3.500
2 PLACES
B
B
⑧
TYP
P5
P5
3
PIN A
SEE NOTE 7
TYP
SECTION B-B
2 PLACES
.135
MAX
.750
MAX
SECTION A-A
2 PLACES
J10
J10
4
PIN A
⑧
TYP
E17
10
⑬
SEE NOTE 3A
2 PLACES
SEE NOTE 14
2 PLACES
C
C
D
D
2.625
2.375
2 PLACES
⑨
TYP
⑧
TYP
J9
4
1.625
1.375
2 PLACES
PIN A
J9
SEE NOTE 7
TYP
-011 CONFIGURATION
USE FIG.8 STITCH
-021 CONFIGURATION
SECTION D-D
2 PLACES
.335 MAX
.130 MAX
SECTION C-C
2 PLACES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1	2018848	WIRE GUIDE, BRG. HSG., M.A., RSVR	16
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	15
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	14
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC-SPLINE	13
1	1	1010416-4	WIRE AWG 28E ORN 3" LONG	12
2	2	1000020-8	SHIELD & GROUND ASS'Y	11
2	2	1000020-6	SHIELD AND GROUND ASS'Y	10
4	4	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
86	86	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	4	MS15795-703	WASHER, FLAT, METAL, ROUND	7
4	4	1010891-12	SCREW, BUTTON HD., SELF LKG. SOC SPLINE	6
~~1~~	~~1~~	~~2018784~~	~~WIRE GUIDE, BRG HSG, M.A. RSVR~~	~~5~~
2	2	1010917-106	CONNECTOR, ELEC, RECEP, 26 PINS	4
2	2	1010917-806	CONNECTOR ELEC, PLUG, 26 PINS	3
1	1	2018624	SLIP RING ASS'Y 40 CONTACT	2
1	1	2018607-011	RESOLVER ASS'Y MIDDLE AXIS	1
021	011	LIST OF MATERIALS		

2018603	DL 2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DATE 1-11-65
CHECKED G. QUINN 2-26-65
APPROVAL
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB ASSEMBLY
RESOLVER MIDDLE AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018613
SCALE 2-1
WT
SHEET OF 7

2018613 G

D C B A

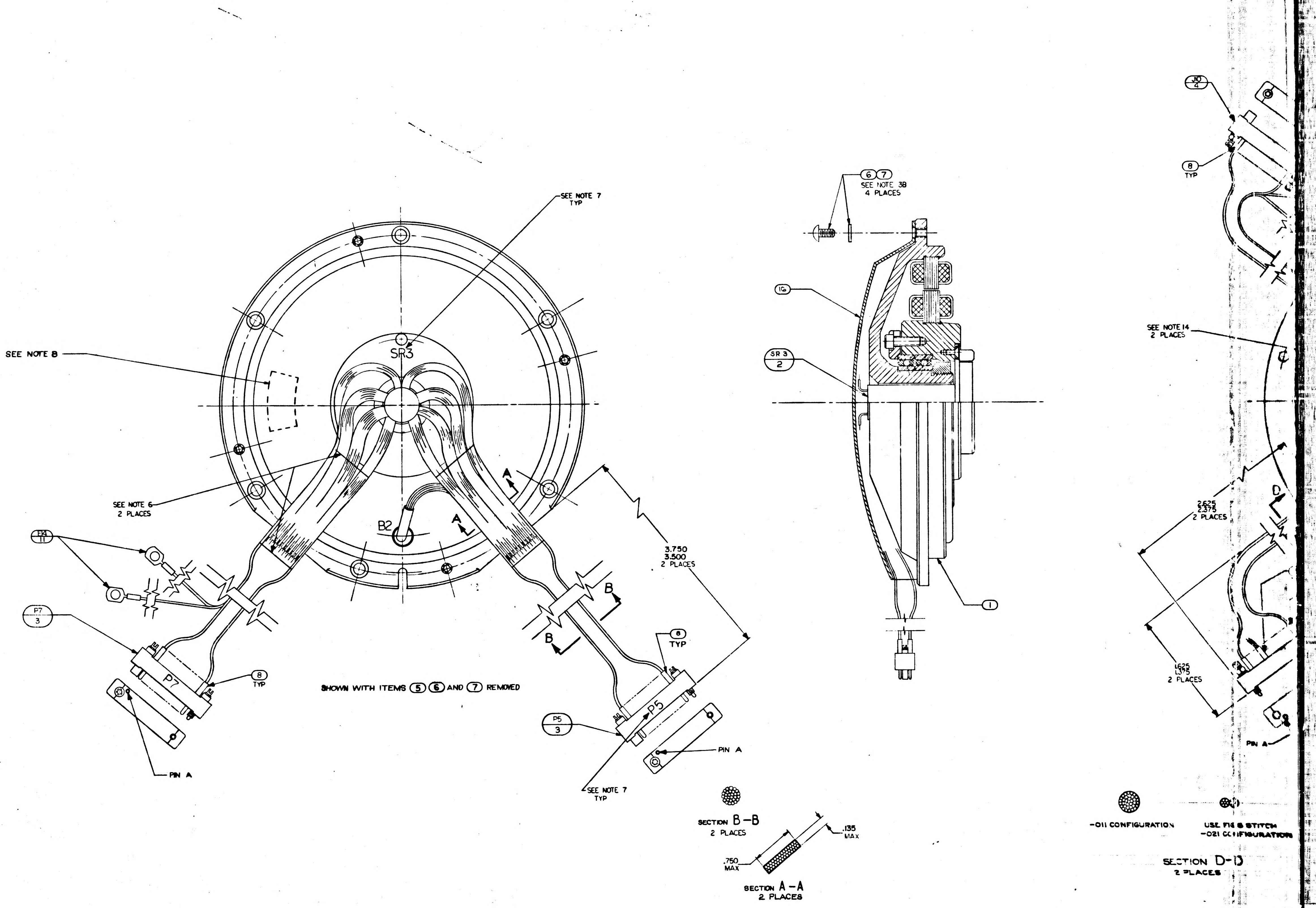
MASTER

2018613 REV SHEET 1

4 3 2

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. **COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS2018613**
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑩ & ⑪ AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATION SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT INDICATED LOCATION PER NOTE 7 & SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (13-1, 13-2, 13-3), (19-1, 19-2, 19-3), (38-1, 38-2, 38-3) & (44-1, 44-2, 44-3) WHICH ARE SHIELDED BUT NOT TWISTED
12. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES & 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"
14. TAPE HARNESS IN AREA INDICATED USING ITEM ⑮ TO MAINTAIN HARNESS CONFIGURATION OF SECTION C-C AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM ⑮


SEE NOTE 7
TYP
SEE NOTE 8
SR3
B2
SEE NOTE 6
2 PLACES
14
11
P7
3
8
TYP
PIN A
A
B
3.750
3.500
2 PLACES
P5
3
8
TYP
SEE NOTE 7
TYP
SHOWN WITH ITEMS ⑤ ⑥ AND ⑦ REMOVED
SECTION B-B
2 PLACES
.135
MAX
.750
MAX
SECTION A-A
2 PLACES
⑥ ⑦
SEE NOTE 3B
4 PLACES
16
SR3
2
1
J10
4
8
TYP
SEE NOTE 14
2 PLACES
2.625
2.375
2 PLACES
1.625
1.375
2 PLACES
D
PIN A
-011 CONFIGURATION
USE FIG 8 STITCH
-021 CONFIGURATION
SECTION D-D
2 PLACES

2018613 REV SHT 1

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REVISION G

NASA DRAWING NO. 2018613 SHEET 2 of 7

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CIRCUIT POINT	CUT WIRE OR SHIELD STRIP WIRE OR JACKET	TIN	TERMINATION FIND NO.	SPEC NO.	CIRCUIT POINT	CUT WIRE OR SHIELD STRIP WIRE OR JACKET	TIN	TERMINATION FIND NO.	SPEC NO.
1			P5-A	13	Y	8		SR3-26				
2-1			P5-B	13	Y	8		SR3-27				
2-2			P5-C	13	Y	8		SR3-28				
3-1			P5-D	13	Y	8		SR3-29				
3-2			P5-E	13	Y	8		SR3-30				
4-1			P5-F	13	Y	8		SR3-31				
4-2			P5-H	13	Y	8		SR3-32				
5-1			P5-J	13	Y	8		SR3-33				
5-2			P5-K	13	Y	8		SR3-34				
6-1			P5-L	13	Y	8		SR3-35				
6-2			P5-M	13	Y	8		SR3-36				
7-1			P5-N	13	Y	8		SR3-37				
7-2			P5-P	13	Y	8		SR3-38				
8-1			P5-R	13	Y	8		SR3-39				
8-2			P5-S	13	Y	8		SR3-40				
9-1			P5-T	13	Y	8		B2A-S3				
9-2			P5-U	13	Y	8		B2A-S1				

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REVISION G

NASA DRAWING NO. 2018613 SHEET 3 of 7

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CIRCUIT POINT	CUT WIRE OR SHIELD STRIP WIRE OR JACKET	TIN	TERMINATION FIND NO.	SPEC NO.	CIRCUIT POINT	CUT WIRE OR SHIELD STRIP WIRE OR JACKET	TIN	TERMINATION FIND NO.	SPEC NO.
10-1			P5-V	13	Y	8		B2A-S2				
10-2			P5-W	13	Y	8		B2A-S4				
11-1			P5-X	13	Y	8		B2B-S3				
11-2			P5-Y	13	Y	8		B2B-S1				
12-1			P5-Z	13	Y	8		B2B-S2				
12-2			P5-a	13	Y	8		B2B-S4				
13						11						
13A			SHLD 13					E14				
13-1			P7-A	13	Y	8		SR3-1				
13-2			P7-B	13	Y	8		SR3-2				
13-3			P7-C	13	Y	8		SR3-3				
14			P7-D	13	Y	8		SR3-4				
15			P7-E	13	Y	8		SR3-5				
16-1			P7-F	13	Y	8		SR3-6				
16-2			P7-H	13	Y	8		SR3-7				
17-1			P7-J	13	Y	8		SR3-8				
17-2			P7-K	13	Y	8		SR3-9				

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REVISION G

NASA DRAWING NO. 2018613 SHEET 4 of 7

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CIRCUIT POINT	CUT WIRE OR SHIELD STRIP WIRE OR JACKET	TIN	TERMINATION FIND NO.	SPEC NO.	CIRCUIT POINT	CUT WIRE OR SHIELD STRIP WIRE OR JACKET	TIN	TERMINATION FIND NO.	SPEC NO.
18-1			P7-L	13	Y	8		SR3-10				
18-2			P7-M	13	Y	8		SR3-11				
19						11						
19A			SHLD-19					E14				
19-1			P7-N	13	Y	8		SR3-12				
19-2			P7-P	13	Y	8		SR3-13				
19-3			P7-R	13	Y	8		SR3-14				
20			P7-S	13	Y	8		SR3-15				
21			P7-T	13	Y	8		SR3-16				
22-1			P7-U	13	Y	8		SR3-17				
22-2			P7-V	13	Y	8		SR3-18				
23-1			P7-W	13	Y	8		SR3-19				
23-2			P7-X	13	Y	8		SR3-20				
23-3			P7-Y	13	Y	8		SR3-21				
23-4			P7-Z	13	Y	8		SR3-22				
23-5			P7-a	13	Y	8		SR3-23				
23-6			P7-b	13	Y	8		SR3-24				
24			P7-c	13	Y	8		SR3-25				

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REVISION G

NASA DRAWING NO. 2018613 SHEET 5 of 7

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CIRCUIT POINT	CUT WIRE OR SHIELD STRIP WIRE OR JACKET	TIN	TERMINATION FIND NO.	SPEC NO.	CIRCUIT POINT	CUT WIRE OR SHIELD STRIP WIRE OR JACKET	TIN	TERMINATION FIND NO.	SPEC NO.
25			J9-A	13	Y	8		SR3-26				
26-1			J9-B	13	Y	9		SR3-27				
26-2			J9-C	13	Y	9		SR3-28				
27-1			J9-B	13	Y			B2A-P3				
27-2			J9-C	13	Y			B2A-P1				
28-1			J9-D	13	Y	8		SR3-29				
28-2			J9-E	13	Y	8		SR3-30				
29-1			J9-F	13	Y	9		SR3-31				
29-2			J9-H	13	Y	9		SR3-32				
30-1			J9-F	13	Y			B2A-P2				
30-2			J9-H	13	Y			B2A-P4				
31-1			J9-J	13	Y	8		SR3-33				
31-2			J9-K	13	Y	8		SR3-34				
32-1			J9-L	13	Y	8		SR3-35				
32-2			J9-M	13	Y	8		SR3-36				
33-1			J9-N	13	Y	8		SR3-37				
33-2			J9-P	13	Y	8		SR3-38				

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	CONDUCTOR INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.
34-1		J9-R	13Y	8	SR3-39		
34-2		J9-S	13Y	8	SR3-40		
35-1		J9-W	13Y	8	SR3-23		
35-2		J9-X	13Y	8	SR3-24		
35-3		J9-Y	13Y	8	SR3-21		
35-4		J9-Z	13Y	8	SR3-22		
36	12	J9-a	13Y	8	J9-b	13Y	8
37		J9-c	13Y	8	SR3-25		
38				10			
38-A		SHLD-38			E17		
38-1		J10-A	13Y	8	SR3-1		
38-2		J10-B	13Y	8	SR3-2		
38-3		J10-C	13Y	8	SR3-3		
39		J10-D	13Y	8	SR3-4		
40		J10-E	13Y	8	SR3-5		
41-1		J10-F	13Y	8	SR3-6		
41-2		J10-H	13Y	8	SR3-7		

M.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018613
SHEET 6 of 7

TDRR 17101 MAR 2 1965

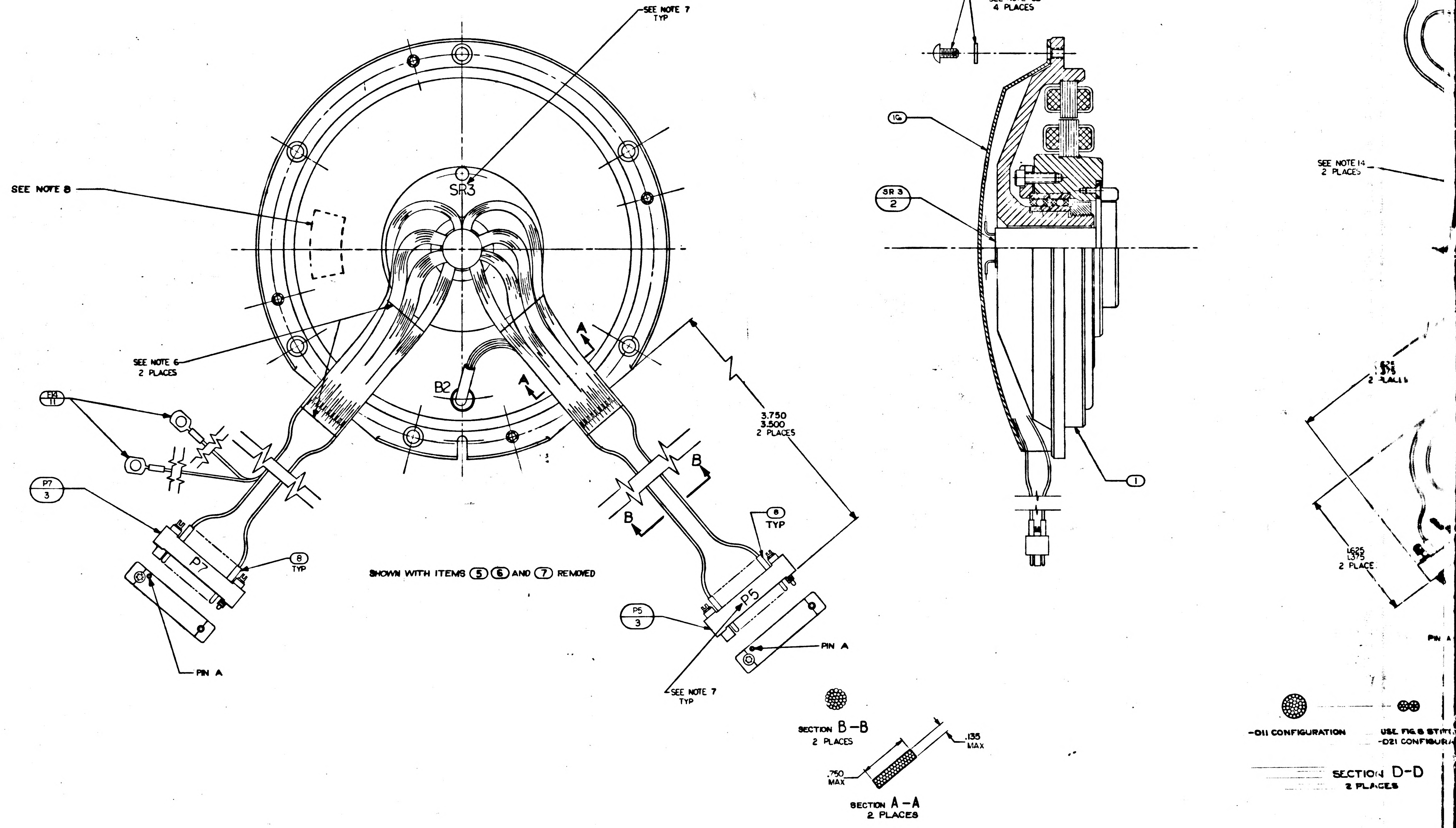
CONDUCTOR FIND NUMBER	CONDUCTOR INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	FROM T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TO T/N	TO TERMINATION SPEC FIND NO.
42-1		J10-J	13Y	8	SR3-8		
42-2		J10-K	13Y	8	SR3-9		
43-1		J10-L	13Y	8	SR3-10		
43-2		J10-M	13Y	8	SR3-11		
44				10			
44-A		SHLD-44			E17		
44-1		J10-N	13Y	8	SR3-12		
44-2		J10-P	13Y	8	SR3-13		
44-3		J10-R	13Y	8	SR3-14		
45		J10-S	13Y	8	SR3-15		
46		J10-T	13Y	8	SR3-16		
47-1		J10-U	13Y	8	SR3-17		
47-2		J10-V	13Y	8	SR3-18		
48-1		J10-W	13Y	8	SR3-19		
48-2		J10-X	13Y	8	SR3-20		

M.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION G

NASA DRAWING NO. 2018613
SHEET [illegible] of 7


SEE NOTE 7
TYP
SEE NOTE 8
SR3
SEE NOTE 6
2 PLACES
B2
A
A
E4
11
P7
3
P7
8
TYP
PIN A
B
B
SHOWN WITH ITEMS (5) (6) AND (7) REMOVED
3.750
3.500
2 PLACES
8
TYP
P5
3
P5
PIN A
SEE NOTE 7
TYP
(6) (7)
SEE NOTE 3B
4 PLACES
1G
SR 3
2
1
8
TYP
SEE NOTE 14
2 PLACES
1.625
1.375
2 PLACE
PIN A
SECTION B-B
2 PLACES
.750
MAX
.135
MAX
SECTION A-A
2 PLACES
-011 CONFIGURATION
USE FIG B STITCH
-021 CONFIGURA
SECTION D-D
2 PLACES

NOTES

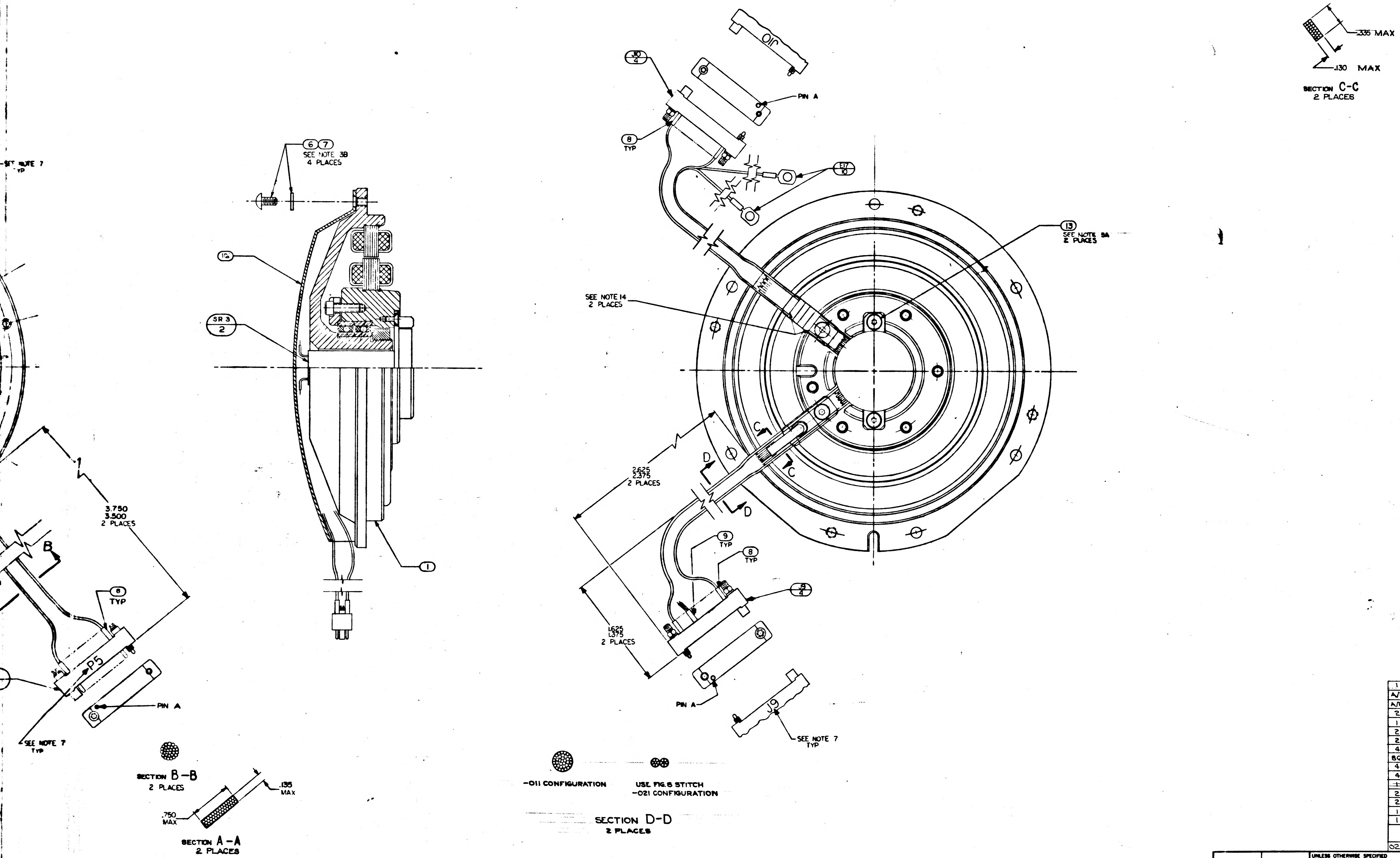
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS2018613
3. SCREW TORQUE REQUIREMENTS ±7%
    - A. 3.5 IN-LB
    - B. 5.0 IN-LB
4. SOLDER LEADS TO (3) & (4) PER ND 1002071
5. HEAT SHRINK SLEEVING ON (10) & (11) AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATION SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO. REVISION LETTER & MANUFACTURERS SYMBOL AT INDICATED LOCATION PER NOTE 7 & SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (13-1, 13-2, 13-3), (19-1, 19-2, 19-3), (38-1, 38-2, 38-3) & (44-1, 44-2, 44-3) WHICH ARE SHIELDED BUT NOT TWISTED
12. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES & 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"
14. TAPE HARNESS IN AREA INDICATED USING ITEM (15) TO MAINTAIN HARNESS CONFIGURATION OF SECTION C-C AND SECURE HARNESS TO THE WIRE RETAINER USING ITEM (15)

2H

	REV	SHEET
2018613	H	1

1-/2018613

SYM	DESCR	TDRR 1710		
A	REVISED TDRR 17687	18MAR65		WK
B	REVISED PER TDRR 13280	25May65		WK
C	REVISED TDRR 21677	31Aug65		WK
D	REVISED TDRR 26254	23Feb66		WK
E	REVISED PER TDRR 26597	7Mar66		WK
F	REVISED TDRR 27774	12Apr66		WK
G	REVISED TDRR 28289	2May66		WK
H	REVISED PER TDRR 32856	3FEB67	LL	



SEE NOTE 7 TYP
6 7
SEE NOTE 3B
4 PLACES
12
SR 3
2
3.750
3.500
2 PLACES
B
8
TYP
P5
PIN A
SEE NOTE 7
TYP
1
J10
10
4
PIN A
8
TYP
11
10
13
SEE NOTE 3A
2 PLACES
SEE NOTE 14
2 PLACES
2.625
2.375
2 PLACES
D
C
C
D
9
TYP
8
TYP
10
4
1.625
1.375
2 PLACES
PIN A
J9
SEE NOTE 7
TYP
.335 MAX
.130 MAX
SECTION C-C
2 PLACES
SECTION B-B
2 PLACES
.135
MAX
.750
MAX
SECTION A-A
2 PLACES
-011 CONFIGURATION
USE FIG.6 STITCH
-021 CONFIGURATION
SECTION D-D
2 PLACES

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1	2018848	WIRE GUIDE, BRG. HSG., M.A., RSVR	16
A/R	A/R	MIL-I-15126 TYPE MFT	TAPE-MYLAR INSULATION 1/4 WIDTH	15
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	14
2	2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC-SPLINE	13
1	1	1010416-4	WIRE AWG 28E ORN 3" LONG	12
2	2	1000020-8	SHIELD & GROUND ASS'Y	11
2	2	1000020-6	SHIELD AND GROUND ASS'Y	10
4	4	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
86	86	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	4	MS15795-703	WASHER, FLAT, METAL, ROUND	7
4	4	1010891-12	SCREW, BUTTON HD., SELF-LKG, SOC-SPLINE	6
~~1~~	~~1~~	~~2018784~~	~~WIRE GUIDE, BRG. HSG. M.A. RSVR~~	~~5~~
2	2	1010917-106	CONNECTOR, ELEC, RECEP, 26 PINS	4
2	2	1010917-806	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	1	2018624	SLIP RING ASS'Y 40 CONTACT	2
1	1	2018607-011	RESOLVER ASS'Y MIDDLE AXIS	1
021	011	LIST OF MATERIALS		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY	USED ON
2018603	DL2018601

APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT

DRAWN DATE 1-11-65
CHECKED G. QUINN 2-26-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB ASSEMBLY RESOLVER MIDDLE AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018613
SCALE 2-1
WT
SHEET OF 7

2018613 H

2/2018613

TDRR 17101 MAR 2 1965

Conductor Find Number	No.	Individual Length	From: Circuit Point	Strip Wire or Jacket	TIN	Termination Find No.	Spec No.	To: Circuit Point	Strip Wire or Jacket	TIN	Termination Find No.	Spec No.
1			P5-A	17	Y	8		SR3-26				
2-1			P5-B	17	Y	8		SR3-27				
2-2			P5-C	17	Y	8		SR3-28				
3-1			P5-D	17	Y	8		SR3-29				
3-2			P5-E	17	Y	8		SR3-30				
4-1			P5-F	17	Y	8		SR3-31				
4-2			P5-H	17	Y	8		SR3-32				
5-1			P5-J	17	Y	8		SR3-33				
5-2			P5-K	17	Y	8		SR3-34				
6-1			P5-L	17	Y	8		SR3-35				
6-2			P5-M	17	Y	8		SR3-36				
7-1			P5-N	17	Y	8		SR3-37				
7-2			P5-P	17	Y	8		SR3-38				
8-1			P5-R	17	Y	8		SR3-39				
8-2			P5-S	17	Y	8		SR3-40				
9-1			P5-T	17	Y	8		B2A-S3				
9-2			P5-U	17	Y	8		B2A-S1				

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018613
SHEET 2 of 7

TDRR 17101 MAR 2 1965

Conductor Find Number	No.	Individual Length	From: Circuit Point	Strip Wire or Jacket	TIN	Termination Find No.	Spec No.	To: Circuit Point	Strip Wire or Jacket	TIN	Termination Find No.	Spec No.
10-1			P5-V	17	Y	8		B2A-S2				
10-2			P5-W	17	Y	8		B2A-S4				
11-1			P5-X	17	X	8		B2B-S3				
11-2			P5-Y	17	Y	8		B2B-S1				
12-1			P5-Z	17	Y	8		B2B-S2				
12-2			P5-a	17	Y	8		B2B-S4				
13						11						
13A			SHLD 13					E14				
13-1			P7-A	17	Y	8		SR3-1				
13-2			P7-B	17	Y	8		SR3-2				
13-3			P7-C	17	Y	8		SR3-3				
14			P7-D	17	Y	8		SR3-4				
15			P7-E	17	Y	8		SR3-5				
16-1			P7-F	17	Y	8		SR3-6				
16-2			P7-H	17	Y	8		SR3-7				
17-1			P7-J	17	Y	8		SR3-8				
17-2			P7-K	17	Y	8		SR3-9				

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018613
SHEET 3 of 7

TDRR 17101 MAR 2 1965

Conductor Find Number	No.	Individual Length	From: Circuit Point	Strip Wire or Jacket	TIN	Termination Find No.	Spec No.	To: Circuit Point	Strip Wire or Jacket	TIN	Termination Find No.	Spec No.
18-1			P7-L	17	Y	8		SR3-10				
18-2			P7-M	17	Y	8		SR3-11				
19						11						
19A			SHLD-19					E14				
19-1			P7-N	17	Y	8		SR3-12				
19-2			P7-P	17	Y	8		SR3-13				
19-3			P7-R	17	Y	8		SR3-14				
20			P7-S	17	Y	8		SR3-15				
21			P7-T	17	Y	8		SR3-16				
22-1			P7-U	17	Y	8		SR3-17				
22-2			P7-V	17	Y	8		SR3-18				
23-1			P7-W	17	Y	8		SR3-19				
23-2			P7-X	17	Y	8		SR3-20				
23-3			P7-Y	17	Y	8		SR3-21				
23-4			P7-Z	17	Y	8		SR3-22				
23-5			P7-a	17	Y	8		SR3-23				
23-6			P7-b	17	Y	8		SR3-24				
24			P7-c	17	Y	8		SR3-25				

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018613
SHEET 4 of 7

TDRR 17101 MAR 2 1965

Conductor Find Number	No.	Individual Length	From: Circuit Point	Strip Wire or Jacket	TIN	Termination Find No.	Spec No.	To: Circuit Point	Strip Wire or Jacket	TIN	Termination Find No.	Spec No.
25			J9-A	17	Y	8		SR3-26				
26-1			J9-B	17	Y	9		SR3-27				
26-2			J9-C	17	Y	9		SR3-28				
27-1			J9-B	17	Y			B2A-P3				
27-2			J9-C	17	Y			B2A-P1				
28-1			J9-D	17	Y	8		SR3-29				
28-2			J9-E	17	Y	8		SR3-30				
29-1			J9-F	17	Y	9		SR3-31				
29-2			J9-H	17	Y	9		SR3-32				
30-1			J9-F	17	Y			B2A-P2				
30-2			J9-H	17	Y			B2A-P4				
31-1			J9-J	17	Y	8		SR3-33				
31-2			J9-K	17	Y	8		SR3-34				
32-1			J9-L	17	Y	8		SR3-35				
32-2			J9-M	17	Y	8		SR3-36				
33-1			J9-N	17	Y	8		SR3-37				
33-2			J9-P	17	Y	8		SR3-38				

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018613
SHEET 5 of 7

TDRR 17101 MAR 2 1965

			FROM					TO				
CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TERMINATION FIND NO.	SPEC	NO.
34-1			J9-R	17Y	8			SR3-39				
34-2			J9-S	17Y	8			SR3-40				
35-1			J9-W	17Y	8			SR3-23				
35-2			J9-X	17Y	8			SR3-24				
35-3			J9-Y	17Y	8			SR3-21				
35-4			J9-Z	17Y	8			SR3-22				
36	12		J9-a	17Y	8			J9-b	17Y	8		
37			J9-c	17Y	8			SR3-25				
38					10							
38-A			SHLD-38					E17				
38-1			J10-A	17Y	8			SR3-1				
38-2			J10-B	17Y	8			SR3-2				
38-3			J10-C	17Y	8			SR3-3				
39			J10-D	17Y	8			SR3-4				
40			J10-E	17Y	8			SR3-5				
41-1			J10-F	17Y	8			SR3-6				
41-2			J10-H	17Y	8			SR3-7				

M.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018613

SHEET 6 of 7

TDRR 17101 MAR 2 1965

			FROM					TO				
CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TERMINATION FIND NO.	SPEC	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT		TERMINATION FIND NO.	SPEC	NO.
42-1			J10-J	17Y	8			SR3-8				
42-2			J10-K	17Y	8			SR3-9				
43-1			J10-L	17Y	8			SR3-10				
43-2			J10-M	17Y	8			SR3-11				
44					10							
44-A			SHLD-44					E17				
44-1			J10-N	17Y	8			SR3-12				
44-2			J10-P	17Y	8			SR3-13				
44-3			J10-R	17Y	8			SR3-14				
45			J10-S	17Y	8			SR3-15				
46			J10-T	17Y	8			SR3-16				
47-1			J10-U	17Y	8			SR3-17				
47-2			J10-V	17Y	8			SR3-18				
48-1			J10-W	17Y	8			SR3-19				
48-2			J10-X	17Y	8			SR3-20				

M.A. RESOLV.

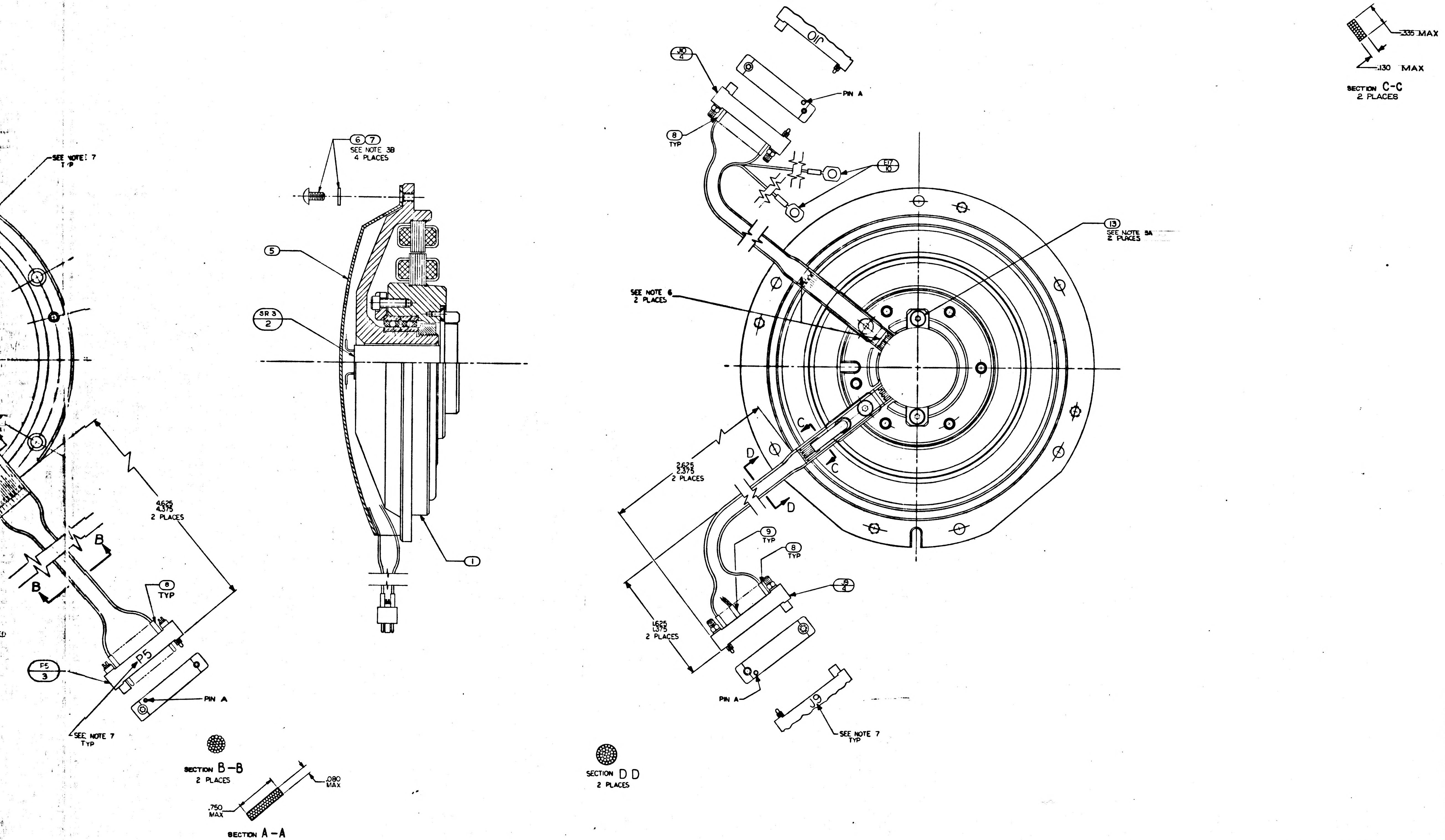
MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018613

SHEET 7 of 7

SYM	REVISIONS TDRR 1710 DESCRIPTION	DATE	APPROVAL


SEE NOTE 7
TYP
⑥⑦
SEE NOTE 3B
4 PLACES
⑤
SR 3
2
4.625
4.375
2 PLACES
B
B
⑧
TYP
P5
F5
3
PIN A
SEE NOTE 7
TYP
①
J10
4
J10
PIN A
⑧
TYP
E17
10
⑬
SEE NOTE 5A
2 PLACES
SEE NOTE 6
2 PLACES
2.625
2.375
2 PLACES
C
C
D
D
⑨
TYP
⑧
TYP
J9
4
1.625
1.375
2 PLACES
PIN A
J9
SEE NOTE 7
TYP
.335 MAX
.130 MAX
SECTION C-C
2 PLACES
SECTION B-B
2 PLACES
SECTION D D
2 PLACES
.080
MAX
.750
MAX
SECTION A-A
2 PLACES

F2

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
A/R	1012507-002	TAPE, LACING	14
2	1010867-2	SCREW, SELF-LKG, FLAT HD, SOC-SPLINE	13
1	1010416-4	WIRE AWG 28E ORN 3" LONG	12
2	1000020-4	SHIELD AND GROUND ASS'Y	11
2	1000020-6	SHIELD AND GROUND ASS'Y	10
4	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
86	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER, FLAT, METAL, ROUND	7
4	1010891-12	SCREW, BUTTON HD., SELF-LKG, SOC-SPLINE	6
1	2018784	WIRE GUIDE, BRG HSG. M.A. RSVR	5
2	1000122	CONNECTOR, ELEC, RECEP 26 PINS	4
2	1000123	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018624	SLIP RING ASS'Y 40 CONTACT	2
1	2018607-011	RESOLVER ASS'Y MIDDLE AXIS	1
011	LIST OF MATERIALS		

2018603	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DATE 1-11-65
CHECKED G. QUINN 2-26-65
APPROVAL 2 Mar 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB ASSEMBLY
RESOLVER MIDDLE AXIS

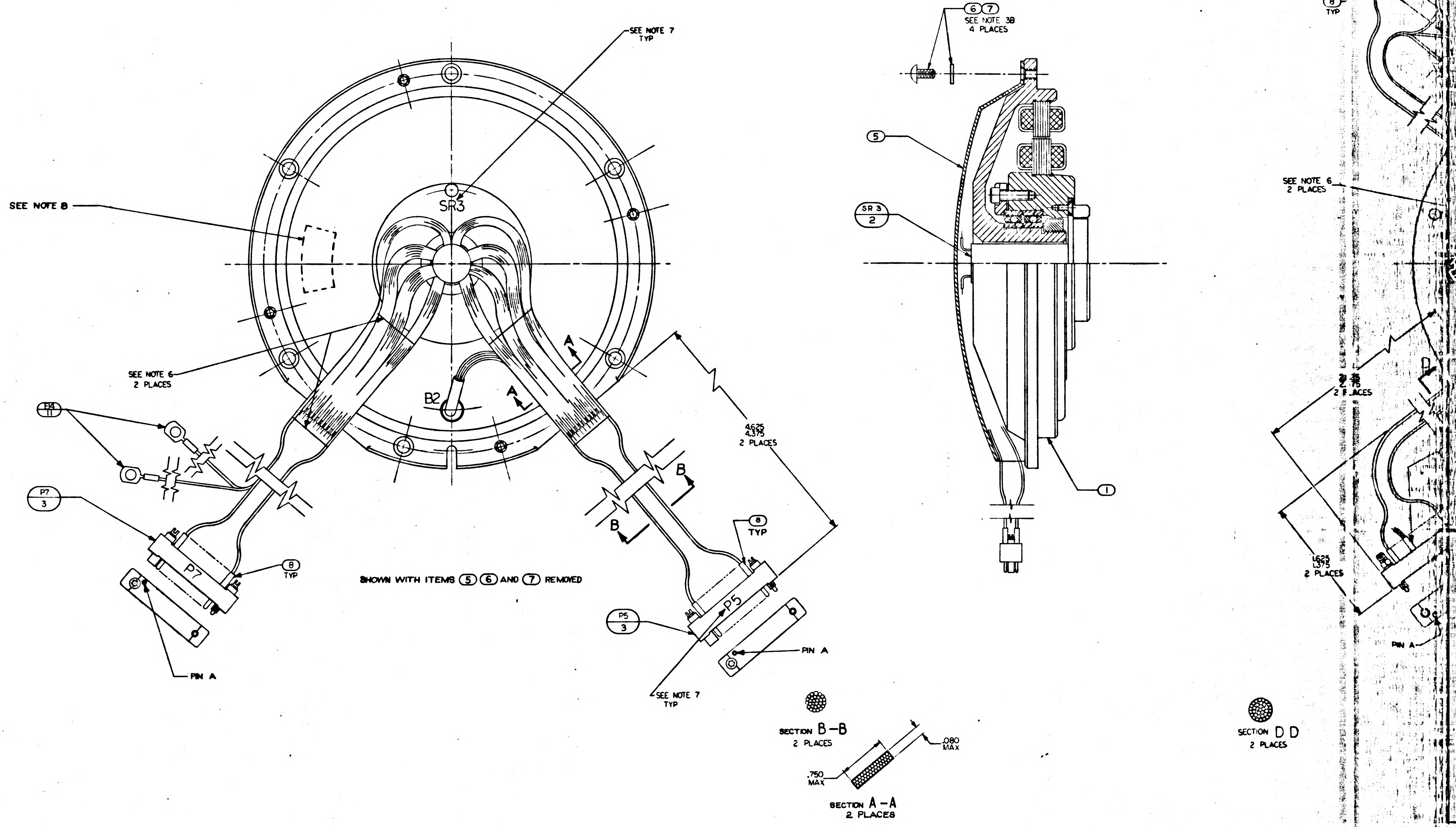
CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018613
SCALE 2-1
WT
SHEET 1 OF

2018613 REV SHEET 1

2018613

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS 2007203
3. SCREW TORQUE REQUIREMENTS ±7%
    - A. 3.5 IN-LB
    - B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑩ & ⑪ AFTER ASSEMBLY
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH COLOR BLACK AT LOCATION SHOWN PER ND 1002019
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT INDICATED LOCATION PER NOTE 7 & SERIALIZE PER ND 1002023
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED TOGETHER PER ND 1002032 WITH THE EXCEPTION OF THE FOLLOWING CONDUCTORS (13-1, 13-2, 13-3), (19-1, 19-2, 19-3), (38-1, 38-2, 38-3) & (44-1, 44-2, 44-3) WHICH ARE SHIELDED BUT NOT TWISTED
12. DIMENSIONS ON SHEETS 2 THRU 7 ARE IN INCHES & 2 PLACE DECIMALS
13. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"


SEE NOTE 7
TYP
SEE NOTE 8
SR3
B2
SEE NOTE 6
2 PLACES
E14
11
P7
3
P7
8
TYP
PIN A
A
A
B
B
4.625
4.375
2 PLACES
8
TYP
P5
P5
3
SEE NOTE 7
TYP
PIN A
SHOWN WITH ITEMS ⑤ ⑥ AND ⑦ REMOVED
⑥ ⑦
SEE NOTE 3B
4 PLACES
5
SR 3
2
1
SECTION B-B
2 PLACES
.080
MAX
.750
MAX
SECTION A-A
2 PLACES
SEE NOTE 6
2 PLACES
8
TYP
D
1.625
1.375
2 PLACES
PIN A
SECTION D D
2 PLACES

F-1

2018613 | REV | SHEET 1

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TO TERMINATION SPEC FIND NO.	NO.
1		P5-A	13	Y	8		SR3-26			
2-1		P5-B	13	Y	8		SR3-27			
2-2		P5-C	13	Y	8		SR3-28			
3-1		P5-D	13	Y	8		SR3-29			
3-2		P5-E	13	Y	8		SR3-30			
4-1		P5-F	13	Y	8		SR3-31			
4-2		P5-H	13	Y	8		SR3-32			
5-1		P5-J	13	Y	8		SR3-33			
5-2		P5-K	13	Y	8		SR3-34			
6-1		P5-L	13	Y	8		SR3-35			
6-2		P5-M	13	Y	8		SR3-36			
7-1		P5-N	13	Y	8		SR3-37			
7-2		P5-P	13	Y	8		SR3-38			
8-1		P5-R	13	Y	8		SR3-39			
8-2		P5-S	13	Y	8		SR3-40			
9-1		P5-T	13	Y	8		B2A-S3			
9-2		P5-U	13	Y	8		B2A-S1			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TO TERMINATION SPEC FIND NO.	NO.
10-1		P5-V	13	Y	8		B2A-S2			
10-2		P5-W	13	Y	8		B2A-S4			
11-1		P5-X	13	Y	8		B2B-S3			
11-2		P5-Y	13	Y	8		B2B-S1			
12-1		P5-Z	13	Y	8		B2B-S2			
12-2		P5-a	13	Y	8		B2B-S4			
13					11					
13A		SHLD 13					E14			
13-1		P7-A	13	Y	8		SR3-1			
13-2		P7-B	13	Y	8		SR3-2			
13-3		P7-C	13	Y	8		SR3-3			
14		P7-D	13	Y	8		SR3-4			
15		P7-E	13	Y	8		SR3-5			
16-1		P7-F	13	Y	8		SR3-6			
16-2		P7-H	13	Y	8		SR3-7			
17-1		P7-J	13	Y	8		SR3-8			
17-2		P7-K	13	Y	8		SR3-9			

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TO TERMINATION SPEC FIND NO.	NO.
18-1		P7-L	13	Y	8		SR3-10			
18-2		P7-M	13	Y	8		SR3-11			
19					11					
19A		SHLD-19					E14			
19-1		P7-N	13	Y	8		SR3-12			
19-2		P7-P	13	Y	8		SR3-13			
19-3		P7-R	13	Y	8		SR3-14			
20		P7-S	13	Y	8		SR3-15			
21		P7-T	13	Y	8		SR3-16			
22-1		P7-U	13	Y	8		SR3-17			
22-2		P7-V	13	Y	8		SR3-18			
23-1		P7-W	13	Y	8		SR3-19			
23-2		P7-X	13	Y	8		SR3-20			
23-3		P7-Y	13	Y	8		SR3-21			
23-4		P7-Z	13	Y	8		SR3-22			
23-5		P7-a	13	Y	8		S 3-23			
23-6		P7-b	13	Y	8		SR3-24			
24		P7-c	13	Y	8		SR3-25			

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TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		Y N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	Y N	TO TERMINATION SPEC FIND NO.	NO.
25		J9-A	13	Y	8		SR3-26			
26-1		J9-B	13	Y	9		SR3-27			
26-2		J9-C	13	Y	9		SR3-28			
27-1		J9-B	13	Y			B2A-P3			
27-2		J9-C	13	Y			B2A-P1			
28-1		J9-D	13	Y	8		SR3-29			
28-2		J9-E	13	Y	8		SR3-30			
29-1		J9-F	13	Y	9		SR3-31			
29-2		J9-H	13	Y	9		SR3-32			
30-1		J9-F	13	Y			B2A-P2			
30-2		J9-H	13	Y			B2A-P4			
31-1		J9-J	13	Y	8		SR3-33			
31-2		J9-K	13	Y	8		SR3-34			
32-1		J9-L	13	Y	8		SR3-35			
32-2		J9-M	13	Y	8		SR3-36			
33-1		J9-N	13	Y	8		SR3-37			
33-2		J9-P	13	Y	8		SR3-38			

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TDRR 17101 MAR 2 1965

CONDUCTOR		FROM			TO		
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.
34-1		J9-R	13Y	8	SR3-39		
34-2		J9-S	13Y	8	SR3-40		
35-1		J9-W	13Y	8	SR3-23		
35-2		J9-X	13Y	8	SR3-24		
35-3		J9-Y	13Y	8	SR3-21		
35-4		J9-Z	13Y	8	SR3-22		
36	12	J9-a	13Y	8	J9-b	13Y	8
37		J9-c	13Y	8	SR3-25		
38				10			
38-A		SHLD-38			E17		
38-1		J10-A	13Y	8	SR3-1		
38-2		J10-B	13Y	8	SR3-2		
38-3		J10-C	13Y	8	SR3-3		
39		J10-D	13Y	8	SR3-4		
40		J10-E	13Y	8	SR3-5		
41-1		J10-F	13Y	8	SR3-6		
41-2		J10-H	13Y	8	SR3-7		

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TDRR 17101 MAR 2 1965

CONDUCTOR		FROM			TO		
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.
42-1		J10-J	13Y	8	SR3-8		
42-2		J10-K	13Y	8	SR3-9		
43-1		J10-L	13Y	8	SR3-10		
43-2		J10-M	13Y	8	SR3-11		
44				10			
44-A		SHLD-44			E17		
44-1		J10-N	13Y	8	SR3-12		
44-2		J10-P	13Y	8	SR3-13		
44-3		J10-R	13Y	8	SR3-14		
45		J10-S	13Y	8	SR3-15		
46		J10-T	13Y	8	SR3-16		
47-1		J10-U	13Y	8	SR3-17		
47-2		J10-V	13Y	8	SR3-18		
48-1		J10-W	13Y	8	SR3-19		
48-2		J10-X	13Y	8	SR3-20		

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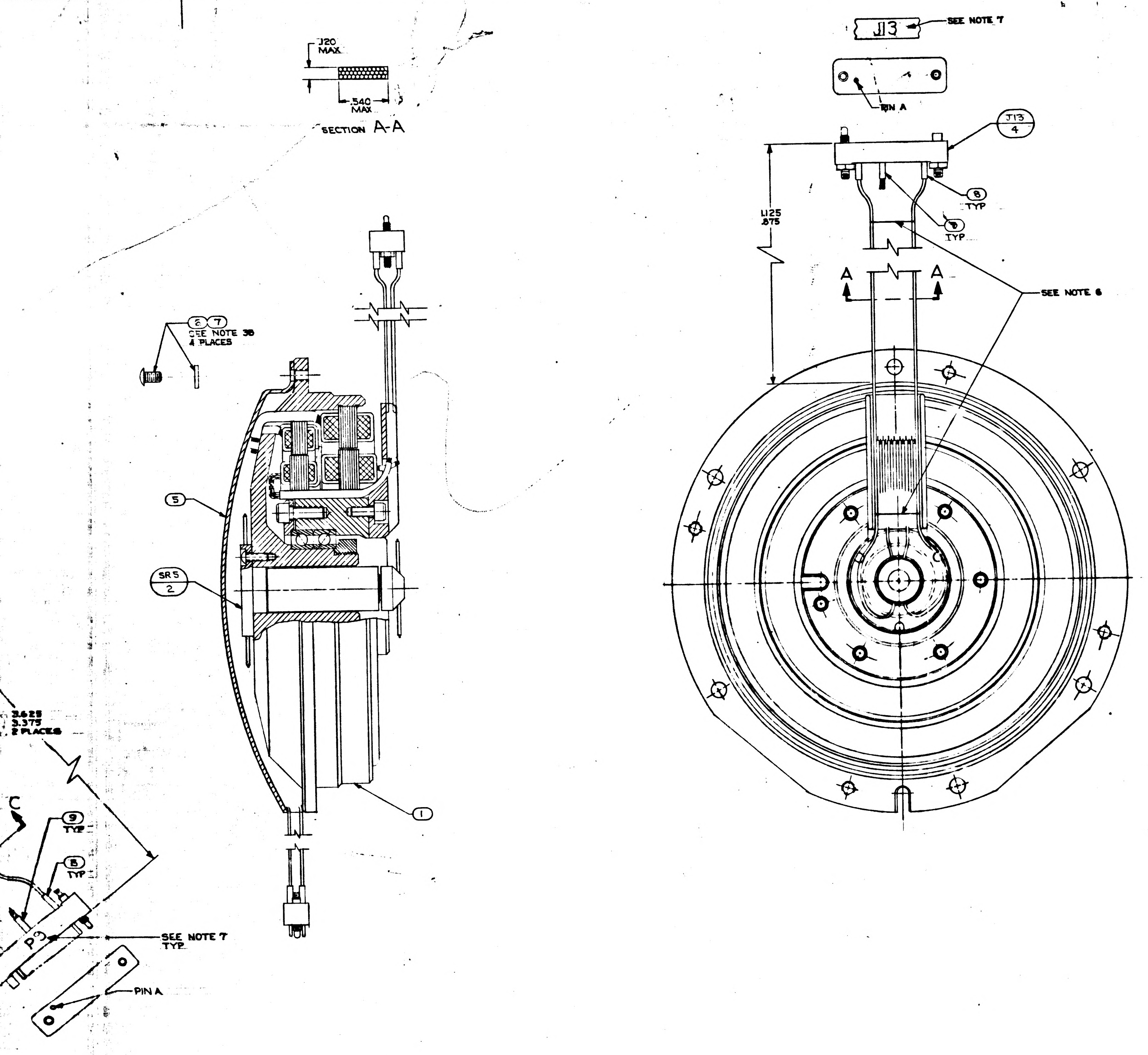
SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS TDRR 17101			
A	REVISED TDRR 17687	9 Mar 65		


.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13
4
8
TYP
9
TYP
1.125
.875
A
A
SEE NOTE 6
6
7
SEE NOTE 3B
4 PLACES
5
SR5
2
1
3.625
3.375
2 PLACES
C
9
TYP
8
TYP
P3
SEE NOTE 7
TYP
PIN A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010717-1	TERMINAL, LUG	14
1	1010416-1	WIRE AWG 28E BLK 3½" LONG	13
2	1010891-2	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	1000020-6	SHIELD & GROUND ASSY	11
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	10
17	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
57	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER FLAT METAL ROUND	7
4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	6
1	2018782	WIRE GUIDE, BRG HSG, I.A., RSVR	5
1	1000119-001	CONNECTOR, ELEC, RECEP, 34 PINS	4
2	1000123	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018634	SLIP, RING ASSY, ELEC, 40 CONTACT	2
1	2018608-011	RESOLVER ASSEMBLY INNER AXIS	1
011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018604	DL2018601
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DTB DATE 1/18/65
CHECKED G QUINN 2/24/65
APPROVAL 24 Feb 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2 Mar 65

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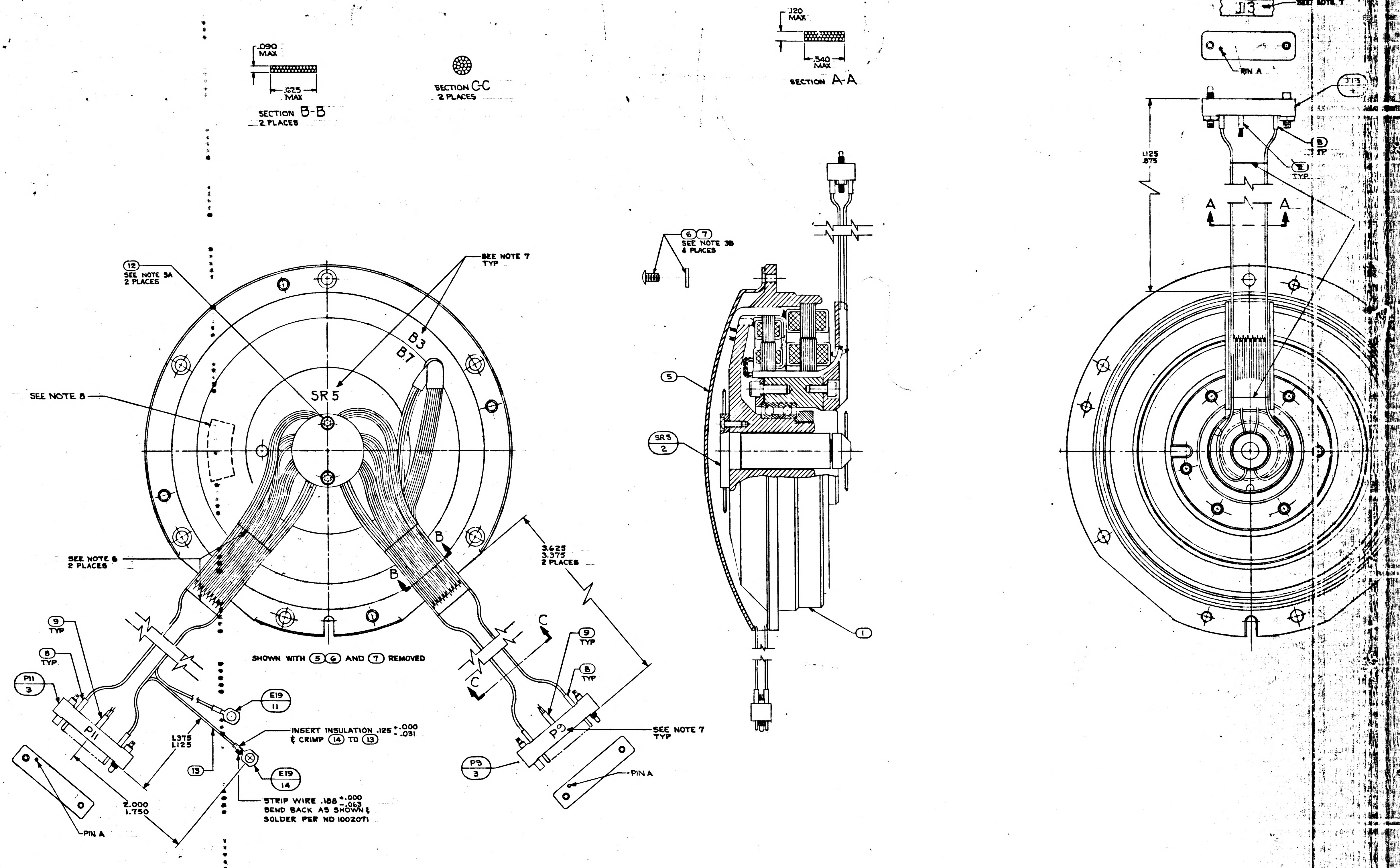
INTERGIMBAL SUB ASSEMBLY
RESOLVER INNER AXIS

CODE IDENT NO. SIZE J NASA DRAWING NO. 2018614
SCALE 2/1 WT SHEET 1 OF 7

2018614 A

2018614 REV A SHEET 1

F-12



.090 MAX
.625 MAX
SECTION B-B
2 PLACES
SECTION C-C
2 PLACES
.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13 4
8 TYP
8 TYP
1.125
.875
A
A
6 7
SEE NOTE 3B
4 PLACES
12
SEE NOTE 3A
2 PLACES
SEE NOTE 7
TYP
B3
B7
SR5
SEE NOTE 8
5
SR5 2
1
SEE NOTE 6
2 PLACES
B
B
3.625
3.375
2 PLACES
C
C
9 TYP
8 TYP
P11 3
P11
E19 11
1.375
1.125
INSERT INSULATION .125 +.000 -.031
& CRIMP 14 TO 13
13
E19 14
2.000
1.750
PIN A
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN &
SOLDER PER ND 1002071
SHOWN WITH 5 6 AND 7 REMOVED
9 TYP
8 TYP
P9
SEE NOTE 7
TYP
P9 3
PIN A

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS 2007203
3. SCREW TORQUE REQUIREMENTS ±7%
    A. 3.5 IN-LB
    B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071.
5. HEAT SHRINK SLEEVING ON ⑪ AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\genfrac{}{}{0pt}{}{.10}{.14}$ HIGH. COLOR BLACK AT LOCATION SHOWN PER ND 1002019.
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032.
12. SPARE LEADS TO BE EITHER 7.00 ±.12 LONG & TERMINATED NEAR $\frac{P9}{3}$ OR 4.00 ±.12 LONG AND TERMINATED NEAR $\frac{J13}{4}$ AFTER FOLDING BACK ON THEMSELVES. ENDS TO BE INSULATED BEFORE TIEING INTO CABLE.
13. DIMENSIONS ON SHEETS 2 THRU 7 ARE INCHES AND 2 PLACE DECIMALS
14. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"

21+

F-1

2018614	REV	SHEET
	A	1

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SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TO TERMINATION FIND NO.
1		P9-A	13Y	8	SR5-26		
2-1		P9-B	13Y	8	SR5-27		
2-2		P9-C	13Y	8	SR5-28		
3-1		P9-D	13Y	8	SR5-29		
3-2		P9-E	13Y	8	SR5-30		
4-1		P9-J	13Y	8	B3A-S3		
4-2		P9-K	13Y	8	B3A-S1		
5-1		P9-L	13Y	8	B3A-S2		
5-2		P9-M	13Y	8	B3A-S4		
6-1		P9-N	13Y	8	B3B-S3		
6-2		P9-P	13Y	8	B3B-S1		
7-1		P9-R	13Y	8	B3B-S2		
7-2		P9-S	13Y	8	B3B-S4		
8		P9-T	13Y	8	SR5-21		
9		P9-U	13Y	8	SR5-31		
10		P9-V	13Y	8	SR5-32		

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SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TO TERMINATION FIND NO.
11-1		P9-W	13Y	8	SR5-23		
11-2		P9-Y	13Y	8	B7-S3		
11-3		P9-a	13Y	9	B7-S1		
12-1		P9-a	13Y		B7-S4		
12-2		P9-Z	13Y	8	B7-S2		
12-3		P9-b	13Y	8	SR5-22		
12-4		P9-X	13Y	8	SR5-24		
13		P9-c	13Y	8	SR5-25		
14		P9-d	13Y	8	SR5-33		
15		P11-A	13Y	9	SR5-1		
16	13	P11-A	13Y		E19	19Y	14
17				11			
17A		SHLD-17			E19		
17-1		P11-B	13Y	9	SR5-2		
17-2		P11-B	13Y		SR5-3		
17-3		P11-D	13Y	9	SR5-4		
17-4		P11-D	13Y		SR5-5		

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TO TERMINATION FIND NO.
18-1		P11-F	13Y	9	SR5-6		
18-2		P11-F	13Y		SR5-7		
18-3		P11-J	13Y	9	SR5-8		
18-4		P11-J	13Y		SR5-9		
19		P11-L	13Y	8	SR5-10		
20		P11-M	13Y	8	SR5-11		
21		P11-N	13Y	8	SR5-12		
22		P11-P	13Y	8	SR5-13		
23-1		P11-R	13Y	8	SR5-14		
23-2		P11-S	13Y	8	SR5-15		
24		P11-T	13Y	8	SR5-16		
25-1		P11-U	13Y	8	SR5-17		
25-2		P11-V	13Y	8	SR5-18		
26		P11-W	13Y	8	SR5-19		
27		P11-X	13Y	8	SR5-20		

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CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TO TERMINATION FIND NO.
28		P13-A	13Y	8	SR5-1		
29-1		P13-B	13Y	9	SR5-2		
29-2		P13-B	13Y		SR5-3		
29-3		P13-D	13Y	9	SR5-4		
29-4		P13-D	13Y		SR5-5		
30		P13-C	13Y	8	SR5-35		
31		P13-E	13Y	8	SR5-36		
32-1		P13-F	13Y	9	SR5-6		
32-2		P13-F	13Y		SR5-7		
32-3		P13-J	13Y	9	SR5-8		
32-4		P13-J	13Y		SR5-9		
33		P13-H	13Y	8	SR5-37		

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SHEET 6 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T IN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T IN	TO TERMINATION SPEC FIND NO.	NO.
34-1			J13-K	13Y		9		B7-P4			
34-2			J13-AA	13Y		9		B7-P2			
34-3			J13-AA	13Y				SR5-23			
35-1			J13-K	13Y				B7-P1			
35-2			J13-BB	13Y		9		B7-P3			
35-3			J13-BB	13Y				SR5-24			
36			J13-L	13Y		8		SR5-10			
37			J13-M	13Y		8		SR5-11			
38			J13-N	13Y		8		SR5-12			
39			J13-P	13Y		8		SR5-13			
40-1			J13-R	13Y		8		SR5-14			
40-2			J13-S	13Y		8		SR5-15			
41			J13-T	13Y		8		SR5-16			
42-1			J13-U	13Y		8		SR5-17			
42-2			J13-V	13Y		8		SR5-18			
43			J13-W	13Y		8		SR5-19			
44			J13-X	13Y		8		SR5-20			

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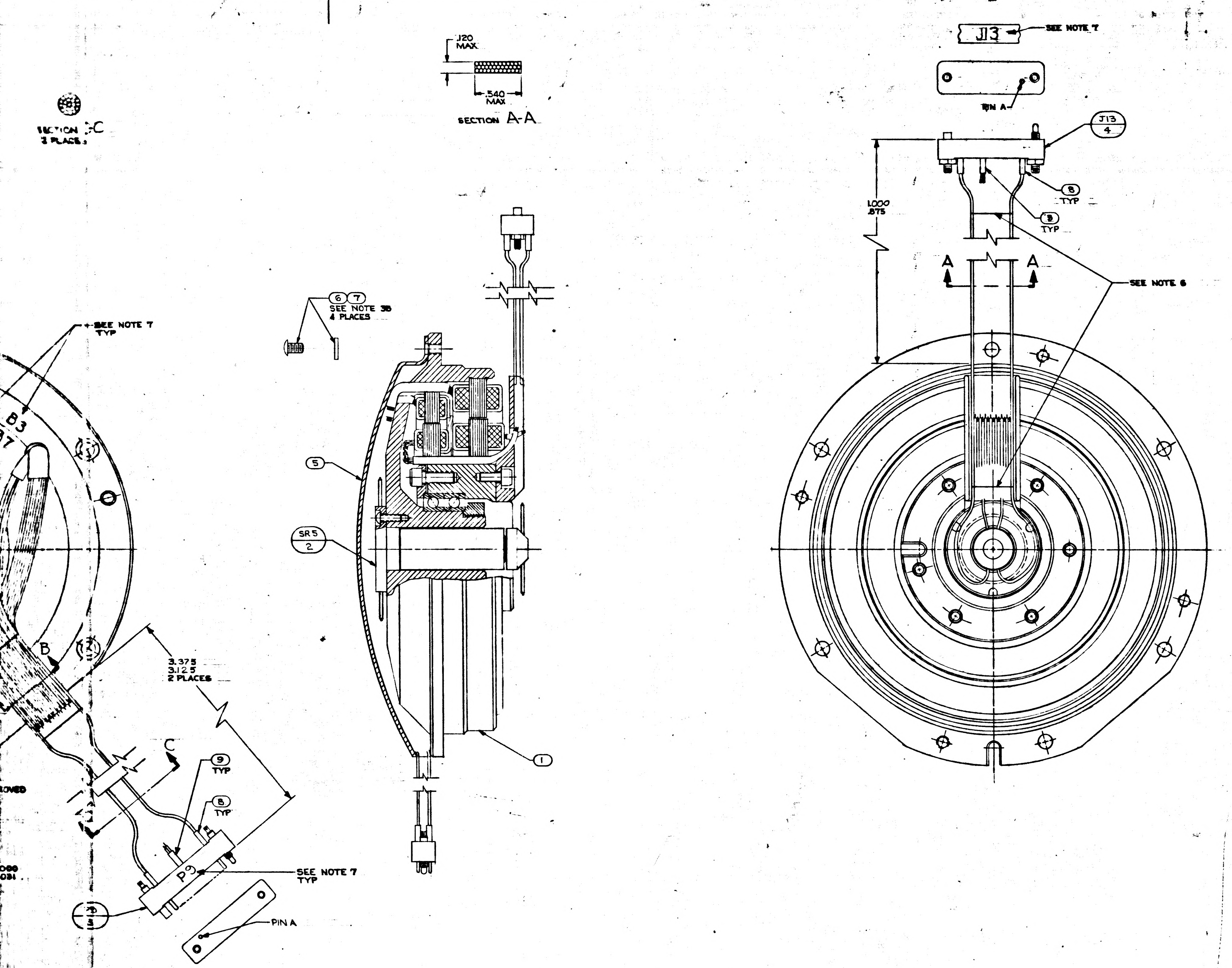
SHEET 7 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T IN	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T IN	TO TERMINATION SPEC FIND NO.	NO.
45			J13-Y	13Y		8		SR5-21			
46			J13-Z	13Y		8		SR5-22			
47			J13-CC	13Y		8		SR5-25			
48			J13-DD	13Y		8		SR5-26			
49-1			J13-EE	13Y		8		SR5-27			
49-2			J13-FF	13Y		9		SR5-28			
50-1			J13-EE	13Y				B3A-P3			
50-2			J13-FF	13Y				B3A-P1			
51-1			J13-HH	13Y		9		SR5-29			
51-2			J13-JJ	13Y		9		SR5-30			
52-1			J13-HH	13Y				B3A-P2			
52-2			J13-JJ	13Y				B3A-P4			
53			J13-KK	13Y		8		SR5-31			
54			J13-LL	13Y		8		SR5-32			
55			J13-MM	13Y		8		SR5-33			
56			J13-NN	13Y		8		SR5-34			

REVISIONS TDRR 17171			
SYM	DESCRIPTION	DATE	APP
A	REVISED TDRR 17687	10 Mar 65	
B	REVISED PER TDRR 19271	3 Nov 65	



J13
SEE NOTE 7
PIN A
J13
4
.120 MAX
.540 MAX
SECTION A-A
SECTION C-C
2 PLACES
1.000
.875
8
TYP
9
TYP
A
A
SEE NOTE 6
6
7
SEE NOTE 3B
4 PLACES
5
SR5
2
1
SEE NOTE 7
TYP
B3
B
3.375
3.125
2 PLACES
C
9
TYP
8
TYP
P9
SEE NOTE 7
TYP
P9
3
PIN A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010717-1	TERMINAL, LUG	14
1	1010416-1	WIRE AWG 28E BLK 3½" LONG	13
2	1010891-2	SCREW, BUTTON HD, SELF-LKG, SOC SPLIN	12
1	1000020-8	SHIELD & GROUND ASSY	11
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	10
17	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
57	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER FLAT METAL ROUND	7
4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	6
1	2018782	WIRE GUIDE, BRG HSG, I.A., RSVR	5
1	1000119-001	CONNECTOR, ELEC, RECEP, 34 PINS	4
2	1000123	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018634	SLIP, RING ASSY, ELEC, 40 CONTACT	2
1	2018608-011	RESOLVER ASSEMBLY INNER AXIS	1
011	LIST OF MATERIALS		

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DTB DATE 1/18/65
CHECKED G QUINN 2/24/65
APPROVAL 2/24/65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2/4/65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

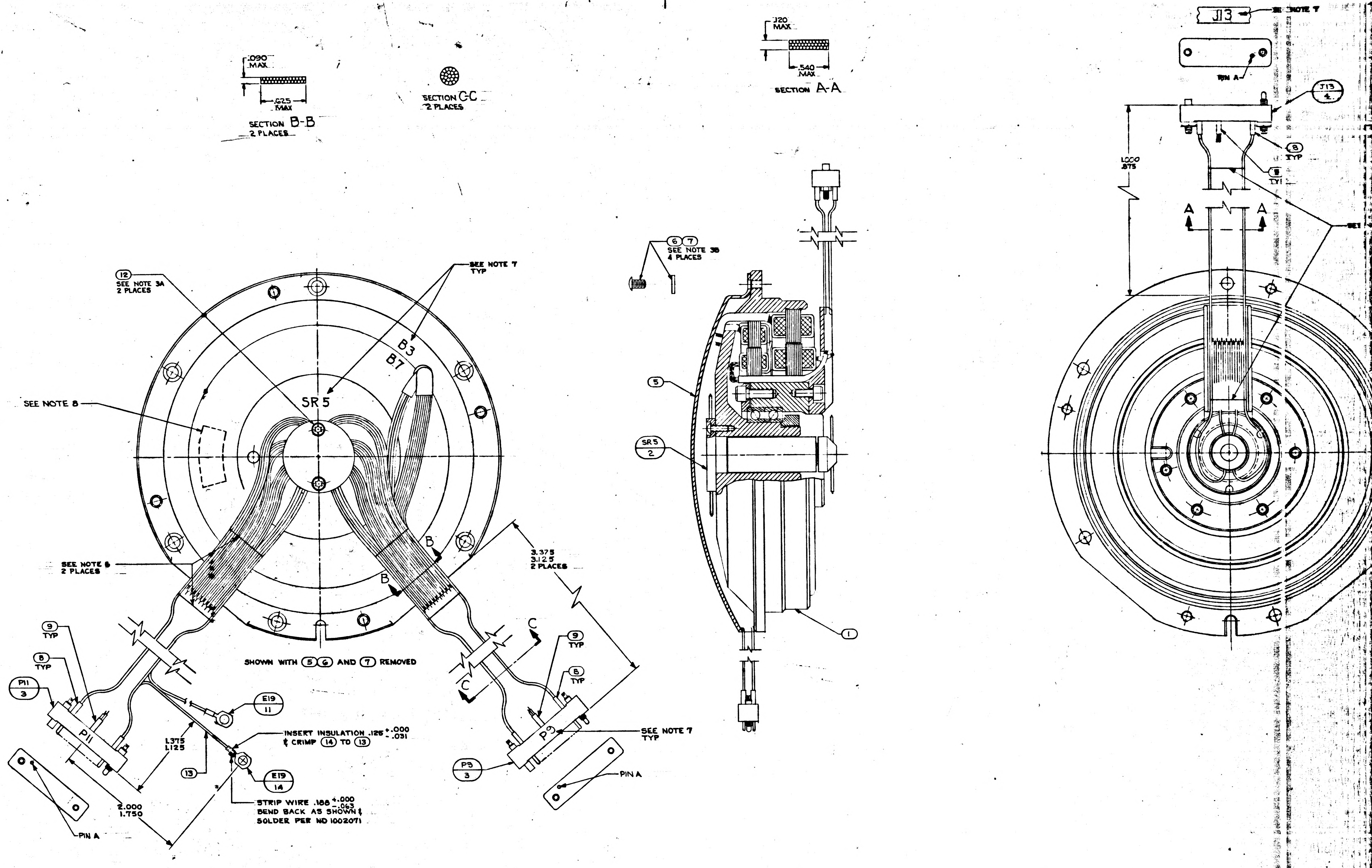
INTERGIMBAL SUB ASSEMBLY RESOLVER INNER AXIS

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018614
SCALE 2/1
WT
SHEET 1

2018614 B

2018614 REV B SHEET 1

MASTER


.090 MAX
.625 MAX
SECTION B-B
2 PLACES
SECTION C-C
2 PLACES
.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13 4
8 TYP
8 TYP
1.000 .875
A
A
12
SEE NOTE 3A
2 PLACES
SEE NOTE 7
TYP
B3
B7
SR5
SEE NOTE 8
6 7
SEE NOTE 3B
4 PLACES
5
SR5 2
1
SEE NOTE 6
2 PLACES
B
B
3.375
3.125
2 PLACES
C
C
9 TYP
8 TYP
P11 3
P11
SHOWN WITH (5) (6) AND (7) REMOVED
E19 11
INSERT INSULATION .125 +.000 -.031
& CRIMP (14) TO (13)
1.375
1.125
13
E19 14
2.000
1.750
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN &
SOLDER PER ND 1002071
PIN A
9 TYP
8 TYP
P9
SEE NOTE 7
TYP
P9 3
PIN A

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018614
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 3.5 IN-LB
   B. 5.0 IN-LB
4. SOLDER LEADS TO (3) & (4) PER ND 1002071
5. HEAT SHRINK SLEEVING ON (11) AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATION SHOWN PER ND 1002019.
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032.
12. SPARE LEADS TO BE EITHER 7.00 ± .12 LONG & TERMINATED NEAR (P9/3) OR 4.00 ± .12 LONG AND TERMINATED NEAR (J13/4) AFTER FOLDING BACK ON THEMSELVES. ENDS TO BE INSULATED BEFORE TIEING INTO CABLE.
13. DIMENSIONS ON SHEETS 2 THRU 7 ARE INCHES AND 2 PLACE DECIMALS
14. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"

21+

2018614	REV	SHEET
	B	1

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018614

SHEET 2 of 7

CONDUCTOR			FROM				TO			
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.	NO.
1			P9-A	13Y	8		SR5-26			
2-1			P9-B	13Y	8		SR5-27			
2-2			P9-C	13Y	8		SR5-28			
3-1			P9-D	13Y	8		SR5-29			
3-2			P9-E	13Y	8		SR5-30			
4-1			P9-J	13Y	8		B3A-S3			
4-2			P9-K	13Y	8		B3A-S1			
5-1			P9-L	13Y	8		B3A-S2			
5-2			P9-M	13Y	8		B3A-S4			
6-1			P9-N	13Y	8		B3B-S3			
6-2			P9-P	13Y	8		B3B-S1			
7-1			P9-R	13Y	8		B3B-S2			
7-2			P9-S	13Y	8		B3B-S4			
8			P9-T	13Y	8		SR5-21			
9			P9-U	13Y	8		SR5-31			
10			P9-V	13Y	8		SR5-32			

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018614

SHEET 3 of 7

CONDUCTOR			FROM				TO			
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.	NO.
11-1			P9-W	13Y	8		SR5-23			
11-2			P9-Y	13Y	8		B7-S3			
11-3			P9-a	13Y	9		B7-S1			
12-1			P9-a	13Y			B7-S4			
12-2			P9-Z	13Y	8		B7-S2			
12-3			P9-b	13Y	8		SR5-22			
12-4			P9-X	13Y	8		SR5-24			
13			P9-c	13Y	8		SR5-25			
14			P9-d	13Y	8		SR5-33			
15			P11-A	13Y	9		SR5-1			
16	13		P11-A	13Y			E19	19Y	14	
17					11					
17A			SHLD-17				E19			
17-1			P11-B	13Y	9		SR5-2			
17-2			P11-B	13Y			SR5-3			
17-3			P11-D	13Y	9		SR5-4			
17-4			P11-D	13Y			SR5-5			

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018614

SHEET 4 of 7

CONDUCTOR			FROM				TO			
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.	NO.
18-1			P11-F	13Y	9		SR5-6			
18-2			P11-F	13Y			SR5-7			
18-3			P11-J	13Y	9		SR5-8			
18-4			P11-J	13Y			SR5-9			
19			P11-L	13Y	8		SR5-10			
20			P11-M	13Y	8		SR5-11			
21			P11-N	13Y	8		SR5-12			
22			P11-P	13Y	8		SR5-13			
23-1			P11-R	13Y	8		SR5-14			
23-2			P11-S	13Y	8		SR5-15			
24			P11-T	13Y	8		SR5-16			
25-1			P11-U	13Y	8		SR5-17			
25-2			P11-V	13Y	8		SR5-18			
26			P11-W	13Y	8		SR5-19			
27			P11-X	13Y	8		SR5-20			

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION B

NASA DRAWING NO. 2018614

SHEET 5 of 7

CONDUCTOR			FROM				TO			
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TIN	TERMINATION SPEC FIND NO.	NO.
28			J13-A	13Y	8		SR5-1			
29-1			J13-B	13Y	9		SR5-2			
29-2			J13-B	13Y			SR5-3			
29-3			J13-D	13Y	9		SR5-4			
29-4			J13-D	13Y			SR5-5			
30			J13-C	13Y	8		SR5-35			
31			J13-E	13Y	8		SR5-36			
32-1			J13-F	13Y	9		SR5-6			
32-2			J13-F	13Y			SR5-7			
32-3			J13-J	13Y	9		SR5-8			
32-4			J13-J	13Y			SR5-9			
33			J13-H	13Y	8		SR5-37			

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION B

NASA DRAWING NO.
2018614
SHEET 6 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TO TERMINATION FIND NO.	SPEC	NO.
34-1		J13-K	13Y		9			B7-P4				
34-2		J13-AA	13Y		9			B7-P2				
34-3		J13-AA	13Y					SR5-23				
35-1		J13-K	13Y					B7-P1				
35-2		J13-BB	13Y		9			B7-P3				
35-3		J13-BB	13Y					SR5-24				
36		J13-L	13Y		8			SR5-10				
37		J13-M	13Y		8			SR5-11				
38		J13-N	13Y		8			SR5-12				
39		J13-P	13Y		8			SR5-13				
40-1		J13-R	13Y		8			SR5-14				
40-2		J13-S	13Y		8			SR5-15				
41		J13-T	13Y		8			SR5-16				
42-1		J13-U	13Y		8			SR5-17				
42-2		J13-V	13Y		8			SR5-18				
43		J13-W	13Y		8			SR5-19				
44		J13-X	13Y		8			SR5-20				

TDRR 17101 MAR 2 1965

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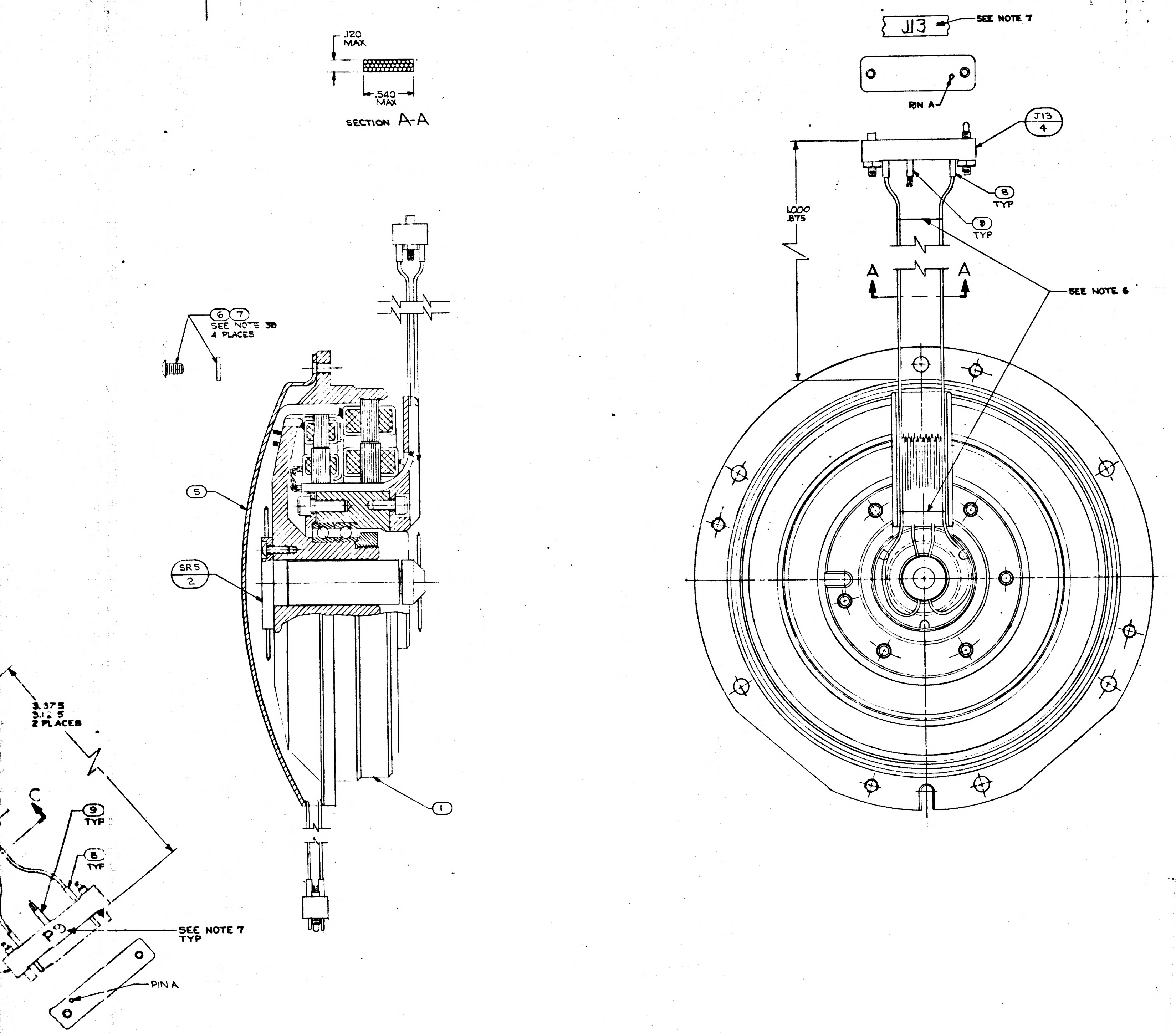
HOUSTON TEXAS

REVISION B

NASA DRAWING NO.
2018614
SHEET 7 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	SPEC	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TO TERMINATION FIND NO.	SPEC	NO.
45		J13-Y	13Y		8			SR5-21				
46		J13-Z	13Y		8			SR5-22				
47		J13-CC	13Y		8			SR5-25				
48		J13-DD	13Y		8			SR5-26				
49-1		J13-EE	13Y		8			SR5-27				
49-2		J13-FF	13Y		9			SR5-28				
50-1		J13-EE	13Y					B3A-P3				
50-2		J13-FF	13Y					B3A-P1				
51-1		J13-HH	13Y		9			SR5-29				
51-2		J13-JJ	13Y		9			SR5-30				
52-1		J13-HH	13Y					B3A-P2				
52-2		J13-JJ	13Y					B3A-P4				
53		J13-KK	13Y		8			SR5-31				
54		J13-LL	13Y		8			SR5-32				
55		J13-MM	13Y		8			SR5-33				
56		J13-NN	13Y		8			SR5-34				

SYM	DESCRIPTION	DATE	APPR	
REVISIONS TDRR 17101				
A	REVISED TDRR 17687	10 Mar 65		
B	REVISED PER TDRR 19271	25 Mar 65		
C	REVISED PER TDRR 20658	27 Jul 65		



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010416-3	WIRE AWG 28E RED 4" LONG	15
1	1010717-1	TERMINAL, LUG	14
1	1010416-1	WIRE AWG 28E BLK 7½" LONG	13
2	1010891-2	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	1000020-8	SHIELD & GROUND ASSY	11
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	10
21	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
55	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER FLAT METAL ROUND	7
4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	6
1	2018782	WIRE GUIDE, BRG HSG, I.A., RSVR	5
1	1000119-001	CONNECTOR, ELEC, RECEP, 34 PINS	4
2	1000123	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018634	SLIP, RING ASSY, ELEC, 40 CONTACT	2
1	2018608-011	RESOLVER ASSEMBLY INNER AXIS	1
011	LIST OF MATERIALS		

2018614 C

NEXT ASSY	USED ON
2018604	DL2018601
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG. NO. CONTRACT
DRAWN DTB DATE 1/18/65
CHECKED G QUINN 2/24/65
APPROVAL 24 Feb 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL W Kupfer 2 Mar 65

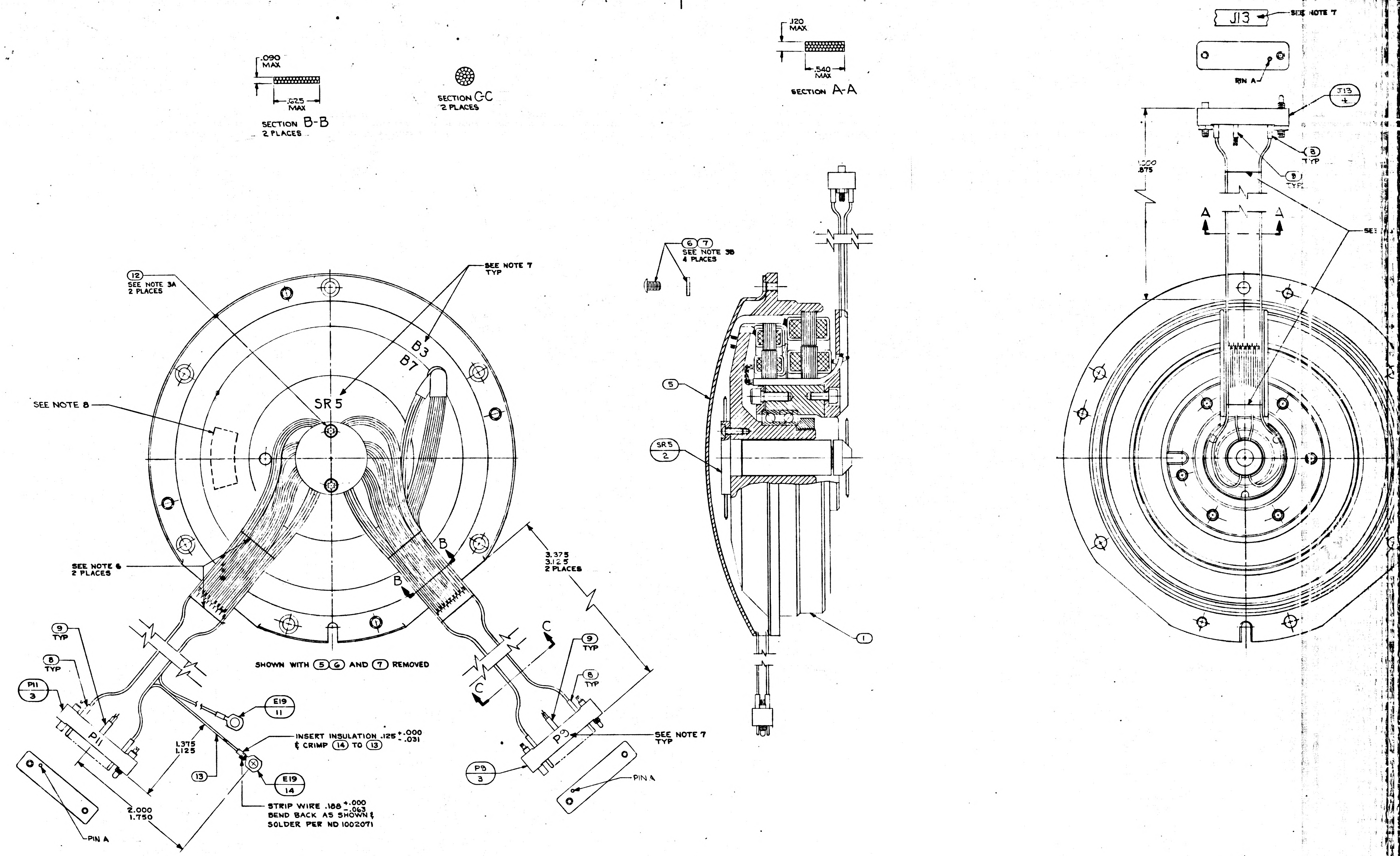
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB ASSEMBLY
RESOLVER INNER AXIS

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 2018614
SCALE 2/1 | WT | SHEET 1 OF 7

MASTER

2018614 | REV C | SHEET 1


.090 MAX
.625 MAX
SECTION B-B
2 PLACES
SECTION C-C
2 PLACES
.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13
4
8
TYP
9
TYP
1.000
.875
A
A
SEE
12
SEE NOTE 3A
2 PLACES
SEE NOTE 7
TYP
B3
B7
SR5
SEE NOTE 8
SEE NOTE 6
2 PLACES
B
B
3.375
3.125
2 PLACES
C
C
9
TYP
8
TYP
P11
3
P11
E19
11
1.375
1.125
INSERT INSULATION .125 +.000 -.031
& CRIMP 14 TO 13
13
E19
14
2.000
1.750
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN &
SOLDER PER ND 1002071
PIN A
SHOWN WITH 5 6 AND 7 REMOVED
9
TYP
8
TYP
P9
SEE NOTE 7
TYP
P9
3
PIN A
6 7
SEE NOTE 3B
4 PLACES
5
SR5
2
1

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018614
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 3.5 IN-LB
   B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑪ AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATION SHOWN PER ND 1002019.
8. IDENTIFY USING DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032.
12. SPARE LEADS TO BE EITHER 7.00 ± .12 LONG & TERMINATED NEAR $\frac{P9}{3}$ OR 4.00 ± .12 LONG AND TERMINATED NEAR $\frac{J13}{4}$ AFTER FOLDING BACK ON THEMSELVES. ENDS TO BE INSULATED BEFORE TIEING INTO CABLE.
13. DIMENSIONS ON SHEETS 2 THRU 7 ARE INCHES AND 2 PLACE DECIMALS
14. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"

21+

2018614	REV	SHEET
	C	1

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION C

NASA DRAWING NO. 2018614
SHEET 3 of 7

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.	NO.
11-1			P9-W	13	Y	8		SR5-23				
11-2			P9-Y	13	Y	8		B7-S3				
11-3			P9-a	13	Y	9		B7-S1				
12-1			P9-a	13	Y			B7-S4				
12-2			P9-Z	13	Y	8		B7-S2				
12-3			P9-b	13	Y	8		SR5-22				
12-4			P9-X	13	Y	8		SR5-24				
13			P9-c	13	Y	8		SR5-25				
14			P9-d	13	Y	8		SR5-33				
15			P11-A	13	Y	9		SR5-1				
16	13		P11-A	13	Y			E19	19	Y	14	
17						11						
17A			SHLD-17					E19				
17-1			P11-B	13	Y	8		SR5-2				
17-2			P11-C	13	Y	9		SR5-3				
17-3			P11-D	13	Y	8		SR5-4				
17-4			P11-E	13	Y	9		SR5-5				
17-5			P11-W	13	Y	9		SR5-19				
17-6			P11-X	13	Y	9		SR5-20				

I.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION C

NASA DRAWING NO. 2018614
SHEET 5 of 7

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.	NO.
28			J13-A	13	Y	8		SR5-1				
29-1			J13-B	13	Y	9		SR5-2				
29-2			J13-C	13	Y	9		SR5-3				
29-3			J13-D	13	Y	9		SR5-4				
29-4			J13-E	13	Y	9		SR5-5				
29-5			J13-W	13	Y	8		SR5-19				
29-6			J13-X	13	Y	8		SR5-20				
30	15		J13-B	13	Y			J13-C	13	Y		
31	13		J13-D	13	Y			J13-E	13	Y		
32-1			J13-F	13	Y	9		SR5-6				
32-2			J13-F	13	Y			SR5-7				
32-3			J13-J	13	Y	9		SR5-8				
32-4			J13-J	13	Y			SR5-9				
33			J13-H	13	Y	8		SR5-37				

TDRR 17101 MAR 2 1965

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HOUSTON TEXAS

REVISION C

NASA DRAWING NO. 2018614
SHEET 2 of 7

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.	NO.
1			P9-A	13	Y	8		SR5-26				
2-1			P9-B	13	Y	8		SR5-27				
2-2			P9-C	13	Y	8		SR5-28				
3-1			P9-D	13	Y	8		SR5-29				
3-2			P9-E	13	Y	8		SR5-30				
4-1			P9-J	13	Y	8		B3A-S3				
4-2			P9-K	13	Y	8		B3A-S1				
5-1			P9-L	13	Y	8		B3A-S2				
5-2			P9-M	13	Y	8		B3A-S4				
6-1			P9-N	13	Y	8		B3B-S3				
6-2			P9-P	13	Y	8		B3B-S1				
7-1			P9-R	13	Y	8		B3B-S2				
7-2			P9-S	13	Y	8		B3B-S4				
8			P9-T	13	Y	8		SR5-21				
9			P9-U	13	Y	8		SR5-31				
10			P9-V	13	Y	8		SR5-32				

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HOUSTON TEXAS

REVISION C

NASA DRAWING NO. 2018614
SHEET 4 of 7

CONDUCTOR			FROM					TO				
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TIN	TERMINATION SPEC FIND NO.	NO.
18-1			P11-F	13	Y	9		SR5-6				
18-2			P11-F	13	Y			SR5-7				
18-3			P11-J	13	Y	9		SR5-8				
18-4			P11-J	13	Y			SR5-9				
19			P11-L	13	Y	8		SR5-10				
20			P11-M	13	Y	8		SR5-11				
21			P11-N	13	Y	8		SR5-12				
22			P11-P	13	Y	8		SR5-13				
23-1			P11-R	13	Y	8		SR5-14				
23-2			P11-S	13	Y	8		SR5-15				
24			P11-T	13	Y	8		SR5-16				
25-1			P11-U	13	Y	8		SR5-17				
25-2			P11-V	13	Y	8		SR5-18				
26	15		P11-C	13	Y			P11-W	13	Y		
27	13		P11-E	13	Y			P11-X	13	Y		

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REVISION C

NASA DRAWING NO. 2018614
SHEET 6 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
34-1			J13-K	13Y	9		B7-P4			
34-2			J13-AA	13Y	9		B7-P2			
34-3			J13-AA	13Y			SR5-23			
35-1			J13-K	13Y			B7-P1			
35-2			J13-BB	13Y	9		B7-P3			
35-3			J13-BB	13Y			SR5-24			
36			J13-L	13Y	8		SR5-10			
37			J13-M	13Y	8		SR5-11			
38			J13-N	13Y	8		SR5-12			
39			J13-P	13Y	8		SR5-13			
40-1			J13-R	13Y	8		SR5-14			
40-2			J13-S	13Y	8		SR5-15			
41			J13-T	13Y	8		SR5-16			
42-1			J13-U	13Y	8		SR5-17			
42-2			J13-V	13Y	8		SR5-18			
[illegible]			[illegible]	[illegible]	[illegible]		[illegible]			
[illegible]			[illegible]	[illegible]	[illegible]		[illegible]			

TDRR 17101 MAR 2 1965

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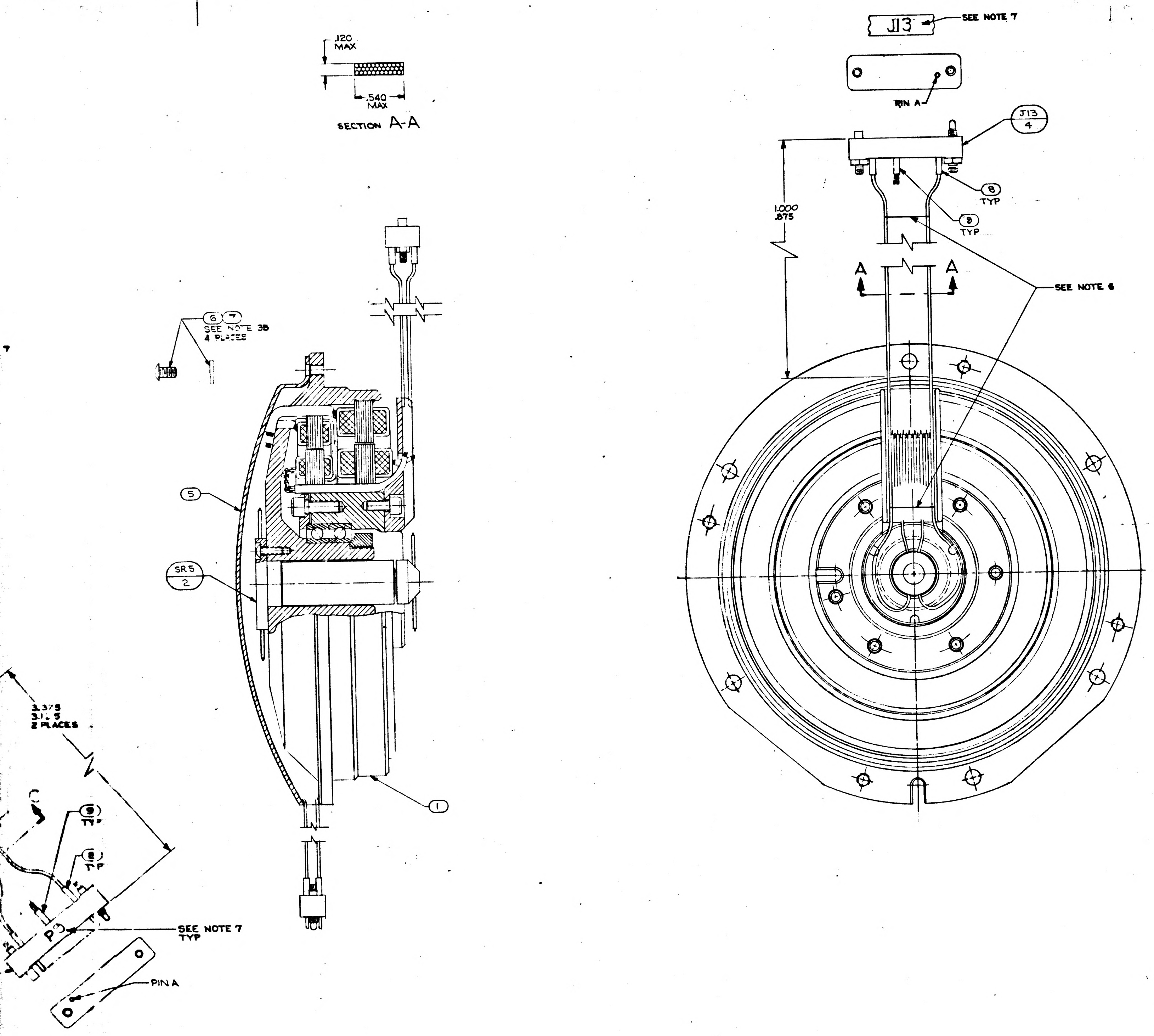
REVISION C

NASA DRAWING NO. 2018614
SHEET 7 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
45			J13-Y	13Y	8		SR5-21			
46			J13-Z	13Y	8		SR5-22			
47			J13-CC	13Y	8		SR5-25			
48			J13-DD	13Y	8		SR5-26			
49-1			J13-EE	13Y	8		SR5-27			
49-2			J13-FF	13Y	9		SR5-28			
50-1			J13-EE	13Y			B3A-P3			
50-2			J13-FF	13Y			B3A-P1			
51-1			J13-HH	13Y	9		SR5-29			
51-2			J13-JJ	13Y	9		SR5-30			
52-1			J13-HH	13Y			B3A-P2			
52-2			J13-JJ	13Y			B3A-P4			
53			J13-KK	13Y	8		SR5-31			
54			J13-LL	13Y	8		SR5-32			
55			J13-MM	13Y	8		SR5-33			
56			J13-NN	13Y	8		SR5-34			



			REVISIONS TDRR 17101
SYM	DESCRIPTION	DATE	APPR
A	REVISED TDRR 17687	18 Mar 65	WK
B	REVISED PER TDRR 19271	25 Mar 65	WK
C	REVISED PER TDRR 20658	27 ... 65	WK
D	REVISED PER TDRR 21683	3 ... 65	WK
E	REVISED PER TDRR 21678	3 ... 65	WK

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010416-3	WIRE AWG 28E RED 4" LONG	15
1	1010717-1	TERMINAL, LUG	14
1	1010416-1	WIRE AWG 28E BLK 7½" LONG	13
2	1010891-2	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	1000020-12	SHIELD & GROUND ASSY	11
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	10
21	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
55	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER FLAT METAL ROUND	7
4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	6
1	2018782	WIRE GUIDE, BRG HSG, I.A., RSVR	5
1	1010917-108	CONNECTOR, ELEC, RECEP, 34 PINS	4
2	1010917-806	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018634	SLIP, RING ASSY, ELEC, 40 CONTACT	2
1	2018608-011	RESOLVER ASSEMBLY INNER AXIS	1
011	LIST OF MATERIALS		

2018614 E

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO. CONTRACT
DRAWN DTB DATE 1/18/65
CHECKED G QUINN 2/24/65
APPROVAL 24 Feb 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

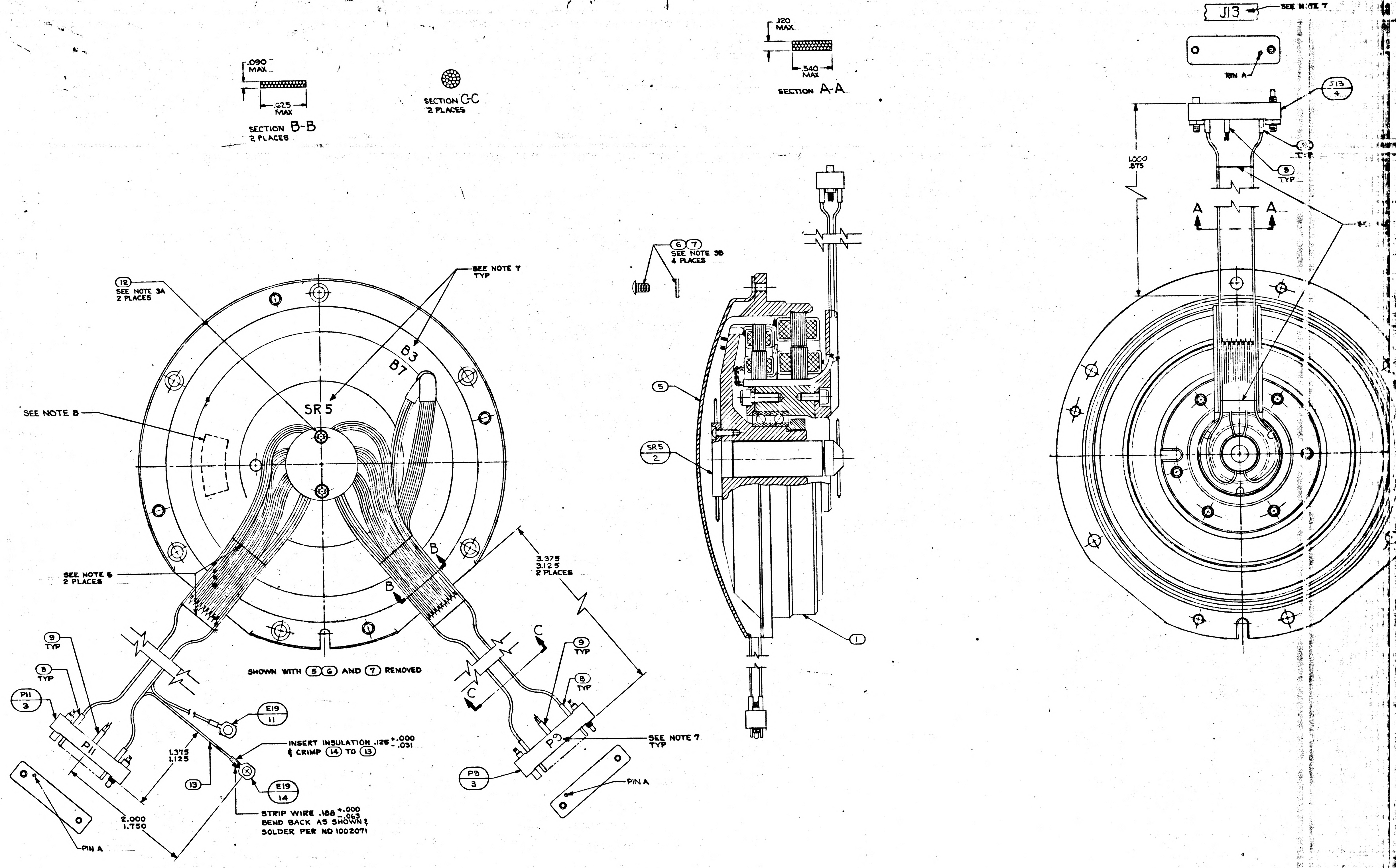
INTERGIMBAL SUB ASSEMBLY RESOLVER INNER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018614
SCALE 2/1
WT
SHEET 1 OF 7

MASTER

F-2

2018614 REV E SHEET 1


.090
MAX
.025
MAX
SECTION B-B
2 PLACES
SECTION C-C
2 PLACES
.120
MAX
.540
MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13
4
1.000
.875
9
TYP
A
A
12
SEE NOTE 3A
2 PLACES
SEE NOTE 7
TYP
B3
B7
SR5
SEE NOTE 8
SEE NOTE 6
2 PLACES
B
B
3.375
3.125
2 PLACES
C
C
6
7
SEE NOTE 3B
4 PLACES
5
SR5
2
1
SHOWN WITH 5 6 AND 7 REMOVED
9
TYP
8
TYP
P11
3
P11
E19
11
1.375
1.125
INSERT INSULATION .125 +.000 -.031
& CRIMP 14 TO 13
13
E19
14
2.000
1.750
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN &
SOLDER PER ND 1002071
PIN A
9
TYP
8
TYP
P9
SEE NOTE 7
TYP
P9
3
PIN A

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018614
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 3.5 IN-LB
   B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑪ AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATION SHOWN PER ND 1002019.
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032.
12. SPARE LEADS TO BE EITHER 7.00 ±.12 LONG & TERMINATED NEAR P9/3 OR 4.00 ±.12 LONG AND TERMINATED NEAR J13/4 AFTER FOLDING BACK ON THEMSELVES. ENDS TO BE INSULATED BEFORE TIEING INTO CABLE.
13. DIMENSIONS ON SHEETS 2 THRU 7 ARE INCHES AND 2 PLACE DECIMALS
14. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
   A = SHIELD GROUND ON "FROM END"
   B = SHIELD GROUND ON "TO END"

21+

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION C

NASA DRAWING NO. 2018614
SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION FIND NO.
1		P9-A	13Y	8	SR5-26		
2-1		P9-B	13Y	8	SR5-27		
2-2		P9-C	13Y	8	SR5-28		
3-1		P9-D	13Y	8	SR5-29		
3-2		P9-E	13Y	8	SR5-30		
4-1		P9-J	13Y	8	B3A-S3		
4-2		P9-K	13Y	8	B3A-S1		
5-1		P9-L	13Y	8	B3A-S2		
5-2		P9-M	13Y	8	B3A-S4		
6-1		P9-N	13Y	8	B3B-S3		
6-2		P9-P	13Y	8	B3B-S1		
7-1		P9-R	13Y	8	B3B-S2		
7-2		P9-S	13Y	8	B3B-S4		
8		P9-T	13Y	8	SR5-21		
9		P9-U	13Y	8	SR5-31		
10		P9-V	13Y	8	SR5-32		

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REVISION C

NASA DRAWING NO. 2018614
SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION FIND NO.
11-1		P9-W	13Y	8	SR5-23		
11-2		P9-Y	13Y	8	B7-S3		
11-3		P9-a	13Y	9	B7-S1		
12-1		P9-a	13Y		B7-S2		
12-2		P9-Z	13Y	8	B7-S4		
12-3		P9-b	13Y	8	SR5-22		
12-4		P9-X	13Y	8	SR5-24		
13		P9-c	13Y	8	SR5-25		
14		P9-d	13Y	8	SR5-33		
15		P11-A	13Y	9	SR5-1		
16	13	P11-A	13Y		E19	19Y	14
17				11			
17A		SHLD-17			E19		
17-1		P11-B	13Y	8	SR5-2		
17-2		P11-C	13Y	9	SR5-3		
17-3		P11-D	13Y	8	SR5-4		
17-4		P11-E	13Y	9	SR5-5		
17-5		P11-W	13Y	9	SR5-19		
17-6		P11-X	13Y	9	SR5-20		

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REVISION C

NASA DRAWING NO. 2018614
SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION FIND NO.
18-1		P11-F	13Y	9	SR5-6		
18-2		P11-F	13Y		SR5-7		
18-3		P11-J	13Y	9	SR5-8		
18-4		P11-J	13Y		SR5-9		
19		P11-L	13Y	8	SR5-10		
20		P11-M	13Y	8	SR5-11		
21		P11-N	13Y	8	SR5-12		
22		P11-P	13Y	8	SR5-13		
23-1		P11-R	13Y	8	SR5-14		
23-2		P11-S	13Y	8	SR5-15		
24		P11-T	13Y	8	SR5-16		
25-1		P11-U	13Y	8	SR5-17		
25-2		P11-V	13Y	8	SR5-18		
26	15	P11-C	13Y		P11-W	13Y	
27	13	P11-E	13Y		P11-X	13Y	

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REVISION C

NASA DRAWING NO. 2018614
SHEET 6 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION FIND NO.
34-1		J13-K	13Y	9	B7-P2		
34-2		J13-AA	13Y	9	B7-P4		
34-3		J13-AA	13Y		SR5-23		
35-1		J13-K	13Y		B7-P1		
35-2		J13-BB	13Y	9	B7-P3		
35-3		J13-BB	13Y		SR5-24		
36		J13-L	13Y	8	SR5-10		
37		J13-M	13Y	8	SR5-11		
38		J13-N	13Y	8	SR5-12		
39		J13-P	13Y	8	SR5-13		
40-1		J13-R	13Y	8	SR5-14		
40-2		J13-S	13Y	8	SR5-15		
41		J13-T	13Y	8	SR5-16		
42-1		J13-U	13Y	8	SR5-17		
42-2		J13-V	13Y	8	SR5-18		
[illegible]		[illegible]	[illegible]	8	[illegible]		
[illegible]		[illegible]	[illegible]	8	[illegible]		

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REVISION
C

NASA DRAWING NO.
2018614
SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/I/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/I/N	TO TERMINATION SPEC FIND NO.
28		J13-A	13Y	8	SR5-1		
29-1		J13-B	13Y	9	SR5-2		
29-2		J13-C	13Y	9	SR5-3		
29-3		J13-D	13Y	9	SR5-4		
29-4		J13-E	13Y	9	SR5-5		
29-5		J13-W	13Y	8	SR5-19		
29-6		J13-X	13Y	8	SR5-20		
30	15	J13-B	13Y		J13-C	13Y	
31	13	J13-D	13Y		J13-E	13Y	
32-1		J13-F	13Y	9	SR5-6		
32-2		J13-F	13Y		SR5-7		
32-3		J13-J	13Y	9	SR5-8		
32-4		J13-J	13Y		SR5-9		
33		J13-H	13Y	8	SR5-37		

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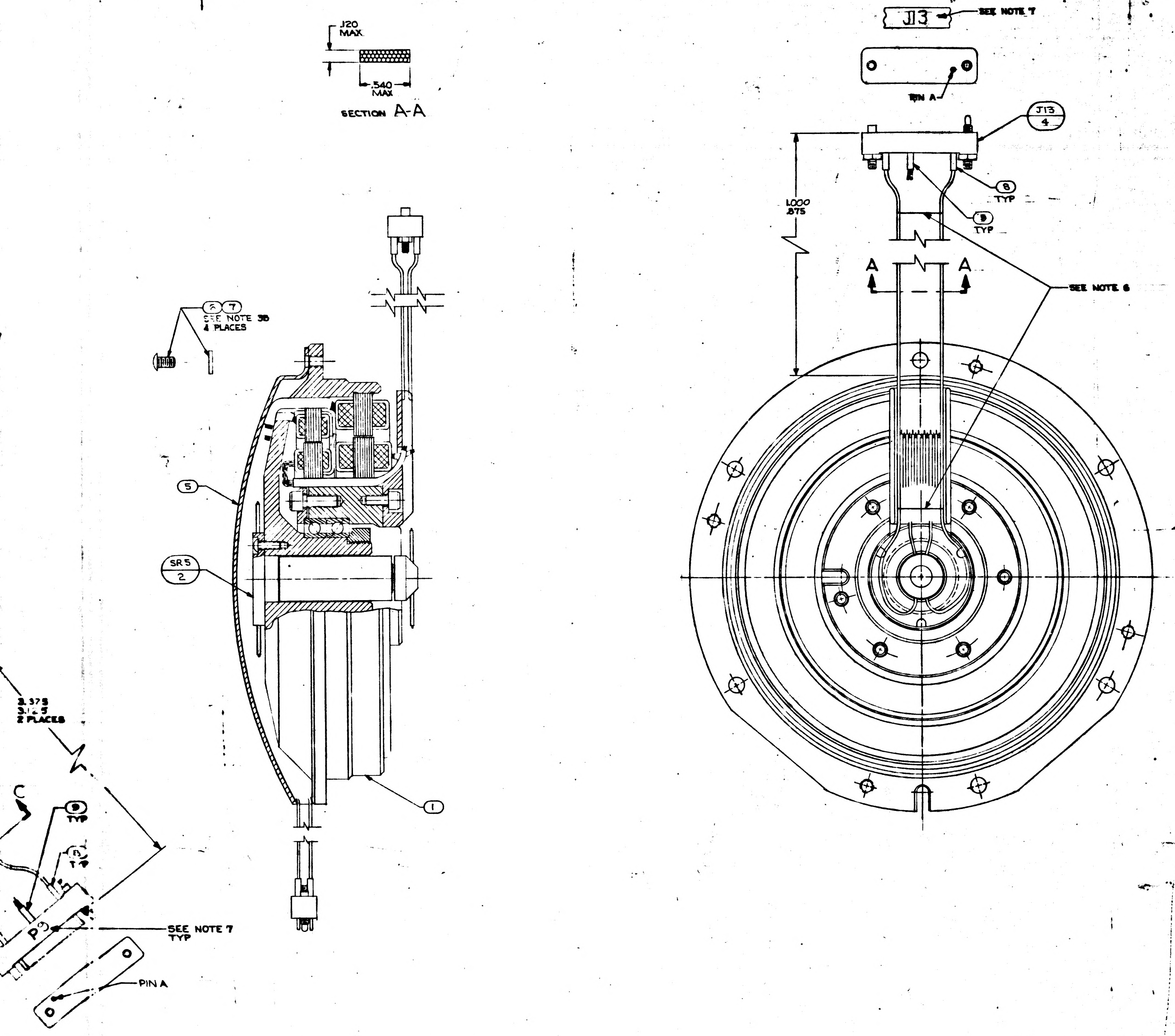
NASA DRAWING NO.
2018614
SHEET 7 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/I/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/I/N	TO TERMINATION SPEC FIND NO.
45		J13-Y	13Y	8	SR5-21		
46		J13-Z	13Y	8	SR5-22		
47		J13-CC	13Y	8	SR5-25		
48		J13-DD	13Y	8	SR5-26		
49-1		J13-EE	13Y	8	SR5-27		
49-2		J13-FF	13Y	9	SR5-28		
50-1		J13-EE	13Y		B3A-P3		
50-2		J13-FF	13Y		B3A-P1		
51-1		J13-HH	13Y	9	SR5-29		
51-2		J13-JJ	13Y	9	SR5-30		
52-1		J13-HH	13Y		B3A-P2		
52-2		J13-JJ	13Y		B3A-P4		
53		J13-KK	13Y	8	SR5-31		
54		J13-LL	13Y	8	SR5-32		
55		J13-MM	13Y	8	SR5-33		
56		J13-NN	13Y	8	SR5-34		



REVISIONS TDRR 17101

SYM	DESCRIPTION	DATE	APPR	
A	REVISED TDRR 17687			WK
B	REVISED PER TDRR 19871	65		WK
C	REVISED PER TDRR 20658	27 Dec 65		WK
D	REVISED PER TDRR 21683	31 Aug 65		WK
E	REVISED PER TDRR 21678	31 Aug 65		WK
F	REVISED TDRR 23042			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010416-3	WIRE AWG 28E RED 4" LONG	15
1	1010717-1	TERMINAL, LUG	14
1	1010416-1	WIRE AWG 28E BLK 7½" LONG	13
2	1010891-2	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	1000020-12	SHIELD & GROUND ASSY	11
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	10
21	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
55	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER FLAT METAL ROUND	7
4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	6
1	2018782	WIRE GUIDE, BRG HSG, I.A., RSVR	5
1	1010917-108	CONNECTOR, ELEC, RECEP, 34 PINS	4
2	1010917-806	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018634	SLIP, RING ASSY, ELEC, 40 CONTACT	2
1	2018608-011	RESOLVER ASSEMBLY INNER AXIS	1

011 LIST OF MATERIALS

NEXT ASSY	USED ON
2018604	DL2018001

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN DTB DATE 1/18/65
CHECKED G QUINN 2/24/65
APPROVAL 2/26/65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2/26/65

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HOUSTON, TEXAS

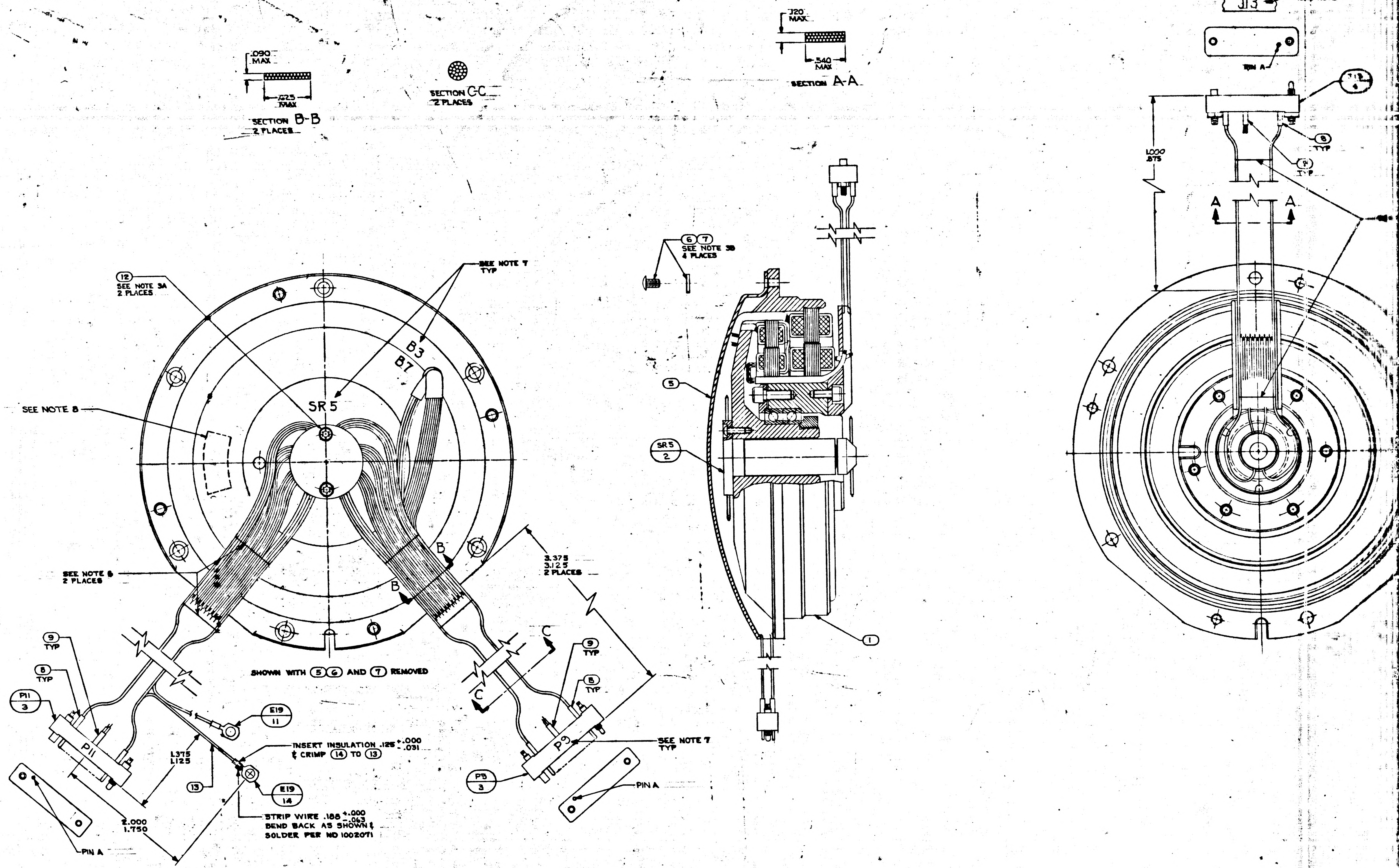
INTERGIMBAL SUB ASSEMBLY
RESOLVER INNER AXIS

CODE IDENT NO. 80230 SIZE J NASA DRAWING NO. 2018614
SCALE 2/1 WT SHEET 1 OF 7

2018614 F

2018614 REV F SHEET 1

MASTER


.090 MAX
.625 MAX
SECTION B-B
2 PLACES
SECTION C-C
2 PLACES
.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13
4
8
TYP
9
TYP
1.000
.875
A
A
6 7
SEE NOTE 3B
4 PLACES
5
SR5
2
1
12
SEE NOTE 3A
2 PLACES
SEE NOTE 7
TYP
B3
B7
SR5
SEE NOTE 8
SEE NOTE 6
2 PLACES
B
B
3.375
3.125
2 PLACES
C
C
SHOWN WITH 5 6 AND 7 REMOVED
9
TYP
8
TYP
P11
3
P11
E19
11
INSERT INSULATION .125 +.000 -.031
& CRIMP 14 TO 13
1.375
1.125
13
E19
14
2.000
1.750
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN &
SOLDER PER ND 1002071
PIN A
9
TYP
8
TYP
P9
SEE NOTE 7
TYP
P9
3
PIN A

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018614
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
4. SOLDER LEADS TO (3) & (4) PER ND 1002071
5. HEAT SHRINK SLEEVING ON (11) AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATION SHOWN PER ND 1002019.
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032.
12. SPARE LEADS TO BE EITHER 7.00 ±.12 LONG & TERMINATED NEAR (P9/3) OR 4.00 ±.12 LONG AND TERMINATED NEAR (J13/4) AFTER FOLDING BACK ON THEMSELVES. ENDS TO BE INSULATED BEFORE TIEING INTO CABLE.
13. DIMENSIONS ON SHEETS 2 THRU 7 ARE INCHES AND 2 PLACE DECIMALS
14. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"

21+

2018614	REV F	SHEET 1

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614

SHEET 2 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM STRIP / T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO STRIP / T/N	TO TERMINATION SPEC FIND NO.	TO NO.
1			P9-A	13Y	8		SR5-26			
2-1			P9-B	13Y	8		SR5-27			
2-2			P9-C	13Y	8		SR5-28			
3-1			P9-D	13Y	8		SR5-29			
3-2			P9-E	13Y	8		SR5-30			
4-1			P9-J	13Y	8		B3A-S3			
4-2			P9-K	13Y	8		B3A-S1			
5-1			P9-L	13Y	8		B3A-S2			
5-2			P9-M	13Y	8		B3A-S4			
6-1			P9-N	13Y	8		B3B-S3			
6-2			P9-P	13Y	8		B3B-S1			
7-1			P9-R	13Y	8		B3B-S2			
7-2			P9-S	13Y	8		B3B-S4			
8			P9-T	13Y	8		SR5-21			
9			P9-U	13Y	8		SR5-31			
10			P9-V	13Y	8		SR5-32			

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614

SHEET 3 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM STRIP / T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO STRIP / T/N	TO TERMINATION SPEC FIND NO.	TO NO.
11-1			P9-W	13Y	8		SR5-23			
11-2			P9-Y	13Y	8		B7-S3			
11-3			P9-a	13Y	9		B7-S1			
12-1			P9-a	13Y			B7-S2			
12-2			P9-Z	13Y	8		B7-S4			
12-3			P9-b	13Y	8		SR5-22			
12-4			P9-X	13Y	8		SR5-24			
13			P9-c	13Y	8		SR5-25			
14			P9-d	13Y	8		SR5-33			
15			P11-A	13Y	9		SR5-1			
16	13		P11-A	13Y			E19	19Y	14	
17					11					
17A			SHLD-17				E19			
17-1			P11-B	13Y	8		SR5-2			
17-2			P11-C	13Y	9		SR5-3			
17-3			P11-D	13Y	8		SR5-4			
17-4			P11-E	13Y	9		SR5-5			
17-5			P11-W	13Y	9		SR5-19			
17-6			P11-X	13Y	9		SR5-20			

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I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614

SHEET 4 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM STRIP / T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO STRIP / T/N	TO TERMINATION SPEC FIND NO.	TO NO.
18-1			P11-F	13Y	9		SR5-6			
18-2			P11-F	13Y			SR5-7			
18-3			P11-J	13Y	9		SR5-8			
18-4			P11-J	13Y			SR5-9			
19			P11-L	13Y	8		SR5-10			
20			P11-M	13Y	8		SR5-11			
21			P11-N	13Y	8		SR5-12			
22			P11-P	13Y	8		SR5-13			
23-1			P11-R	13Y	8		SR5-14			
23-2			P11-S	13Y	8		SR5-15			
24			P11-T	13Y	8		SR5-16			
25-1			P11-U	13Y	8		SR5-17			
25-2			P11-V	13Y	8		SR5-18			
26	15		P11-C	13Y			P11-[illegible]	13Y		
27	13		P11-K	13Y			P11-X	13Y		

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614

SHEET [illegible] of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	FROM STRIP / T/N	FROM TERMINATION SPEC FIND NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	TO STRIP / T/N	TO TERMINATION SPEC FIND NO.	TO NO.
28			J13-A	13Y	8		SR5-1			
29-1			J13-B	13Y	9		SR5-2			
29-2			J13-C	13Y	9		SR5-3			
29-3			J13-D	13Y	9		SR5-4			
29-4			J13-E	13Y	9		SR5-5			
29-5			J13-W	13Y	8		SR5-19			
29-6			J13-X	13Y	8		SR5-20			
30	15		J13-B	13Y			J13-C	13Y		
31	13		J13-D	13Y			J13-E	13Y		
32-1			J13-F	13Y	9		SR5-6			
32-2			J13-F	13Y			SR5-7			
32-3			J13-J	13Y	9		SR5-8			
32-4			J13-J	13Y			SR5-9			
33			J13-H	13Y	8		SR5-37			

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614

SHEET 6 of 7

CONDUCTOR		FROM				TO		
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TERMINATION SPEC FIND NO.	NO.
34-1		J13-K	13Y	9		B7-P2		
34-2		J13-AA	13Y	9		B7-P4		
34-3		J13-AA	13Y			SR5-23		
35-1		J13-K	13Y			B7-P1		
35-2		J13-BB	13Y	9		B7-P3		
35-3		J13-BB	13Y			SR5-24		
36		J13-L	13Y	8		SR5-10		
37		J13-M	13Y	8		SR5-11		
38		J13-N	13Y	8		SR5-12		
39		J13-P	13Y	8		SR5-13		
40-1		J13-R	13Y	8		SR5-14		
40-2		J13-S	13Y	8		SR5-15		
41		J13-T	13Y	8		SR5-16		
42-1		J13-U	13Y	8		SR5-17		
42-2		J13-V	13Y	8		SR5-18		
[illegible]		[illegible]	[illegible]	[illegible]		[illegible]		
[illegible]		[illegible]	[illegible]	[illegible]		[illegible]		

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION F

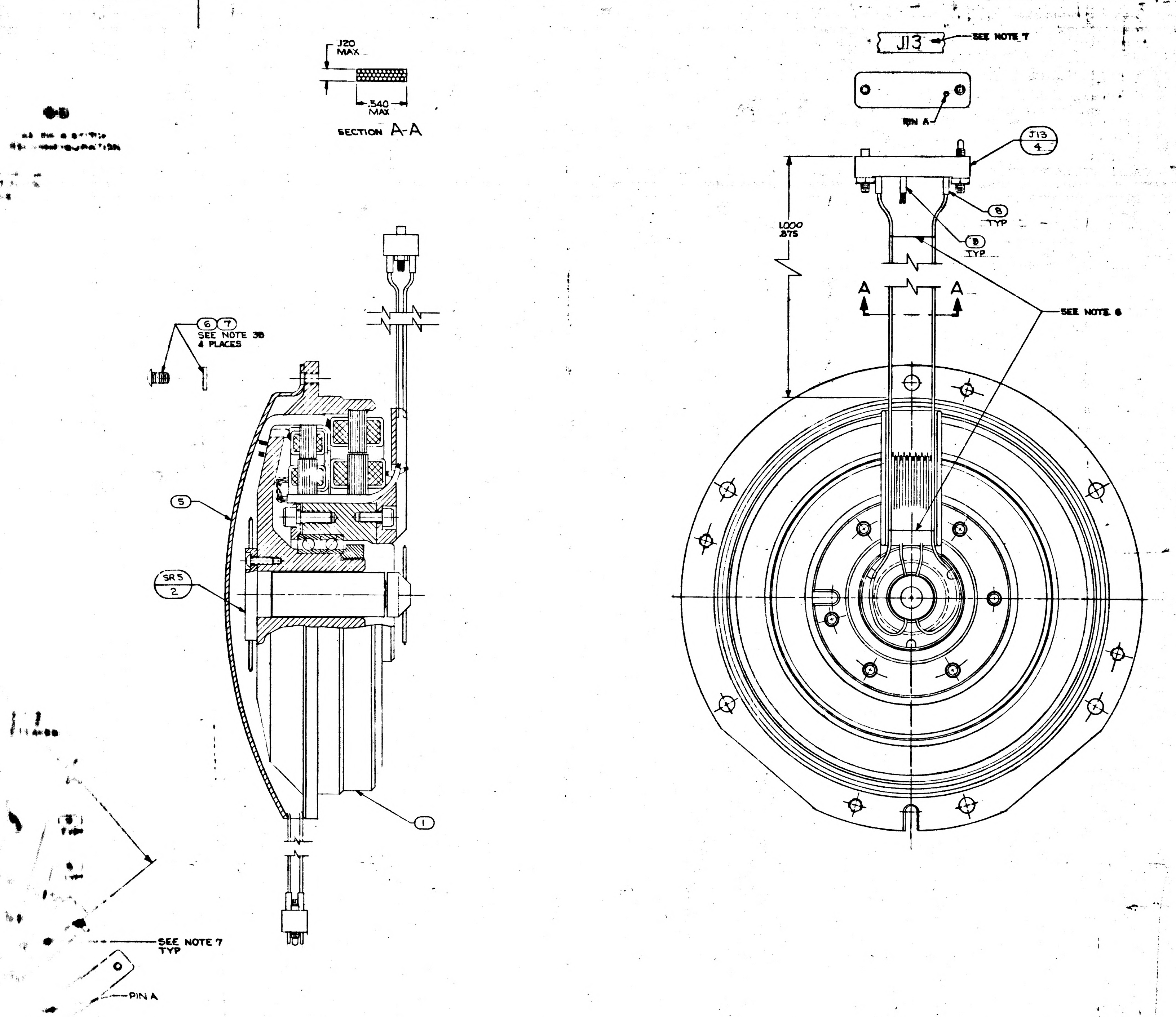
NASA DRAWING NO. 2018614

SHEET 7 of 7

CONDUCTOR		FROM				TO		
INDIVIDUAL LENGTH FIND NUMBER	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	TERMINATION SPEC FIND NO.	NO.
45		J13-Y	13Y	8		SR5-21		
46		J13-Z	13Y	8		SR5-22		
47		J13-CC	13Y	8		SR5-25		
48		J13-DD	13Y	8		SR5-26		
49-1		J13-EE	13Y	8		SR5-27		
49-2		J13-FF	13Y	9		SR5-28		
50-1		J13-EE	13Y			B3A-P3		
50-2		J13-FF	13Y			B3A-P1		
51-1		J13-HH	13Y	9		SR5-29		
51-2		J13-JJ	13Y	9		SR5-30		
52-1		J13-HH	13Y			B3A-P2		
52-2		J13-JJ	13Y			B3A-P4		
53		J13-KK	13Y	8		SR5-31		
54		J13-LL	13Y	8		SR5-32		
55		J13-MM	13Y	8		SR5-33		
56		J13-NN	13Y	8		SR5-34		

REVISIONS TDRR 17101

SYM	DESCRIPTION	DATE		
A	REVISED TDRR 17687			WK
B	REVISED PER TDRR 19271	25Mar65		WK
C	REVISED PER TDRR 20X58	27Jul65		WK
D	REVISED PER TDRR 21683	31Aug65		WK
E	REVISED PER TDRR 21678	31Aug65		WK
F	REVISED TDRR 23042	19Oct65		
G	REVISED PER TDRR 26597	7Mar66		WK



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010416-3	WIRE AWG 28E RED 4" LONG	15
1	1010717-1	TERMINAL, LUG	14
1	1010416-1	WIRE AWG 28E BLK 7½" LONG	13
2	1010891-2	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	1000020-12	SHIELD & GROUND ASSY	11
A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	10
21	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
55	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER FLAT METAL ROUND	7
4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	6
1	2018782	WIRE GUIDE, BRG HSG, I.A., RSVR	5
1	1010917-108	CONNECTOR, ELEC, RECEP, 34 PINS	4
2	1010917-806	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018634	SLIP, RING ASSY, ELEC, 40 CONTACT	2
1	2018608-011	RESOLVER ASSEMBLY INNER AXIS	1

011 LIST OF MATERIALS

2018614 G

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN DTB DATE 1/18/6
CHECKED G QUINN 2/24/65
APPROVAL 24Feb65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL 2Mar65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

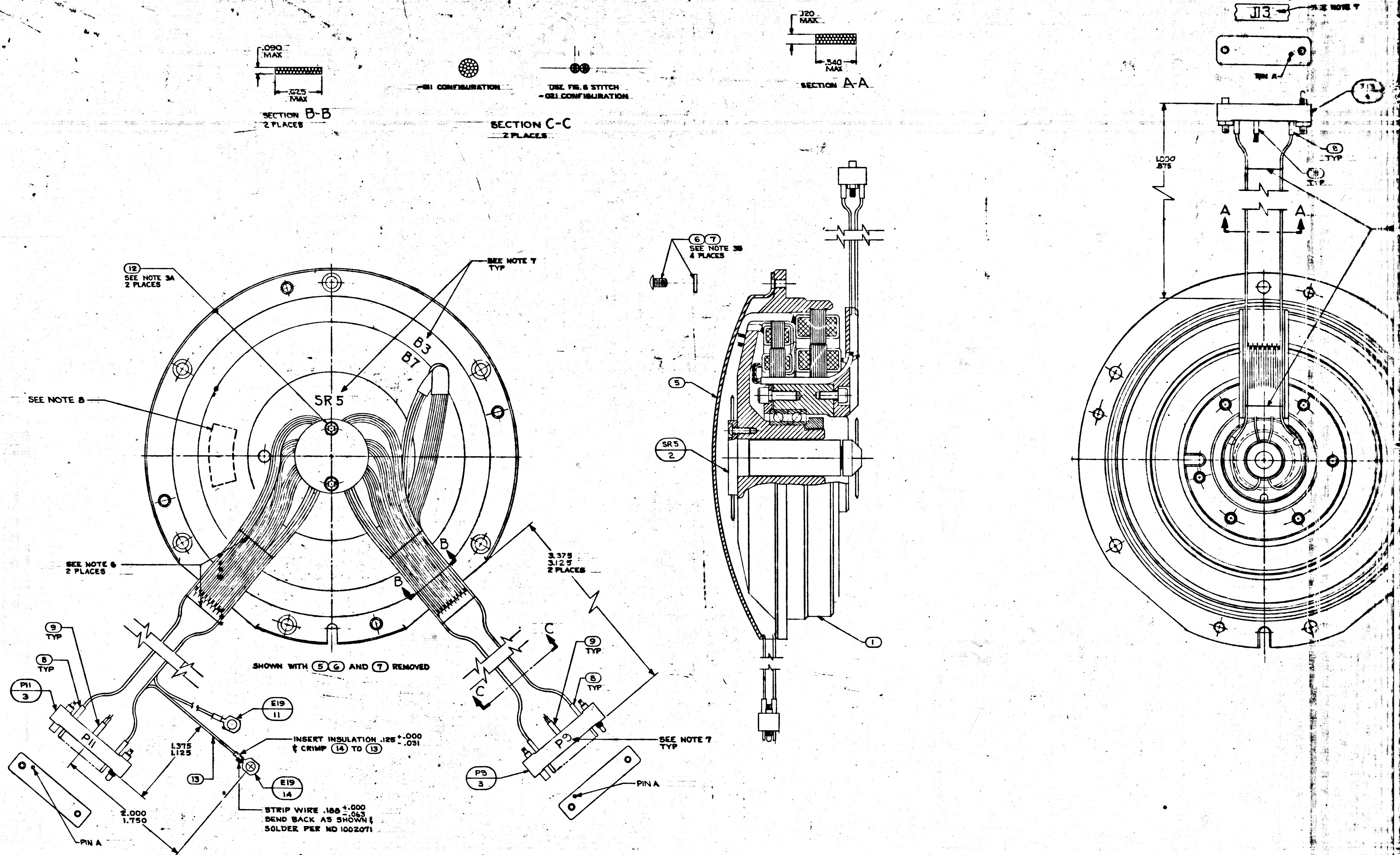
INTERGIMBAL SUB ASSEMBLY
RESOLVER INNER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018614
SCALE 2/1
WT
SHEET 1 OF 1

MASTER

REV. C SHEET 1

E-2


.090 MAX
.625 MAX
SECTION B-B
2 PLACES
-011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION
SECTION C-C
2 PLACES
.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13 4
8 TYP
11 TYP
1.000
.875
A
A
12 SEE NOTE 3A 2 PLACES
SEE NOTE 7 TYP
B3
B7
SR5
SEE NOTE 8
SEE NOTE 6 2 PLACES
B
B
3.375
3.125
2 PLACES
C
C
9 TYP
8 TYP
P11 3
P11
E19 11
INSERT INSULATION .125 +.000 -.031 & CRIMP 14 TO 13
1.375
1.125
13
E19 14
STRIP WIRE .188 +.000 -.063 BEND BACK AS SHOWN & SOLDER PER ND 1002071
2.000
1.750
PIN A
SHOWN WITH 5 6 AND 7 REMOVED
9 TYP
8 TYP
P9
SEE NOTE 7 TYP
P9 3
PIN A
6 7 SEE NOTE 3B 4 PLACES
5
SR5 2
1

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018614
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑪ AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATION SHOWN PER ND 1002019.
8. IDENTIFY USING DRAWING NO., REVISION LETTER & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032.
12. SPARE LEADS TO BE EITHER 7.00 ±.12 LONG & TERMINATED NEAR $\frac{P9}{3}$ OR 4.00 ±.12 LONG AND TERMINATED NEAR $\frac{J13}{4}$ AFTER FOLDING BACK ON THEMSELVES. ENDS TO BE INSULATED BEFORE TIEING INTO CABLE.
13. DIMENSIONS ON SHEETS 2 THRU 7 ARE INCHES AND 2 PLACE DECIMALS
14. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"

21+

2018614	REV G	SHEET 1

F-1

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I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614 SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION FIND NO.
1		P9-A	13Y	8	SR5-26		
2-1		P9-B	13Y	8	SR5-27		
2-2		P9-C	13Y	8	SR5-28		
3-1		P9-D	13Y	8	SR5-29		
3-2		P9-E	13Y	8	SR5-30		
4-1		P9-J	13Y	8	B3A-S3		
4-2		P9-K	13Y	8	B3A-S1		
5-1		P9-L	13Y	8	B3A-S2		
5-2		P9-M	13Y	8	B3A-S4		
6-1		P9-N	13Y	8	B3B-S3		
6-2		P9-P	13Y	8	B3B-S1		
7-1		P9-R	13Y	8	B3B-S2		
7-2		P9-S	13Y	8	B3B-S4		
8		P9-T	13Y	8	SR5-21		
9		P9-U	13Y	8	SR5-31		
10		P9-V	13Y	8	SR5-32		

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I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614 SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION FIND NO.
11-1		P9-W	13Y	8	SR5-23		
11-2		P9-Y	13Y	8	B7-S3		
11-3		P9-a	13Y	9	B7-S1		
12-1		P9-a	13Y		B7-S2		
12-2		P9-Z	13Y	8	B7-S4		
12-3		P9-b	13Y	8	SR5-22		
12-4		P9-X	13Y	8	SR5-24		
13		P9-c	13Y	8	SR5-25		
14		P9-d	13Y	8	SR5-33		
15		P11-A	13Y	9	SR5-1		
16	13	P11-A	13Y		E19	19Y	14
17				11			
17A		SHLD-17			E19		
17-1		P11-B	13Y	8	SR5-2		
17-2		P11-C	13Y	9	SR5-3		
17-3		P11-D	13Y	8	SR5-4		
17-4		P11-E	13Y	9	SR5-5		
17-5		P11-W	13Y	9	SR5-19		
17-6		P11-X	13Y	9	SR5-20		

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I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614 SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION FIND NO.
18-1		P11-F	13Y	9	SR5-6		
18-2		P11-F	13Y		SR5-7		
18-3		P11-J	13Y	9	SR5-8		
18-4		P11-J	13Y		SR5-9		
19		P11-L	13Y	8	SR5-10		
20		P11-M	13Y	8	SR5-11		
21		P11-N	13Y	8	SR5-12		
22		P11-P	13Y	8	SR5-13		
23-1		P11-R	13Y	8	SR5-14		
23-2		P11-S	13Y	8	SR5-15		
24		P11-T	13Y	8	SR5-16		
25-1		P11-U	13Y	8	SR5-17		
25-2		P11-V	13Y	8	SR5-18		
26	15	P11-C	13Y		P11-W	13Y	
27	13	P11-K	13Y		P11-X	13Y	

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614 SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET	TO TERMINATION FIND NO.
28		J13-A	13Y	8	SR5-1		
29-1		J13-B	13Y	9	SR5-2		
29-2		J13-C	13Y	9	SR5-3		
29-3		J13-D	13Y	9	SR5-4		
29-4		J13-E	13Y	9	SR5-5		
29-5		J13-W	13Y	8	SR5-19		
29-6		J13-X	13Y	8	SR5-20		
30	15	J13-B	13Y		J13-C	13Y	
31	13	J13-D	13Y		J13-E	13Y	
32-1		J13-F	13Y	9	SR5-6		
32-2		J13-F	13Y		SR5-7		
32-3		J13-J	13Y	9	SR5-8		
32-4		J13-J	13Y		SR5-9		
33		J13-H	13Y	8	SR5-37		

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I.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614
SHEET 6 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
34-1			J13-K	13Y		9		B7-P2				
34-2			J13-AA	13Y		9		B7-P4				
34-3			J13-AA	13Y				SR5-23				
35-1			J13-K	13Y				B7-P1				
35-2			J13-BB	13Y		9		B7-P3				
35-3			J13-BB	13Y				SR5-24				
36			J13-L	13Y		8		SR5-10				
37			J13-M	13Y		8		SR5-11				
38			J13-N	13Y		8		SR5-12				
39			J13-P	13Y		8		SR5-13				
40-1			J13-R	13Y		8		SR5-14				
40-2			J13-S	13Y		8		SR5-15				
41			J13-T	13Y		8		SR5-16				
42-1			J13-U	13Y		8		SR5-17				
42-2			J13-V	13Y		8		SR5-18				
[illegible]			[illegible]	[illegible]		[illegible]		[illegible]				
[illegible]			[illegible]	[illegible]		[illegible]		[illegible]				

TDRR 17101 MAR 2 1965

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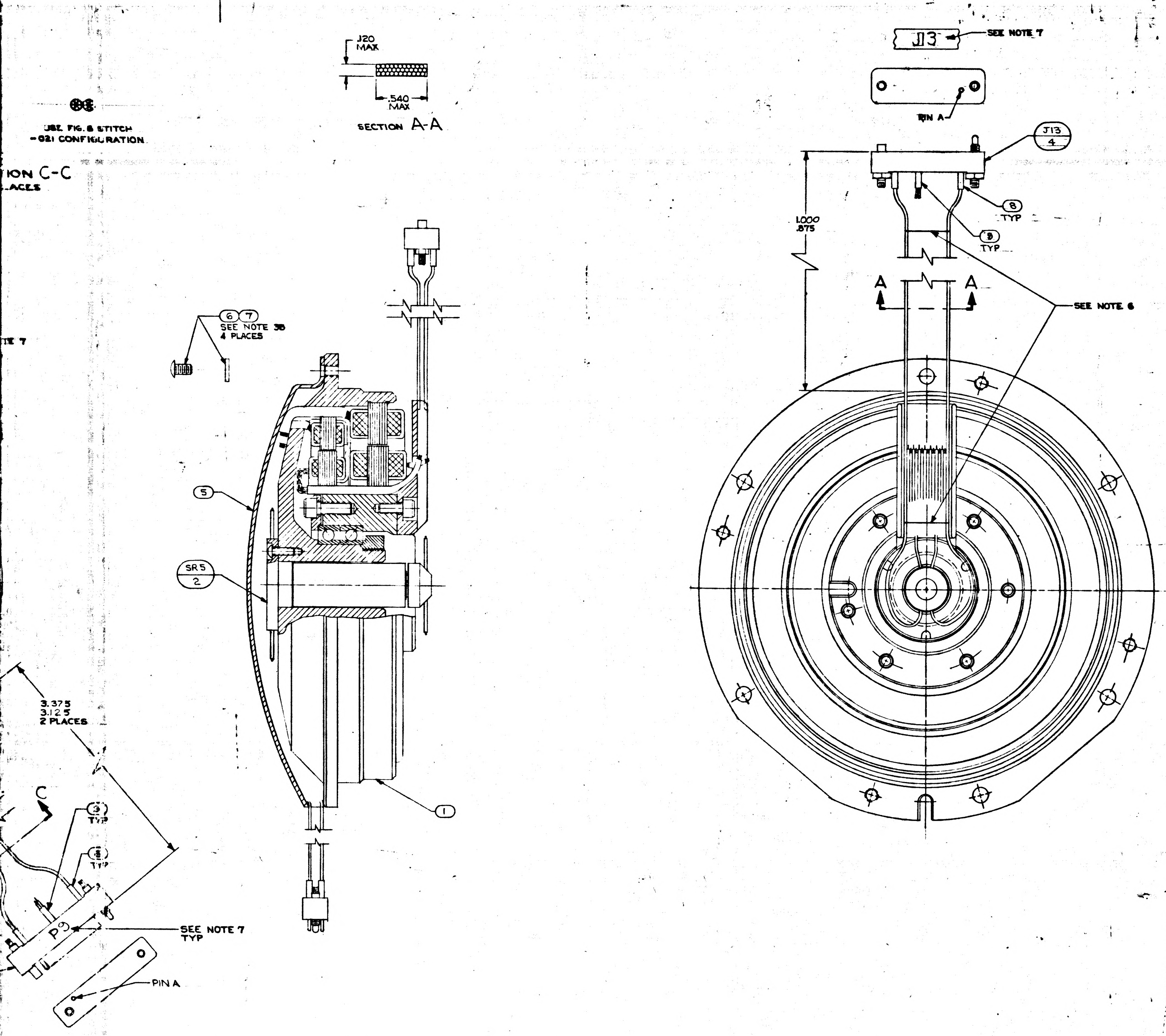
MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION F

NASA DRAWING NO. 2018614
SHEET 7 of 7

CONDUCTOR FIND NUMBER	NO.	INDIVIDUAL LENGTH	FROM: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.	TO: CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	T/N	TERMINATION SPEC FIND NO.	NO.
45			J13-Y	13Y		8		SR5-21				
46			J13-Z	13Y		8		SR5-22				
47			J13-CC	13Y		8		SR5-25				
48			J13-DD	13Y		8		SR5-26				
49-1			J13-EE	13Y		8		SR5-27				
49-2			J13-FF	13Y		9		SR5-28				
50-1			J13-EE	13Y				B3A-P3				
50-2			J13-FF	13Y				B3A-P1				
51-1			J13-HH	13Y		9		SR5-29				
51-2			J13-JJ	13Y		9		SR5-30				
52-1			J13-HH	13Y				B3A-P2				
52-2			J13-JJ	13Y				B3A-P4				
53			J13-KK	13Y		8		SR5-31				
54			J13-LL	13Y		8		SR5-32				
55			J13-MM	13Y		8		SR5-33				
56			J13-NN	13Y		8		SR5-34				


.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13 4
8 TYP
9 TYP
1.000 .875
A
A
SEE NOTE 6
USE FIG. 8 STITCH -021 CONFIGURATION
ION C-C
LACES
TE 7
6 7 SEE NOTE 38 4 PLACES
5
SR5 2
1
3.375 3.125 2 PLACES
C
3 TYP
8 TYP
P3
SEE NOTE 7 TYP
PIN A

TDRR 17601

LTR	DESCRIPTION	DATE	APPROVAL	
A	REVISED TDRR 17687			WK
B	REVISED PER TDRR 19271	25 Nov 65		WK
C	REVISED PER TDRR 20658	27 Dec 65		WK
D	REVISED PER TDRR 21683			WK
E	REVISED PER TDRR 21673	31 Aug 65		WK
F	REVISED TDRR 23042			
G	REVISED PER TDRR 26597			WK
H	REVISED TDRR 27774			WK

	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1	1010416-3	WIRE AWG 28E RED 4" LONG	15
1	1	1010717-1	TERMINAL, LUG	14
1	1	1010416-1	WIRE AWG 28E BLK 7½" LONG	13
2	2	1010891-2	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	1	1000020-12	SHIELD & GROUND ASSY	11
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	10
21	21	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
55	55	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	4	MS15795-703	WASHER FLAT METAL ROUND	7
4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	6
1	1	2018782	WIRE GUIDE, BRG HSG, I.A., RSVR	5
1	1	1010917-108	CONNECTOR, ELEC, RECEP, 34 PINS	4
2	2	1010917-806	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	1	2018634	SLIP, RING ASSY, ELEC, 40 CONTACT	2
1	1	2018608-011	RESOLVER ASSEMBLY INNER AXIS	1
021	011	LIST OF MATERIALS		

NEXT ASSY	USED ON
2018604	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DTB DATE 1/18/65
CHECKED G QUINN 2/24/65
APPROVAL 24 Feb 65
APPROVAL
NASA APPROVAL 3-2-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

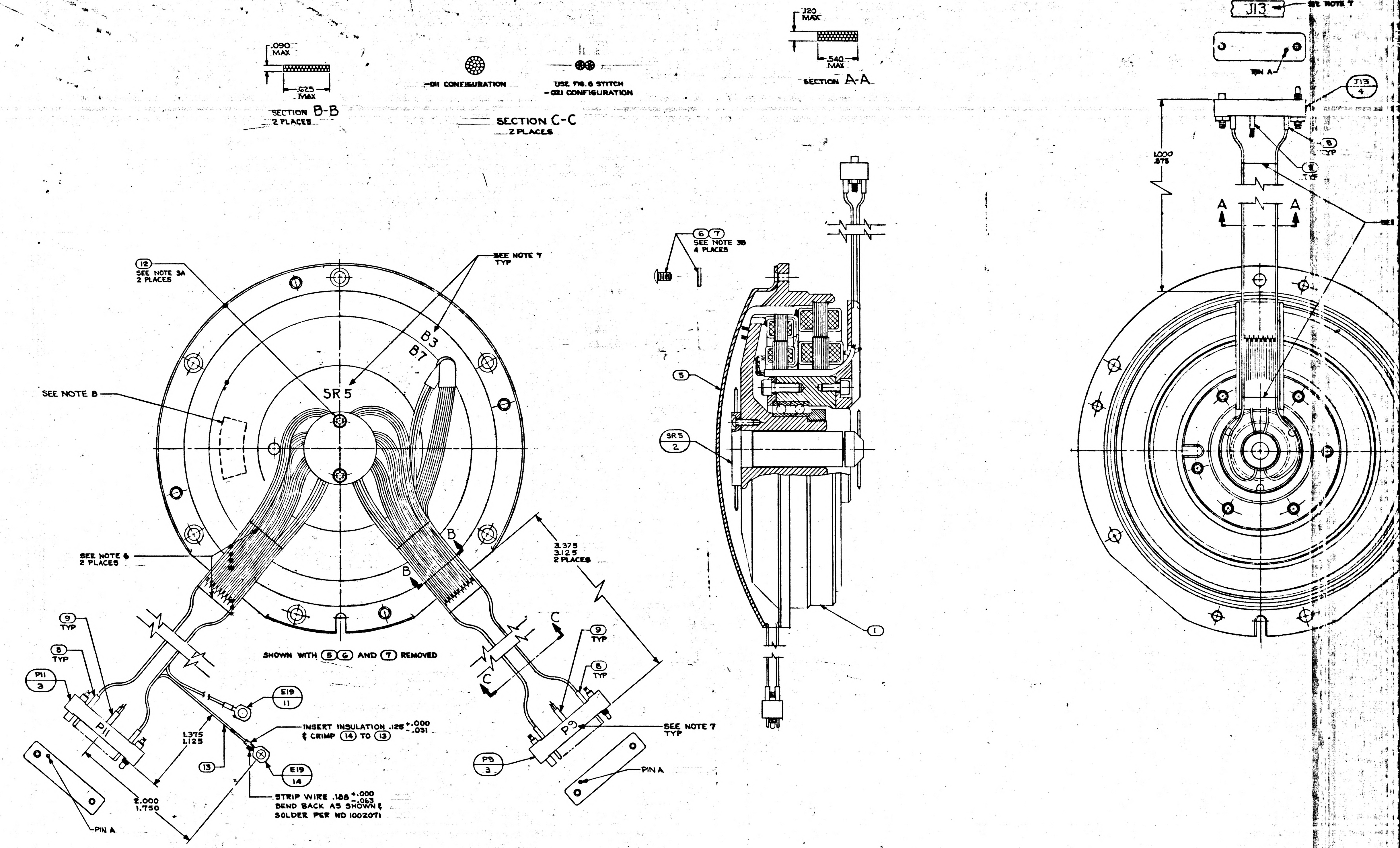
INTERGIMBAL SUB ASSEMBLY RESOLVER INNER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018614
SCALE 2/1
WT
SHEET 1 OF 7

2018614 H

MASTER

2018614 | REV H | SHEET 1


.090 MAX
.625 MAX
SECTION B-B
2 PLACES
-011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION
SECTION C-C
2 PLACES
.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13 4
8 TYP
TYP
1.000 .875
A A
6 7 SEE NOTE 3B 4 PLACES
12 SEE NOTE 3A 2 PLACES
SEE NOTE 7 TYP
B3
B7
SR 5
SEE NOTE 8
5
SR5 2
1
SEE NOTE 6 2 PLACES
B B
3.375 3.125 2 PLACES
C C
SHOWN WITH 5 6 AND 7 REMOVED
9 TYP
8 TYP
P11 3
P11
E19 11
E19 14
INSERT INSULATION .125 +.000 -.031 & CRIMP 14 TO 13
13
1.375 1.125
2.000 1.750
STRIP WIRE .188 +.000 -.063 BEND BACK AS SHOWN & SOLDER PER ND 1002071
P9
P9 3
SEE NOTE 7 TYP
PIN A

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018614
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 3.5 IN-LB
   B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑪ AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATION SHOWN PER ND 1002019.
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032.
12. SPARE LEADS TO BE EITHER 7.00 ± .12 LONG & TERMINATED NEAR $\frac{P9}{3}$ OR 4.00 ±.12 LONG AND TERMINATED NEAR $\frac{J13}{4}$ AFTER FOLDING BACK ON THEMSELVES. ENDS TO BE INSULATED BEFORE TIEING INTO CABLE.
13. DIMENSIONS ON SHEETS 2 THRU 7 ARE INCHES AND 2 PLACE DECIMALS
14. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"

21+

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018614

SHEET 2 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
1		P9-A	13Y	8		SR5-26			
2-1		P9-B	13Y	8		SR5-27			
2-2		P9-C	13Y	8		SR5-28			
3-1		P9-D	13Y	8		SR5-29			
3-2		P9-E	13Y	8		SR5-30			
4-1		P9-J	13Y	8		B3A-S3			
4-2		P9-K	13Y	8		B3A-S1			
5-1		P9-L	13Y	8		B3A-S2			
5-2		P9-M	13Y	8		B3A-S4			
6-1		P9-N	13Y	8		B3B-S3			
6-2		P9-P	13Y	8		B3B-S1			
7-1		P9-R	13Y	8		B3B-S2			
7-2		P9-S	13Y	8		B3B-S4			
8		P9-T	13Y	8		SR5-21			
9		P9-U	13Y	8		SR5-31			
10		P9-V	13Y	8		SR5-32			

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018614

SHEET 3 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
11-1		P9-W	13Y	8		SR5-23			
11-2		P9-Y	13Y	8		B7-S3			
11-3		P9-a	13Y	9		B7-S1			
12-1		P9-a	13Y			B7-S2			
12-2		P9-Z	13Y	8		B7-S4			
12-3		P9-b	13Y	8		SR5-22			
12-4		P9-X	13Y	8		SR5-24			
13		P9-c	13Y	8		SR5-25			
14		P9-d	13Y	8		SR5-33			
15		P11-A	13Y	9		SR5-1			
16	13	P11-A	13Y			E19	19Y	14	
17				11					
17A		SHLD-17				E19			
17-1		P11-B	13Y	8		SR5-2			
17-2		P11-C	13Y	9		SR5-3			
17-3		P11-D	13Y	8		SR5-4			
17-4		P11-E	13Y	9		SR5-5			
17-5		P11-W	13Y	9		SR5-19			
17-6		P11-X	13Y	9		SR5-20			

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018614

SHEET 4 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
18-1		P11-F	13Y	9		SR5-6			
18-2		P11-F	13Y			SR5-7			
18-3		P11-J	13Y	9		SR5-8			
18-4		P11-J	13Y			SR5-9			
19		P11-L	13Y	8		SR5-10			
20		P11-M	13Y	8		SR5-11			
21		P11-N	13Y	8		SR5-12			
22		P11-P	13Y	8		SR5-13			
23-1		P11-R	13Y	8		SR5-14			
23-2		P11-S	13Y	8		SR5-15			
24		P11-T	13Y	8		SR5-16			
25-1		P11-U	13Y	8		SR5-17			
25-2		P11-V	13Y	8		SR5-18			
26	15	P11-C	13Y			P11-W	13Y		
27	13	P11-E	13Y			P11-X	13Y		

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 2018614

SHEET 5 of 7

CONDUCTOR INDIVIDUAL LENGTH FIND NUMBER	NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.	NO.
28		J13-A	13Y	8		SR5-1			
29-1		J13-B	13Y	9		SR5-2			
29-2		J13-C	13Y	9		SR5-3			
29-3		J13-D	13Y	9		SR5-4			
29-4		J13-E	13Y	9		SR5-5			
29-5		J13-W	13Y	8		SR5-19			
29-6		J13-X	13Y	8		SR5-20			
30	15	J13-B	13Y			J13-C	13Y		
31	13	J13-D	13Y			J13-E	13Y		
32-1		J13-F	13Y	9		SR5-6			
32-2		J13-F	13Y			SR5-7			
32-3		J13-J	13Y	9		SR5-8			
32-4		J13-J	13Y			SR5-9			
33		J13-H	13Y	8		SR5-37			

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION H

NASA DRAWING NO. 201861 4

SHEET 6 of 7

CONDUCTOR			FROM					TO			
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	NO.
34-1			J13-K	13Y		9		B7-P2			
34-2			J13-AA	13Y		9		B7-P4			
34-3			J13-AA	13Y				SR5-23			
35-1			J13-K	13Y				B7-P1			
35-2			J13-BB	13Y		9		B7-P3			
35-3			J13-BB	13Y				SR5-24			
36			J13-L	13Y		8		SR5-10			
37			J13-M	13Y		8		SR5-11			
38			J13-N	13Y		8		SR5-12			
39			J13-P	13Y		8		SR5-13			
40-1			J13-R	13Y		8		SR5-14			
40-2			J13-S	13Y		8		SR5-15			
41			J13-T	13Y		8		SR5-16			
42-1			J13-U	13Y		8		SR5-17			
42-2			J13-V	13Y		8		SR5-18			
[illegible]			[illegible]	[illegible]		[illegible]		[illegible]			
[illegible]			[illegible]	[illegible]		[illegible]		[illegible]			

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

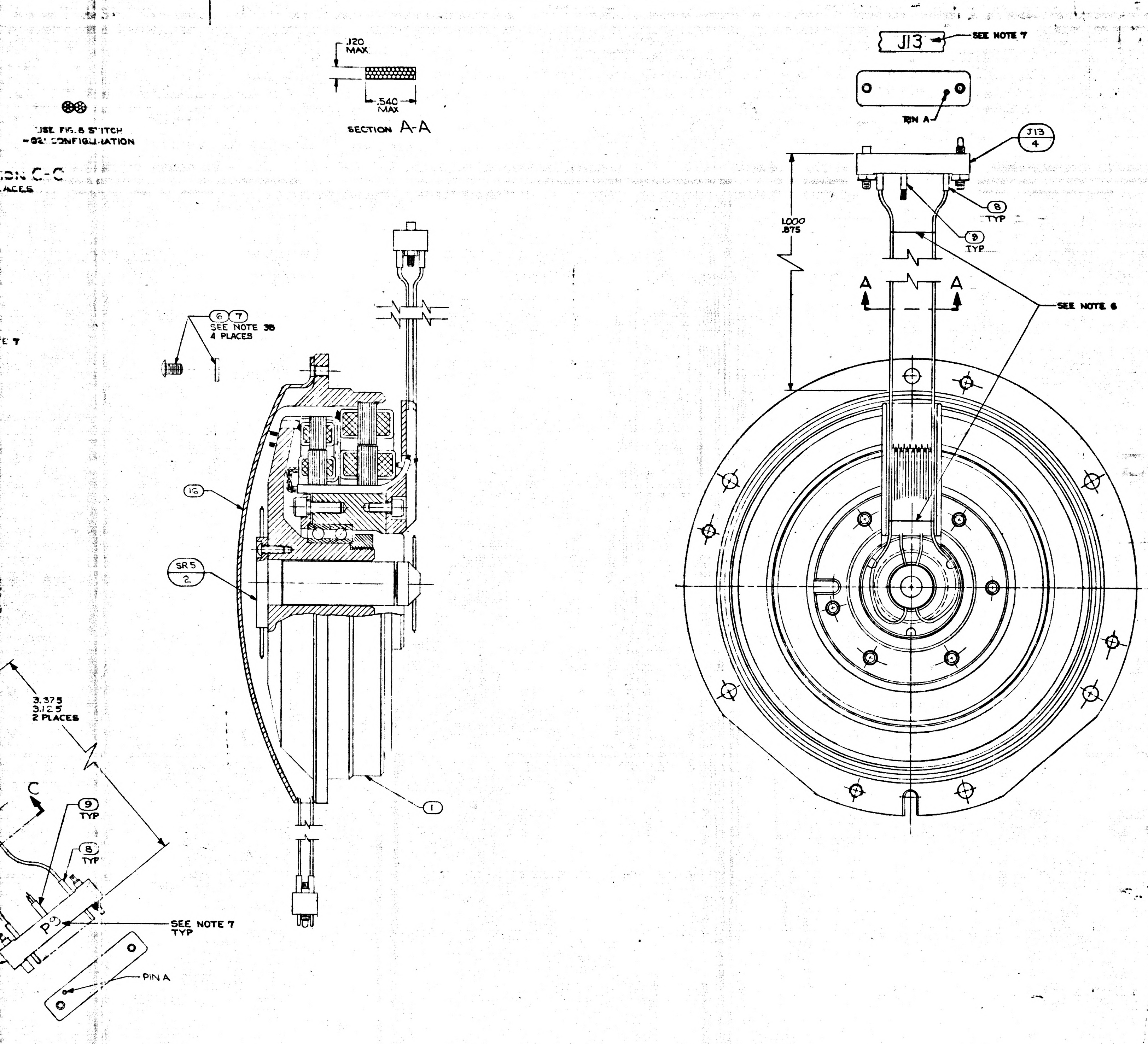
REVISION H

NASA DRAWING NO. 201861 4

SHEET 7 of 7

CONDUCTOR			FROM					TO			
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		T I N	TERMINATION SPEC FIND NO.	NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T I N	TERMINATION SPEC FIND NO.	NO.
45			J13-Y	13Y		8		SR5-21			
46			J13-Z	13Y		8		SR5-22			
47			J13-CC	13Y		8		SR5-25			
48			J13-DD	13Y		8		SR5-26			
49-1			J13-EE	13Y		8		SR5-27			
49-2			J13-FF	13Y		9		SR5-28			
50-1			J13-EE	13Y				B3A-P3			
50-2			J13-FF	13Y				B3A-P1			
51-1			J13-HH	13Y		9		SR5-29			
51-2			J13-JJ	13Y		9		SR5-30			
52-1			J13-HH	13Y				B3A-P2			
52-2			J13-JJ	13Y				B3A-P4			
53			J13-KK	13Y		8		SR5-31			
54			J13-LL	13Y		8		SR5-32			
55			J13-MM	13Y		8		SR5-33			
56			J13-NN	13Y		8		SR5-34			

SYM	DESCRIPTION	DATE	APPR	
	TDRR 17101			
A	REVISED TDRR 17687	[illegible]	[illegible]	WK
B	REVISED PER TDRR 19271	25 Mar 65	[illegible]	WK
C	REVISED PER TDRR 20658	27 Jul 65	[illegible]	WK
D	REVISED PER TDRR 21683	31 Aug 65	[illegible]	WK
E	REVISED PER TDRR 21678	31 Aug 65	[illegible]	WK
F	REVISED TDRR 23042	19 Oct 65	[illegible]	[illegible]
G	REVISED PER TDRR 26597	7 Mar 66	[illegible]	WK
H	REVISED TDRR 27774	18 Apr 66	[illegible]	WK
J	REVISED TDRR 28286	2 May 66	[illegible]	[illegible]



.120 MAX
.540 MAX
SECTION A-A
USE FIG. 8 STITCH -021 CONFIGURATION
SECTION C-C
PLACES
J13
SEE NOTE 7
PIN A
J13 4
8 TYP
9 TYP
1.000
.875
A
A
SEE NOTE 6
6 7 SEE NOTE 3B 4 PLACES
12
SR5 2
1
3.375
3.125
2 PLACES
C
9 TYP
8 TYP
P3
SEE NOTE 7 TYP
PIN A

QTY REQD 021	QTY REQD 011	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1	2018846	WIRE GUIDE, BRG. HSG., I.A., RSVR	16
1	1	1010416-3	WIRE AWG 28E RED 4" LONG	15
1	1	1010717-1	TERMINAL, LUG	14
1	1	1010416-1	WIRE AWG 28E BLK 7½" LONG	13
2	2	1010891-2	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	1	1000020-12	SHIELD & GROUND ASSY	11
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	10
21	21	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
55	55	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	4	MS15795-703	WASHER FLAT METAL ROUND	7
4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	6
~~1~~	~~1~~	~~2018782~~	~~WIRE GUIDE, BRG HSG, I.A., RSVR~~	~~5~~
1	1	1010917-108	CONNECTOR, ELEC, RECEP, 34 PINS	4
2	2	1010917-806	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	1	2018634	SLIP, RING ASSY, ELEC, 40 CONTACT	2
1	1	2018608-011	RESOLVER ASSEMBLY INNER AXIS	1

LIST OF MATERIALS

NEXT ASSY	USED ON
2018604	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING.
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DTB DATE 1/18/65
CHECKED G QUINN 2/24/65
APPROVAL [illegible] 24 Feb 65
APPROVAL
NASA APPROVAL [illegible] 3-2-65
MIT APPROVAL [illegible] 2 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB ASSEMBLY
RESOLVER INNER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018614
SCALE 2/1
WT
SHEET 1 OF 7

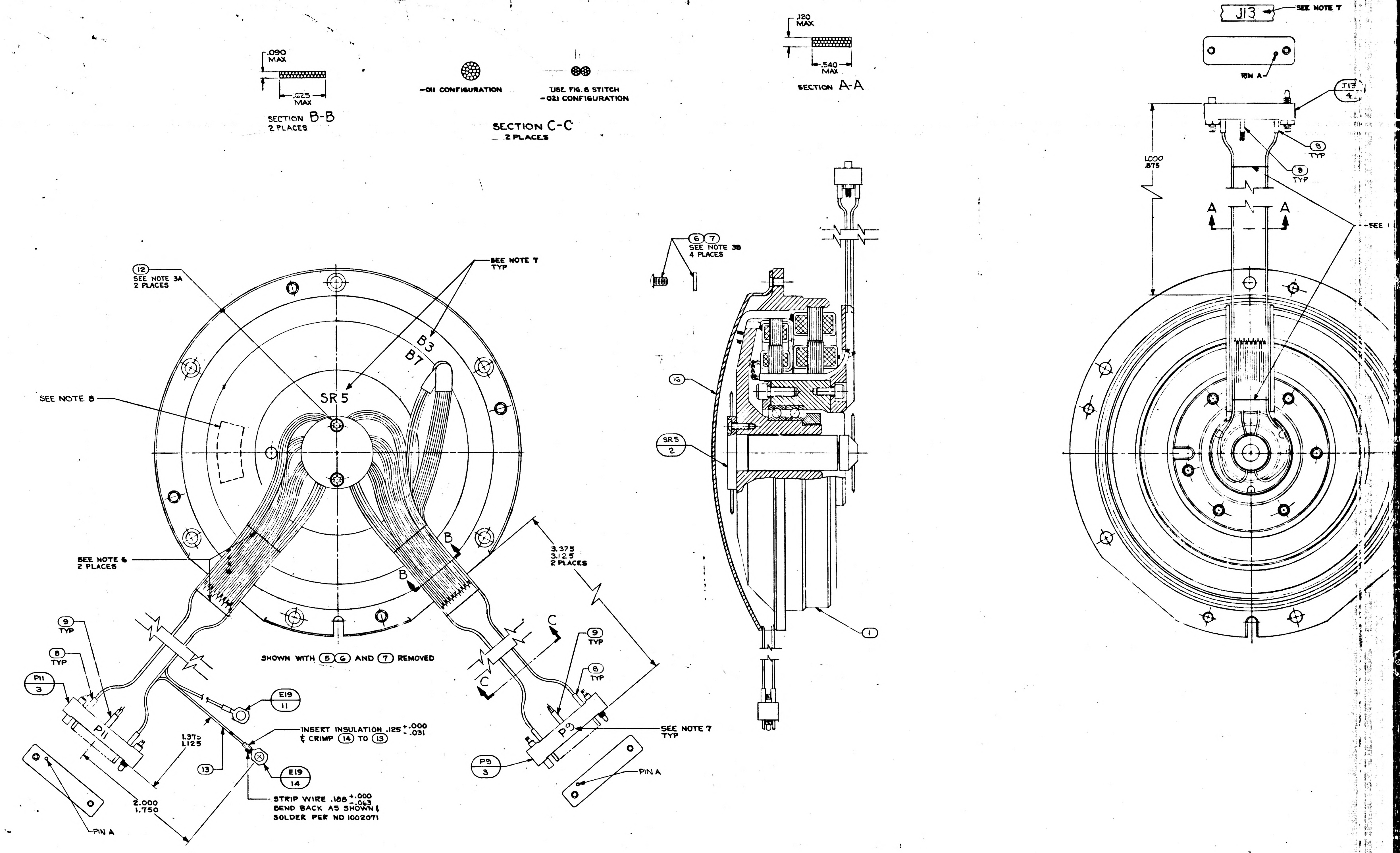
2018614 J

2H

MASTER

2018614	REV J	SHT 1

F-2


.090 MAX
.625 MAX
SECTION B-B
2 PLACES
-011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION
SECTION C-C
2 PLACES
.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13
4
8
TYP
9
TYP
1.000
.875
A
A
SEE
12
SEE NOTE 3A
2 PLACES
SEE NOTE 7
TYP
B3
B7
SR5
SEE NOTE 8
6 7
SEE NOTE 3B
4 PLACES
16
SR5
2
1
SEE NOTE 6
2 PLACES
B
B
3.375
3.125
2 PLACES
C
C
9
TYP
8
TYP
P11
3
P11
E19
11
SHOWN WITH 5 6 AND 7 REMOVED
INSERT INSULATION .125 +.000 -.031
& CRIMP 14 TO 13
1.375
1.125
13
E19
14
2.000
1.750
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN &
SOLDER PER ND 1002071
PIN A
P9
P9
3
SEE NOTE 7
TYP
PIN A

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018614
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 3.5 IN-LB
   B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071
5. HEAT SHRINK SLEEVING ON ⑪ AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATION SHOWN PER ND 1002019.
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032.
12. SPARE LEADS TO BE EITHER 7.00 ± .12 LONG & TERMINATED NEAR $\frac{P9}{3}$ OR 4.00 ± .12 LONG AND TERMINATED NEAR $\frac{J13}{4}$ AFTER FOLDING BACK ON THEMSELVES. ENDS TO BE INSULATED BEFORE TIEING INTO CABLE.
13. DIMENSIONS ON SHEETS 2 THRU 7 ARE INCHES AND 2 PLACE DECIMALS
14. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"

	REV	SHEET
2018614	J	1

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION J

NASA DRAWING NO. 2018614

SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.
1		P9-A	13Y	8	SR5-26		
2-1		P9-B	13Y	8	SR5-27		
2-2		P9-C	13Y	8	SR5-28		
3-1		P9-D	13Y	8	SR5-29		
3-2		P9-E	13Y	8	SR5-30		
4-1		P9-J	13Y	8	B3A-S3		
4-2		P9-K	13Y	8	B3A-S1		
5-1		P9-L	13Y	8	B3A-S2		
5-2		P9-M	13Y	8	B3A-S4		
6-1		P9-N	13Y	8	B3B-S3		
6-2		P9-P	13Y	8	B3B-S1		
7-1		P9-R	13Y	8	B3B-S2		
7-2		P9-S	13Y	8	B3B-S4		
8		P9-T	13Y	8	SR5-21		
9		P9-U	13Y	8	SR5-31		
10		P9-V	13Y	8	SR5-32		

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION J

NASA DRAWING NO. 2018614

SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.
11-1		P9-W	13Y	8	SR5-23		
11-2		P9-Y	13Y	8	B7-S3		
11-3		P9-a	13Y	9	B7-S1		
12-1		P9-a	13Y		B7-S2		
12-2		P9-Z	13Y	8	B7-S4		
12-3		P9-b	13Y	8	SR5-22		
12-4		P9-X	13Y	8	SR5-24		
13		P9-c	13Y	8	SR5-25		
14		P9-d	13Y	8	SR5-33		
15		P11-A	13Y	9	SR5-1		
16	13	P11-A	13Y		E19	19Y	14
17				11			
17A		SHLD-17			E19		
17-1		P11-B	13Y	8	SR5-2		
17-2		P11-C	13Y	9	SR5-3		
17-3		P11-D	13Y	8	SR5-4		
17-4		P11-E	13Y	9	SR5-5		
17-5		P11-W	13Y	9	SR5-19		
17-6		P11-X	13Y	9	SR5-20		

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION J

NASA DRAWING NO. 2018614

SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.
18-1		P11-F	13Y	9	SR5-6		
18-2		P11-F	13Y		SR5-7		
18-3		P11-J	13Y	9	SR5-8		
18-4		P11-J	13Y		SR5-9		
19		P11-L	13Y	8	SR5-10		
20		P11-M	13Y	8	SR5-11		
21		P11-N	13Y	8	SR5-12		
22		P11-P	13Y	8	SR5-13		
23-1		P11-R	13Y	8	SR5-14		
23-2		P11-S	13Y	8	SR5-15		
24		P11-T	13Y	8	SR5-16		
25-1		P11-U	13Y	8	SR5-17		
25-2		P11-V	13Y	8	SR5-18		
26	15	P11-C	13Y		P11-W	13Y	
27	13	P11-E	13Y		P11-X	13Y	

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION J

NASA DRAWING NO. 2018614

SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T/N	FROM TERMINATION SPEC FIND NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	T/N	TO TERMINATION SPEC FIND NO.
28		J13-A	13Y	8	SR5-1		
29-1		J13-B	13Y	9	SR5-2		
29-2		J13-C	13Y	9	SR5-3		
29-3		J13-D	13Y	9	SR5-4		
29-4		J13-E	13Y	9	SR5-5		
29-5		J13-W	13Y	8	SR5-19		
29-6		J13-X	13Y	8	SR5-20		
30	15	J13-B	13Y		J13-C	13Y	
31	13	J13-D	13Y		J13-E	13Y	
32-1		J13-F	13Y	9	SR5-6		
32-2		J13-F	13Y		SR5-7		
32-3		J13-J	13Y	9	SR5-8		
32-4		J13-J	13Y		SR5-9		
33		J13-H	13Y	8	SR5-37		

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION J

NASA DRAWING NO. 2018614
SHEET 6 of 7

CONDUCTOR			FROM			TO
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT
34-1			J13-K	13Y	9	B7-P2
34-2			J13-AA	13Y	9	B7-P4
34-3			J13-AA	13Y		SR5-23
35-1			J13-K	13Y		B7-P1
35-2			J13-BB	13Y	9	B7-P3
35-3			J13-BB	13Y		SR5-24
36			J13-L	13Y	8	SR5-10
37			J13-M	13Y	8	SR5-11
38			J13-N	13Y	8	SR5-12
39			J13-P	13Y	8	SR5-13
40-1			J13-R	13Y	8	SR5-14
40-2			J13-S	13Y	8	SR5-15
41			J13-T	13Y	8	SR5-16
42-1			J13-U	13Y	8	SR5-17
42-2			J13-V	13Y	8	SR5-18

TDRR 17101 MAR 2 1965

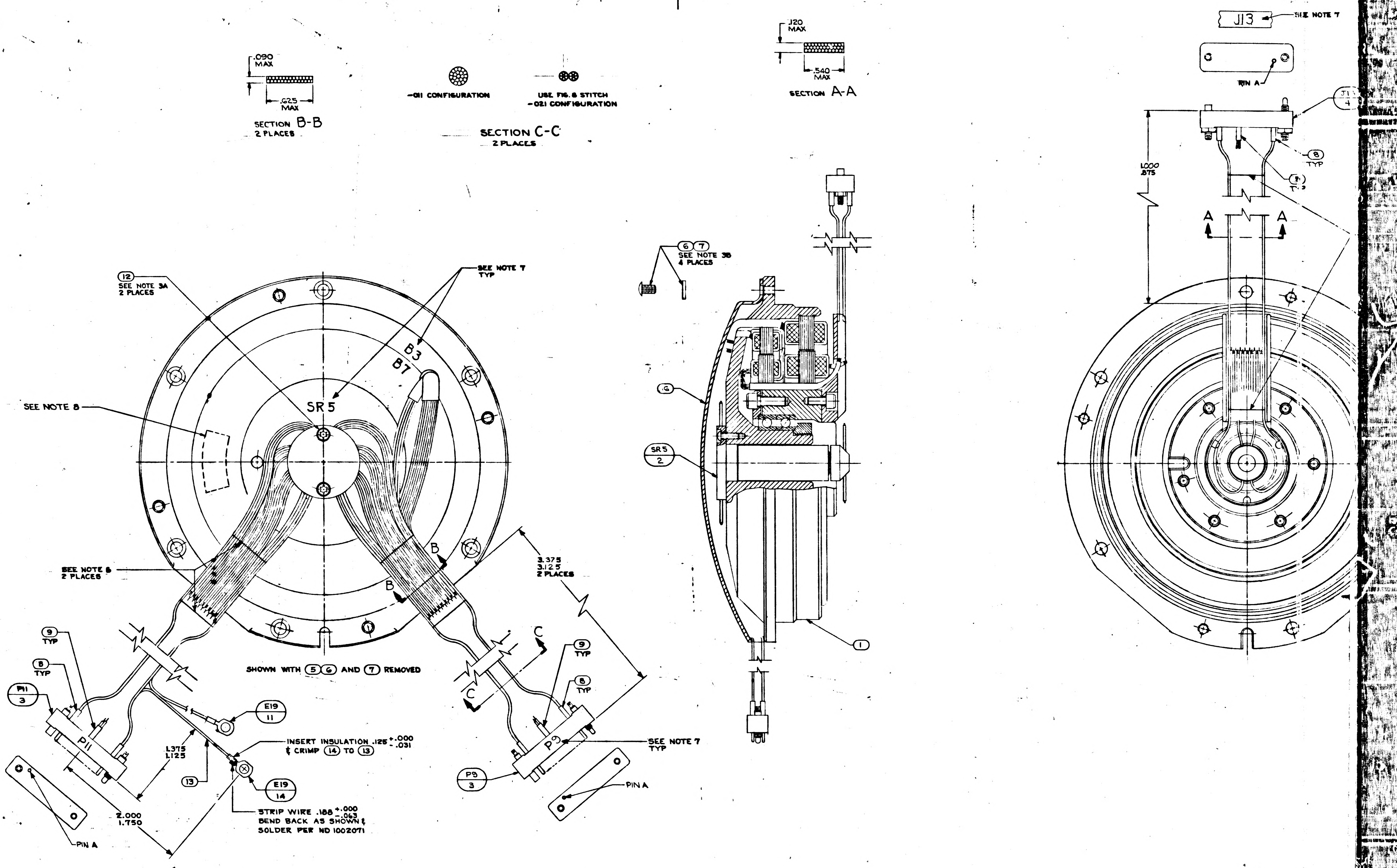
I.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION J

NASA DRAWING NO. 2018614
SHEET 7 of 7

CONDUCTOR			FROM			TO
FIND NUMBER	NO.	INDIVIDUAL LENGTH	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	T/N	TERMINATION SPEC FIND NO.	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT
45			J13-Y	13Y	8	SR5-21
46			J13-Z	13Y	8	SR5-22
47			J13-CC	13Y	8	SR5-25
48			J13-DD	13Y	8	SR5-26
49-1			J13-EE	13Y	8	SR5-27
49-2			J13-FF	13Y	9	SR5-28
50-1			J13-EE	13Y		B3A-P3
50-2			J13-FF	13Y		B3A-P1
51-1			J13-HH	13Y	9	SR5-29
51-2			J13-JJ	13Y	9	SR5-30
52-1			J13-HH	13Y		B3A-P2
52-2			J13-JJ	13Y		B3A-P4
53			J13-KK	13Y	8	SR5-31
54			J13-LL	13Y	8	SR5-32
55			J13-MM	13Y	8	SR5-33
56			J13-NN	13Y	8	SR5-34



.090 MAX
.625 MAX
SECTION B-B
2 PLACES
-011 CONFIGURATION
USE FIG. 8 STITCH
-021 CONFIGURATION
SECTION C-C
2 PLACES
.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
1.000
.875
A
A
8
TYP
6 7
SEE NOTE 3B
4 PLACES
12
SEE NOTE 3A
2 PLACES
SEE NOTE 7
TYP
B3
B7
SR5
SEE NOTE 8
SEE NOTE 6
2 PLACES
B
B
3.375
3.125
2 PLACES
C
C
9
TYP
8
TYP
P11
3
E19
11
P11
INSERT INSULATION .125 +.000 -.031
& CRIMP 14 TO 13
1.375
1.125
13
E19
14
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN &
SOLDER PER ND 1002071
2.000
1.750
PIN A
SHOWN WITH 5 6 AND 7 REMOVED
9
TYP
8
TYP
P9
SEE NOTE 7
TYP
P9
3
PIN A
G
SR5
2
1

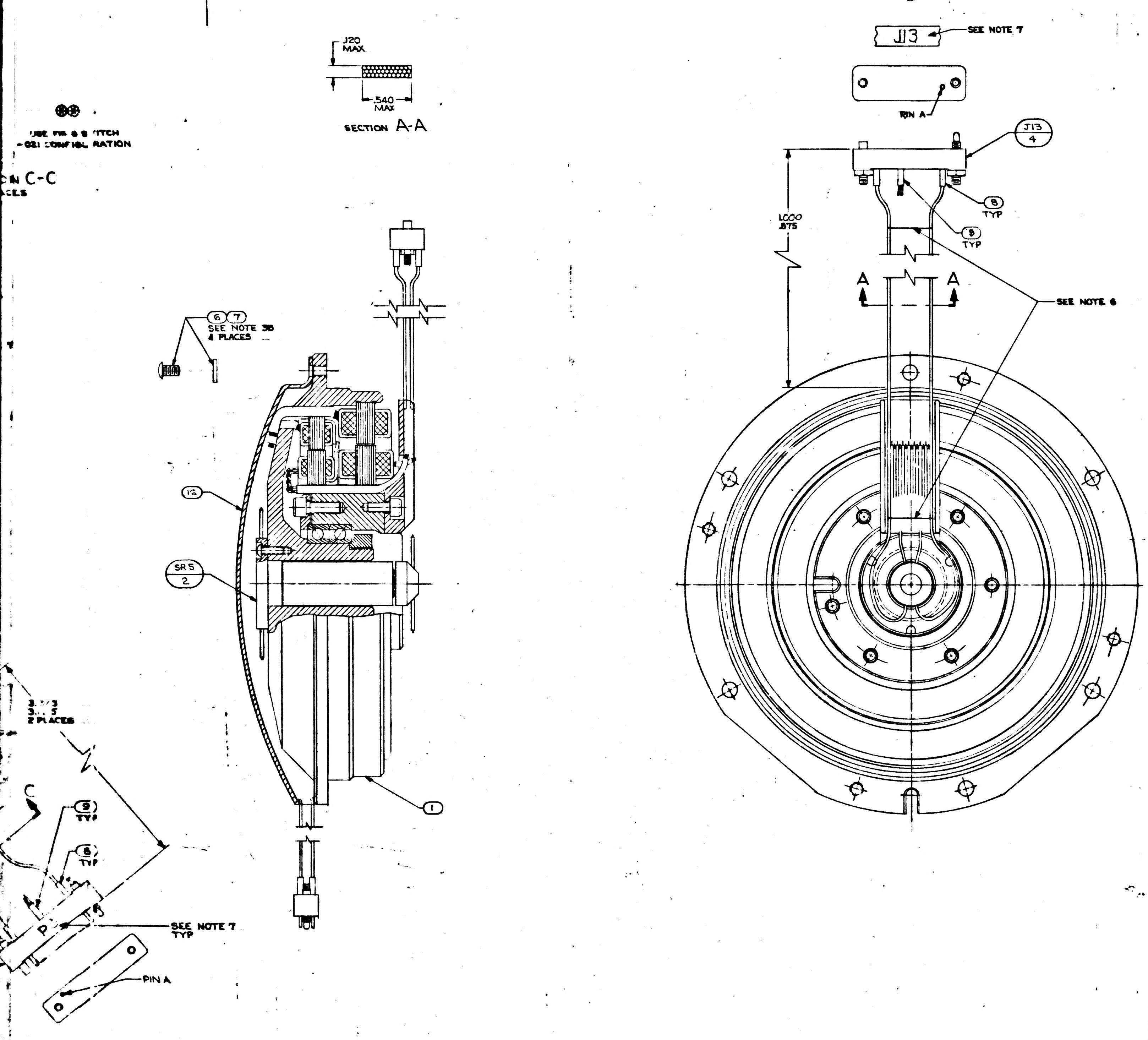
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH & SHALL MEET THE REQUIREMENTS OF PS 2018614
3. SCREW TORQUE REQUIREMENTS ±7%
   A. 3.5 IN-LB
   B. 5.0 IN-LB
4. SOLDER LEADS TO (3) & (4) PER ND 1002071
5. HEAT SHRINK SLEEVING ON (11) AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $\frac{.10}{.14}$ HIGH. COLOR BLACK AT LOCATION SHOWN PER ND 1002019.
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032.
12. SPARE LEADS TO BE EITHER 7.00 ±.12 LONG & TERMINATED NEAR (P9/3) OR 4.00 ±.12 LONG AND TERMINATED NEAR (J13/4) AFTER FOLDING BACK ON THEMSELVES. ENDS TO BE INSULATED BEFORE TIEING INTO CABLE.
13. DIMENSIONS ON SHEETS 2 THRU 7 ARE INCHES AND 2 PLACE DECIMALS
14. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    A = SHIELD GROUND ON "FROM END"
    B = SHIELD GROUND ON "TO END"

2018614	REV K	SHEET 1

TDRR 17101

A	REVISED TDRR 17687	10 Mar 65	[illegible]	WK
B	REVISED PER TDRR 19271	25 Mar 65	[illegible]	WK
C	REVISED PER TDRR 20658	27 July 65	[illegible]	WK
D	REVISED PER TDRR 21683	31 Aug 65	[illegible]	WK
E	REVISED PER TDRR 21678	31 Aug 65	[illegible]	WK
F	REVISED TDRR 23042	19 Oct 65	[illegible]	[illegible]
G	REVISED PER TDRR 26597	7 Mar 66	[illegible]	WK
H	REVISED TDRR 27774	12 Apr 66	[illegible]	WK
J	REVISED TDRR 28286	2 May 66	[illegible]	WK
K	REVISED PER TDRR 32853	9 [illegible] 67	[illegible]	[illegible]



J13
SEE NOTE 7
PIN A
J13
4
.120 MAX
.540 MAX
SECTION A-A
USE FIG 8 & 9 PITCH
-021 CONFIGURATION
SECTION C-C
1.000
.875
8
TYP
9
TYP
A
A
SEE NOTE 6
6
7
SEE NOTE 38
4 PLACES
12
SR5
2
1
3.[illegible]3
3.[illegible]5
2 PLACES
C
9
TYP
8
TYP
SEE NOTE 7
TYP
PIN A
4
3
2
1
D
C
B
A

1	1	2018846	WIRE GUIDE, BRG. HSG., I.A., RSVR	16
1	1	1010416-3	WIRE AWG 28E RED 4" LONG	15
1	1	1010717-1	TERMINAL, LUG	14
1	1	1010416-1	WIRE AWG 28E BLK 7½" LONG	13
2	2	1010891-2	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	1	1000020-12	SHIELD & GROUND ASSY	11
A/R	A/R	MIL-T-713 TYPE P CLASS 2	TAPE, NYLON, WAXED	10
21	21	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
55	55	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	4	MS15795-703	WASHER FLAT METAL ROUND	7
4	4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	6
~~1~~	~~1~~	~~2018782~~	~~WIRE GUIDE, BRG HSG, I.A., RSVR~~	~~5~~
1	1	1010917-108	CONNECTOR, ELEC, RECEP, 34 PINS	4
2	2	1010917-806	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	1	2018634	SLIP, RING ASSY, ELEC, 40 CONTACT	2
1	1	2018608-011	RESOLVER ASSEMBLY INNER AXIS	1
	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
021	011	LIST OF MATERIALS		

K
2018614

2018604	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN DTB DATE 1/18/65
CHECKED G QUINN 2/24/65
APPROVAL [illegible] 24 Feb 65
APPROVAL
NASA APPROVAL [illegible] 3-2-65
MIT APPROVAL [illegible] 3 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERGIMBAL SUB ASSEMBLY
RESOLVER INNER AXIS

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO. 2018614
SCALE 2/1
WT
SHEET 1 OF 7

2018614 REV K SHEET 1

2H

2018614

27 2018614

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION K

NASA DRAWING NO. 2018614 SHEET 2 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET T/N	FROM TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET T/N	TO TERMINATION SPEC FIND NO.
1		P9-A	17Y	8	SR5-26		
2-1		P9-B	17Y	8	SR5-27		
2-2		P9-C	17Y	8	SR5-28		
3-1		P9-D	17Y	8	SR5-29		
3-2		P9-E	17Y	8	SR5-30		
4-1		P9-J	17Y	8	B3A-S3		
4-2		P9-K	17Y	8	B3A-S1		
5-1		P9-L	17Y	8	B3A-S2		
5-2		P9-M	17Y	8	B3A-S4		
6-1		P9-N	17Y	8	B3B-S3		
6-2		P9-P	17Y	8	B3B-S1		
7-1		P9-R	17Y	8	B3B-S2		
7-2		P9-S	17Y	8	B3B-S4		
8		P9-T	17Y	8	SR5-21		
9		P9-U	17Y	8	SR5-31		
10		P9-V	17Y	8	SR5-32		

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION K

NASA DRAWING NO. 2018614 SHEET 3 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET T/N	FROM TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET T/N	TO TERMINATION SPEC FIND NO.
11-1		P9-W	17Y	8	SR5-23		
11-2		P9-Y	17Y	8	B7-S3		
11-3		P9-a	17Y	9	B7-S1		
12-1		P9-a	17Y		B7-S2		
12-2		P9-Z	17Y	8	B7-S4		
12-3		P9-b	17Y	8	SR5-22		
12-4		P9-X	17Y	8	SR5-24		
13		P9-c	17Y	8	SR5-25		
14		P9-d	17Y	8	SR5-33		
15		P11-A	17Y	9	SR5-1		
16	13	P11-A	17Y		E19	19Y	14
17				11			
17A		SHLD-17			E19		
17-1		P11-B	17Y	8	SR5-2		
17-2		P11-C	17Y	9	SR5-3		
17-3		P11-D	17Y	8	SR5-4		
17-4		P11-E	17Y	9	SR5-5		
17-5		P11-W	17Y	9	SR5-19		
17-6		P11-X	17Y	9	SR5-20		

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION K

NASA DRAWING NO. 2018614 SHEET 4 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET T/N	FROM TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET T/N	TO TERMINATION SPEC FIND NO.
18-1		P11-F	17Y	9	SR5-6		
18-2		P11-F	17Y		SR5-7		
18-3		P11-J	17Y	9	SR5-8		
18-4		P11-J	17Y		SR5-9		
19		P11-L	17Y	8	SR5-10		
20		P11-M	17Y	8	SR5-11		
21		P11-N	17Y	8	SR5-12		
22		P11-P	17Y	8	SR5-13		
23-1		P11-R	17Y	8	SR5-14		
23-2		P11-S	17Y	8	SR5-15		
24		P11-T	17Y	8	SR5-16		
25-1		P11-U	17Y	8	SR5-17		
25-2		P11-V	17Y	8	SR5-18		
26	15	P11-C	17Y		P11-W	17Y	
27	13	P11-E	17Y		P11-X	17Y	

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION K

NASA DRAWING NO. 2018614 SHEET 5 of 7

CONDUCTOR FIND NUMBER	INDIVIDUAL LENGTH FIND NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET T/N	FROM TERMINATION SPEC FIND NO.	TO CIRCUIT POINT	TO STRIP WIRE OR JACKET T/N	TO TERMINATION SPEC FIND NO.
28		J13-A	17Y	8	SR5-1		
29-1		J13-B	17Y	9	SR5-2		
29-2		J13-C	17Y	9	SR5-3		
29-3		J13-D	17Y	9	SR5-4		
29-4		J13-E	17Y	9	SR5-5		
29-5		J13-W	17Y	8	SR5-19		
29-6		J13-X	17Y	8	SR5-20		
30	15	J13-B	17Y		J13-C	17Y	
31	13	J13-D	17Y		J13-E	17Y	
32-1		J13-F	17Y	9	SR5-6		
32-2		J13-F	17Y		SR5-7		
32-3		J13-J	17Y	9	SR5-8		
32-4		J13-J	17Y		SR5-9		
33		J13-H	17Y	8	SR5-37		

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	FROM TERMINATION NO.	TO CIRCUIT POINT	TO TERMINATION SPEC FIND NO.	TO TERMINATION NO.
34-1		J13-K	17Y	9		B7-P2		
34-2		J13-AA	17Y	9		B7-P4		
34-3		J13-AA	17Y			SR5-23		
35-1		J13-K	17Y			B7-P1		
35-2		J13-BB	17Y	9		B7-P3		
35-3		J13-BB	17Y			SR5-24		
36		J13-L	17Y	8		SR5-10		
37		J13-M	17Y	8		SR5-11		
38		J13-N	17Y	8		SR5-12		
39		J13-P	17Y	8		SR5-13		
40-1		J13-R	17Y	8		SR5-14		
40-2		J13-S	17Y	8		SR5-15		
41		J13-T	17Y	8		SR5-16		
42-1		J13-U	17Y	8		SR5-17		
42-2		J13-V	17Y	8		SR5-18		

I.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION K

NASA DRAWING NO. 2018614
SHEET 6 of 7

TDRR 17101 MAR 2 1965

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	FROM CIRCUIT POINT	FROM STRIP WIRE OR JACKET	FROM TERMINATION SPEC FIND NO.	FROM TERMINATION NO.	TO CIRCUIT POINT	TO TERMINATION SPEC FIND NO.	TO TERMINATION NO.
45		J13-Y	17Y	8		SR5-21		
46		J13-Z	17Y	8		SR5-22		
47		J13-CC	17Y	8		SR5-25		
48		J13-DD	17Y	8		SR5-26		
49-1		J13-EE	17Y	8		SR5-27		
49-2		J13-FF	17Y	9		SR5-28		
50-1		J13-EE	17Y			B3A-P3		
50-2		J13-FF	17Y			B3A-P1		
51-1		J13-HH	17Y	9		SR5-29		
51-2		J13-JJ	17Y	9		SR5-30		
52-1		J13-HH	17Y			B3A-P2		
52-2		J13-JJ	17Y			B3A-P4		
53		J13-KK	17Y	8		SR5-31		
54		J13-LL	17Y	8		SR5-32		
55		J13-MM	17Y	8		SR5-33		
56		J13-NN	17Y	8		SR5-34		

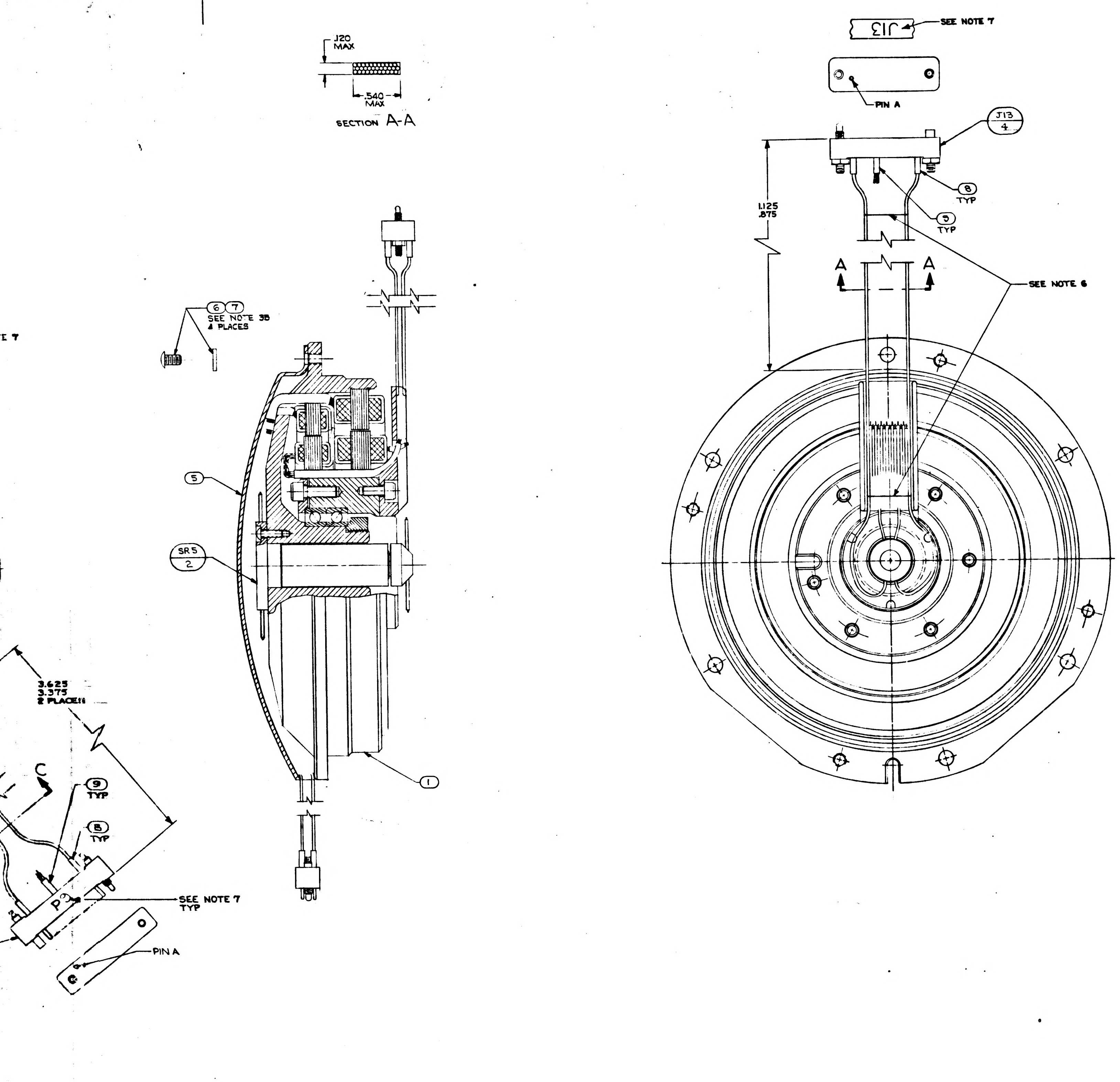
I.A. RESOLV.

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

REVISION K

NASA DRAWING NO. 2018614
SHEET 7 of 7

REVISIONS TDRR 17101			
SYM	DESCRIPTION	DATE	APPROVAL



.120 MAX
.540 MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13 / 4
8 TYP
9 TYP
1.125 / .875
A
A
SEE NOTE 6
6 7 SEE NOTE 3B 4 PLACES
5
SR5 / 2
1
3.625 / 3.375 2 PLACES
C
9 TYP
8 TYP
P3
SEE NOTE 7 TYP
PIN A

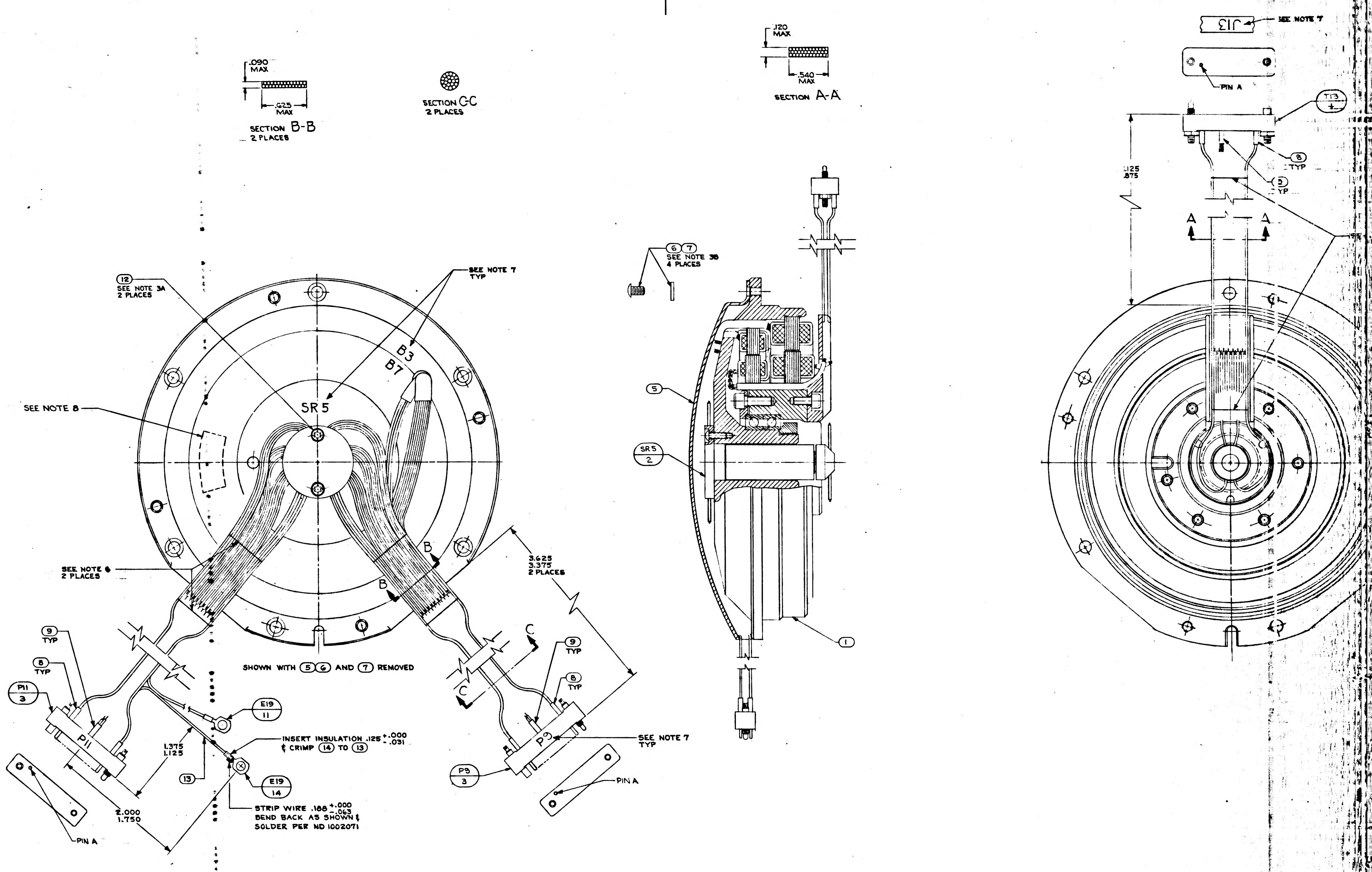
F-2

1	1010717-1	TERMINAL, LUG	14
1	1010416-1	WIRE AWG 28E BLK 3½" LONG	13
2	1010891-2	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	12
1	1000020-6	SHIELD & GROUND ASSY	11
A/R	1012507-002	TAPE-LACING	10
17	1006776-14	INSULATION SLEEVING ELEC 5/16 LONG	9
57	1006776-18	INSULATION SLEEVING ELEC 5/16 LONG	8
4	MS15795-703	WASHER FLAT METAL ROUND	7
4	1010891-12	SCREW, BUTTON HD, SELF-LKG, SOC SPLINE	6
1	2018782	WIRE GUIDE, BRG HSG, I.A., RSVR	5
1	1000119-001	CONNECTOR, ELEC, RECEP, 34 PINS	4
2	1000123	CONNECTOR, ELEC, PLUG, 26 PINS	3
1	2018634	SLIP, RING ASSY, ELEC, 40 CONTACT	2
1	2018608-011	RESOLVER ASSEMBLY INNER AXIS	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
011	LIST OF MATERIALS		

2018614

2018604	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING MATERIAL HEAT TREATMENT FINAL FINISH	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG NO CONTRACT DRAWN DTB DATE 1/18/64 CHECKED G QUINN 2/24/65 APPROVAL 24 Feb 65 APPROVAL NASA APPROVAL 3-2-65 MIT APPROVAL 3 Mar 65	MANNED SPACECRAFT CENTER HOUSTON, TEXAS INTERGIMBAL SUB ASSEMBLY RESOLVER INNER AXIS CODE IDENT NO. SIZE J NASA DRAWING NO. 2018614 SCALE 2/1 WT SHEET 1 OF 7
NEXT ASSY	USED ON			
APPLICATION				

2018614	REV	SHEET 1


.090
MAX
.625
MAX
SECTION B-B
2 PLACES
SECTION C-C
2 PLACES
.120
MAX
.540
MAX
SECTION A-A
J13
SEE NOTE 7
PIN A
J13
4
8
TYP
5
TYP
1.125
.875
A
A
6 7
SEE NOTE 3B
4 PLACES
12
SEE NOTE 3A
2 PLACES
SEE NOTE 7
TYP
B3
B7
SR5
SEE NOTE 8
5
SR5
2
1
SEE NOTE 6
2 PLACES
B
B
3.625
3.375
2 PLACES
C
C
SHOWN WITH 5 6 AND 7 REMOVED
9
TYP
8
TYP
P11
3
P11
E19
11
INSERT INSULATION .125 +.000 -.031
& CRIMP 14 TO 13
1.375
1.125
13
E19
14
STRIP WIRE .188 +.000 -.063
BEND BACK AS SHOWN &
SOLDER PER ND 1002071
2.000
1.750
PIN A
9
TYP
8
TYP
P9
SEE NOTE 7
TYP
P9
3
PIN A

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. ASSEMBLE & TEST PER THE REQUIREMENTS OF PS 2007203
3. SCREW TORQUE REQUIREMENTS ±7%
   - A. 3.5 IN-LB
   - B. 5.0 IN-LB
4. SOLDER LEADS TO ③ & ④ PER ND 1002071.
5. HEAT SHRINK SLEEVING ON ⑪ AFTER ASSEMBLY.
6. USE CHICAGO STITCH LACING IN AREAS INDICATED PER ND 1002032
7. MARK CHARACTERS $^{.10}_{.14}$ HIGH. COLOR BLACK AT LOCATION SHOWN PER ND 1002019.
8. IDENTIFY USING DRAWING NO, REVISION LETTER & MANUFACTURERS SYMBOL AT THE INDICATED LOCATION PER NOTE 7 AND SERIALIZE PER ND 1002023.
9. MAXIMUM ALLOWABLE TORQUE 5 OZ-IN.
10. Y OR N IN TINNED COLUMN ON SHEETS 2 THRU 7 INDICATES YES OR NO
11. CONDUCTORS WITH THE SAME NUMBER SHALL BE TWISTED OR TWISTED & SHIELDED. TWIST PER ND 1002032.
12. SPARE LEADS TO BE EITHER 7.00 ±.12 LONG & TERMINATED NEAR $\frac{P9}{3}$ OR 4.00 ±.12 LONG AND TERMINATED NEAR $\frac{J13}{4}$ AFTER FOLDING BACK ON THEMSELVES. ENDS TO BE INSULATED BEFORE TIEING INTO CABLE.
13. DIMENSIONS ON SHEETS 2 THRU 7 ARE INCHES AND 2 PLACE DECIMALS
14. SUFFIX LETTERS IN CONDUCTOR COLUMN ON SHEETS 2 THRU 7 INDICATES THE FOLLOWING:
    - A = SHIELD GROUND ON "FROM END"
    - B = SHIELD GROUND ON "TO END"

E-1

2018614	REV	SHEET 1

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION

NASA DRAWING NO. 201614

SHEET 2 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO NO.
1			P9-A	13Y		8			SR5-26					
2-1			P9-B	13Y		8			SR5-27					
2-2			P9-C	13Y		8			SR5-28					
3-1			P9-D	13Y		8			SR5-29					
3-2			P9-E	13Y		8			SR5-30					
4-1			P9-J	13Y		8			B3A-S3					
4-2			P9-K	13Y		8			B3A-S1					
5-1			P9-L	13Y		8			B3A-S2					
5-2			P9-M	13Y		8			B3A-S4					
6-1			P9-N	13Y		8			B3B-S3					
6-2			P9-P	13Y		8			B3B-S1					
7-1			P9-R	13Y		8			B3B-S2					
7-2			P9-S	13Y		8			B3B-S4					
8			P9-T	13Y		8			SR5-21					
9			P9-U	13Y		8			SR5-31					
10			P9-V	13Y		8			SR5-32					

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION

NASA DRAWING NO. 201614

SHEET 3 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO NO.
11-1			P9-W	13Y		8			SR5-23					
11-2			P9-Y	13Y		8			B7-S3					
11-3			P9-a	13Y		9			B7-S1					
12-1			P9-a	13Y					B7-S4					
12-2			P9-Z	13Y		8			B7-S2					
12-3			P9-b	13Y		8			SR5-22					
12-4			P9-X	13Y		8			SR5-24					
13			P9-c	13Y		8			SR5-25					
14			P9-d	13Y		8			SR5-33					
15			P11-A	13Y		9			SR5-1					
16	13		P11-A	13Y					E19	19Y		14		
17						11								
17A			SHLD-17						E19					
17-1			P11-B	13Y		9			SR5-2					
17-2			P11-B	13Y					SR5-3					
17-3			P11-D	13Y		9			SR5-4					
17-4			P11-D	13Y					SR5-5					

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REVISION

NASA DRAWING NO. 201614

SHEET 4 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO NO.
18-1			P11-F	13Y		9			SR5-6					
18-2			P11-F	13Y					SR5-7					
18-3			P11-J	13Y		9			SR5-8					
18-4			P11-J	13Y					SR5-9					
19			P11-L	13Y		8			SR5-10					
20			P11-M	13Y		8			SR5-11					
21			P11-N	13Y		8			SR5-12					
22			P11-P	13Y		8			SR5-13					
23-1			P11-R	13Y		8			SR5-14					
23-2			P11-S	13Y		8			SR5-15					
24			P11-T	13Y		8			SR5-16					
25-1			P11-U	13Y		8			SR5-17					
25-2			P11-V	13Y		8			SR5-18					
26			P11-W	13Y		8			SR5-19					
27			P11-X	13Y		8			SR5-20					

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION

NASA DRAWING NO. 201614

SHEET 5 of 7

CONDUCTOR FIND NUMBER	CONDUCTOR NO.	INDIVIDUAL LENGTH	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	FROM TERMINATION FIND NO.	FROM TERMINATION SPEC	FROM NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT		T/N	TO TERMINATION FIND NO.	TO TERMINATION SPEC	TO NO.
28			P13-A	13Y		8			SR5-1					
29-1			P13-B	13Y		9			SR5-2					
29-2			P13-B	13Y					SR5-3					
29-3			P13-D	13Y		9			SR5-4					
29-4			P13-D	13Y					SR5-5					
30			P13-C	13Y		8			SR5-35					
31			P13-E	13Y		8			SR5-36					
32-1			P13-F	13Y		9			SR5-6					
32-2			P13-F	13Y					SR5-7					
32-3			P13-J	13Y		9			SR5-8					
32-4			P13-J	13Y					SR5-9					
33			P13-H	13Y		8			SR5-37					

TDRR 17101 MAR 2 1965

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MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION

NASA DRAWING NO. 201861 4

SHEET 6 of 7

CONDUCTOR FIND NUMBER	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		FROM: TERMINATION SPEC FIND NO.	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT
34-1	J13-K	13Y	9	B7-P4
34-2	J13-AA	13Y	9	B7-P2
34-3	J13-AA	13Y		SR5-23
35-1	J13-K	13Y		B7-P1
35-2	J13-BB	13Y	9	B7-P3
35-3	J13-BB	13Y		SR5-24
36	J13-L	13Y	8	SR5-10
37	J13-M	13Y	8	SR5-11
38	J13-N	13Y	8	SR5-12
39	J13-P	13Y	8	SR5-13
40-1	J13-R	13Y	8	SR5-14
40-2	J13-S	13Y	8	SR5-15
41	J13-T	13Y	8	SR5-16
42-1	J13-U	13Y	8	SR5-17
42-2	J13-V	13Y	8	SR5-18
43	J13-W	13Y	8	SR5-19
44	J13-X	13Y	8	SR5-20

TDRR 17101 MAR 2 1965

I.A. RESOLV.

MANNED SPACECRAFT CENTER HOUSTON TEXAS

REVISION

NASA DRAWING NO. 201861 4

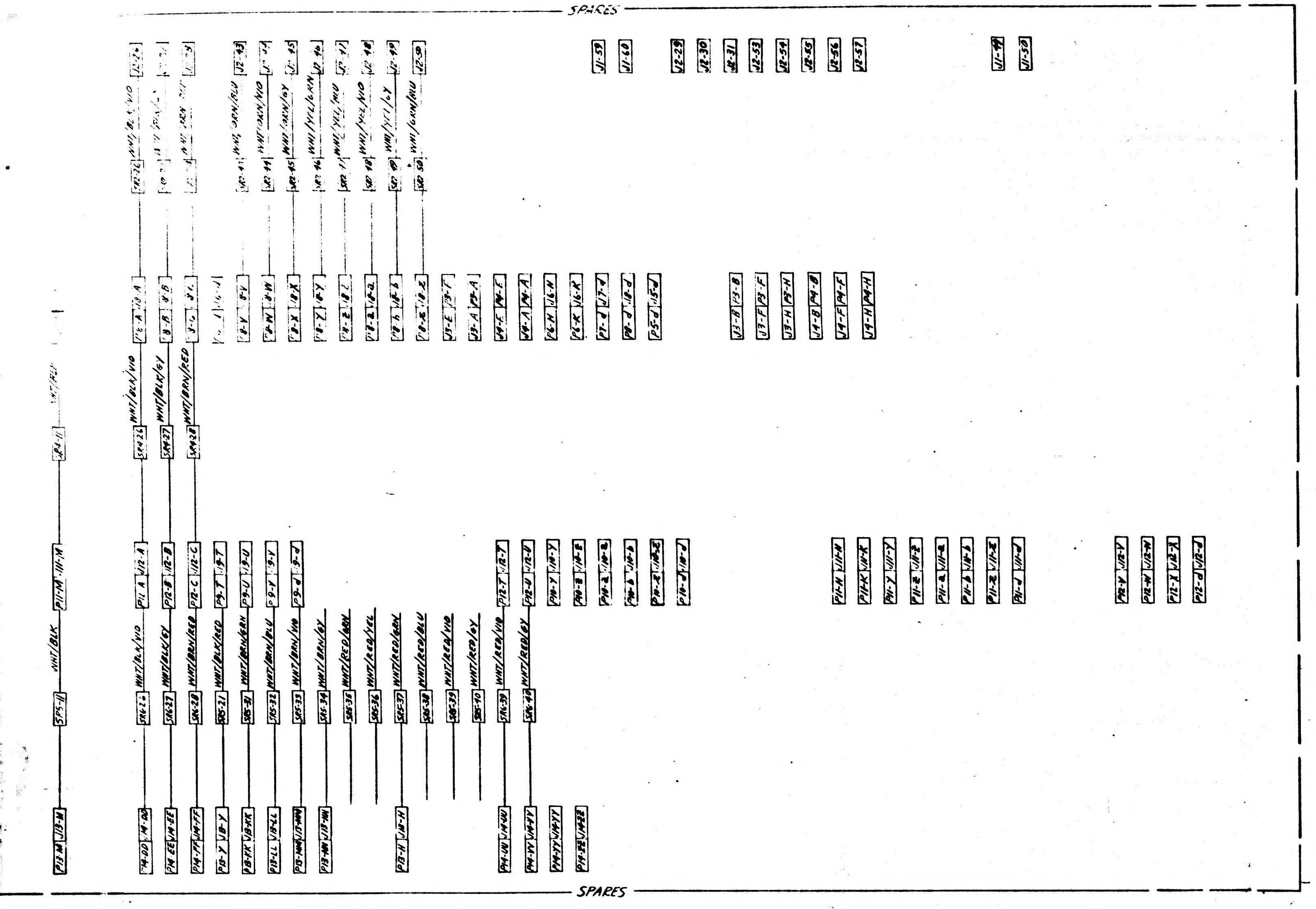
SHEET 7 of 7

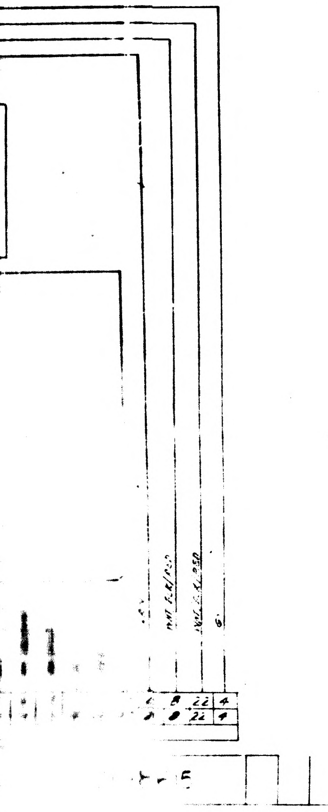
CONDUCTOR FIND NUMBER	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT		FROM: TERMINATION SPEC FIND NO.	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT
45	J13-Y	13Y	8	SR5-21
46	J13-Z	13Y	8	SR5-22
47	J13-CC	13Y	8	SR5-25
48	J13-DD	13Y	8	SR5-26
49-1	J13-EE	13Y	8	SR5-27
49-2	J13-FF	13Y	9	SR5-28
50-1	J13-EE	13Y		B3A-P3
50-2	J13-FF	13Y		B3A-P1
51-1	J13-HH	13Y	9	SR5-29
51-2	J13-JJ	13Y	9	SR5-30
52-1	J13-HH	13Y		B3A-P2
52-2	J13-JJ	13Y		B3A-P4
53	J13-KK	13Y	8	SR5-31
54	J13-LL	13Y	8	SR5-32
55	J13-MM	13Y	8	SR5-33
56	J13-NN	13Y	8	SR5-34

2018615

SYM	DESCRIPTION	DATE	APPROVAL
-	REVISED PER TDRR [illegible]	[illegible]	[illegible]

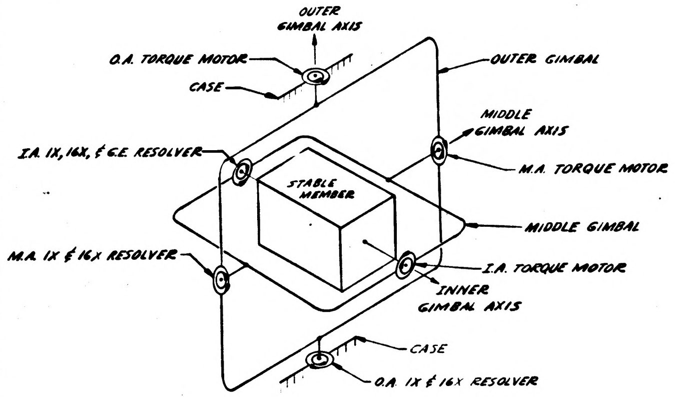
REVISIONS TDRR --54





REFERENCE DESIGNATION	DESCRIPTION	PART NUMBER	NO. REQ'D
A1, A2, A3	PIP	2018639	3
A4, A5, A6	PIP PREAMP	2007060	3
A7	PRECISION RESOLVER ASSY	2007204-011	1
A8, A9	HEATER	2018641	2
A10, A11, A12	HTR & TAPERED MOUNT ASSY, 25 IRIG	2018741	3
A13	TEMP CONTROL MODULE	2007064-011	1
A14	TEMP CONTROL THERMOSTAT	2018637	1
A15	TEMP ALARM MODULE	2007170-011	1
A16	TEMP ALARM THERMOSTAT	2018636	1
A17	BLOWER CONTROL MODULE	2007171-011	1
A18	BLOWER CONTROL THERMOSTAT	2018635	1
B4	TORQUE MOTOR	2018629	1
B1, B2, B3	RESOLVER, MULTIPLE SPEED (1X & 16X)	2018631	3
B5, B6	TORQUE MOTOR	2018623	2
B7	RESOLVER, GYRO ERROR	2018632	1
B8, B9	BLOWER	2018644	2
C1, C2	CAPACITOR	1010799-	2
E1, E2	TERMINAL LUG	1010717-1	4
E10 THRU E23	TERMINAL LUG	1010717-1	28
E41 THRU E44	TERMINAL	1001600-1	4
E45 THRU E47	TERMINAL	1001600-1	3
E50 THRU E59	TERMINAL	1000100-3	5
E61, E62	SPLICE	———	2
F1, F2	FUSE	1000170-12	2
E70 THRU E73	TERMINAL	1000100-3	4
J1	CONNECTOR - RECEPTACLE	1010783-1	1
J2	↓ ↓	1010783-2	1
J3, J4	↓ ↓	1011741-000	2
J5 THRU J12	↓ ↓	1000122	8
J13	↓ ↓	1000119-1	1
J14	↓ ↓	1010813-1	1
J15, J16, J17	↓ ↓	1010852-26	3
J18, J19, J20	↓ PLUG	1001497-2	3
K1	RELAY	1010353-10	1
MP1, MP2, MP3	IRIG	2021500	3
P3, P4	CONNECTOR, PLUG	1011757-000	2
P5 THRU P12	↓ ↓	1000123	8
P13	↓ ↓	1000120-1	1
P14	↓ ↓	1010813-4	1
P15, P16, P17	↓ RECEPTACLE	1000121	3
P18, P19, P20	↓ RECEPTACLE	1001497-1	3
R1	RESISTOR, FIXED	1010928-	1
R2	↓ ↓	↓	1
R3	↓ ↓	↓	1
R4	↓ ↓	↓	1
R5	↓ ↓	↓	1
R6	↓ ↓	↓	1
R7, R8	↓ ↓	1010312-37	2
SR1, SR2	SLIP RING ASSY	2018625	2
SR3, SR4	SLIP RING ASSY	2018624	2
SR5, SR6	SLIP RING ASSY	2018634	2
S1, S2	SAFETY THERMOSTAT	1001485	2
T1	TRANSFORMER	2007019	1

VALUES SELECTED AT ASSY (R1 THRU R6)



NOTE 1. ARROWS ON RESOLVERS & TORQUE MOTORS INDICATE THE POSITIVE DIRECTION OF ROTATION OF THE INNER MEMBER WITH RESPECT TO THE OUTER MEMBER AND THE OUTER MEMBER WITH RESPECT TO THE INNER MEMBER WHEN VIEWED ALONG THE AXIS IN A POSITIVE DIRECTION.

DRAWINGS FOR REFERENCE:

2018601	IMU ASSY BLK II
2018796	WIRING HARNESS A
2018797	WIRING HARNESS B
2018798	WIRING HARNESS C

MIT
INSTRUMENTATION LAB
Cambridge, Mass
DWG. NO. CONTRACT

DRAWN THENO DATE 8-27-64
CHECKED WINBERG
APPROVAL A. E. Winberg 3-8-65
APPROVAL [illegible] 23 Mar 65
NASA APPROVAL W. J. Rhine 3-23-65
MIT APPROVAL W. Kupfer 23 Mar 65

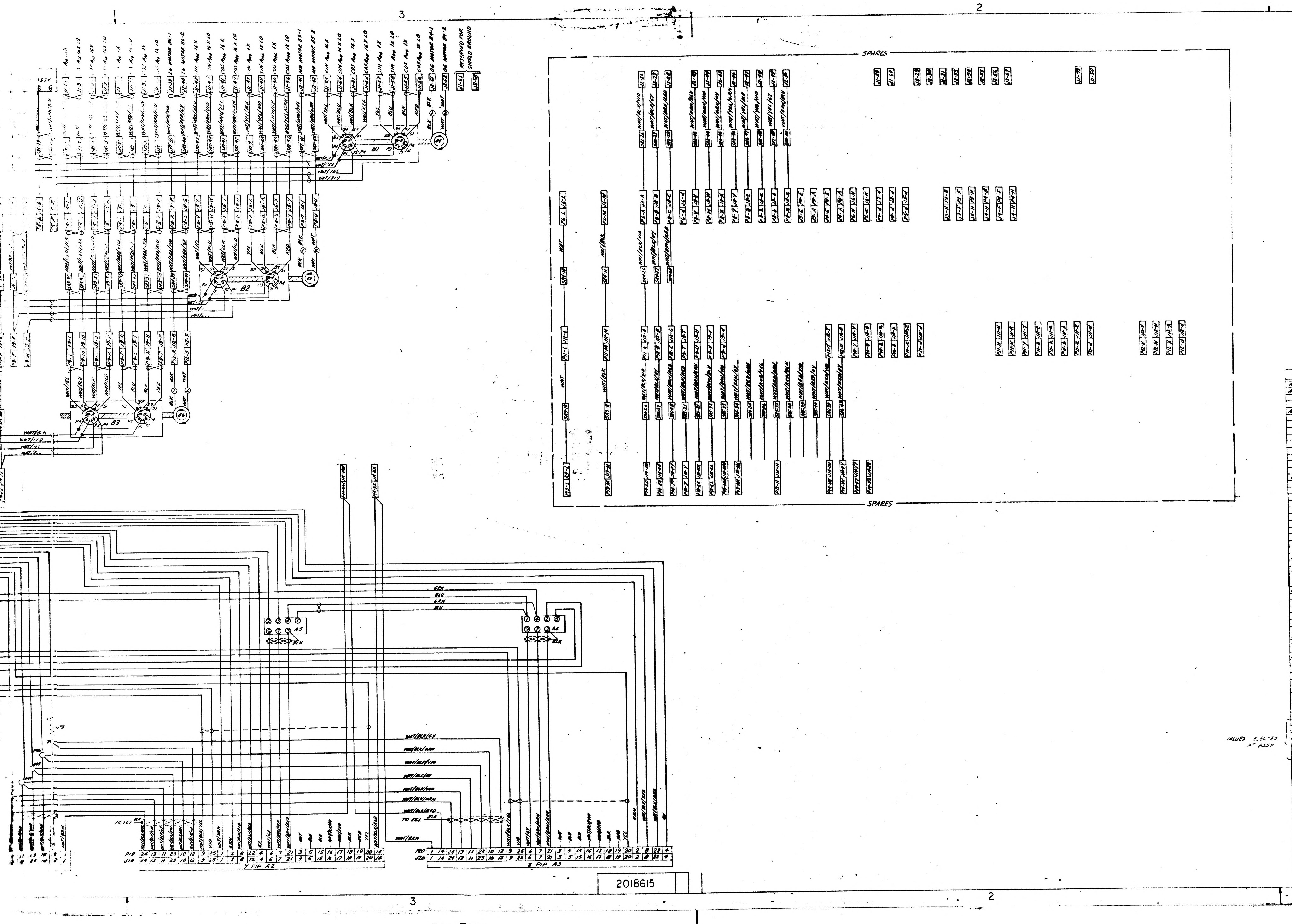
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

IMU WIRING DIAGRAM
BLOCK II

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	J	2018615

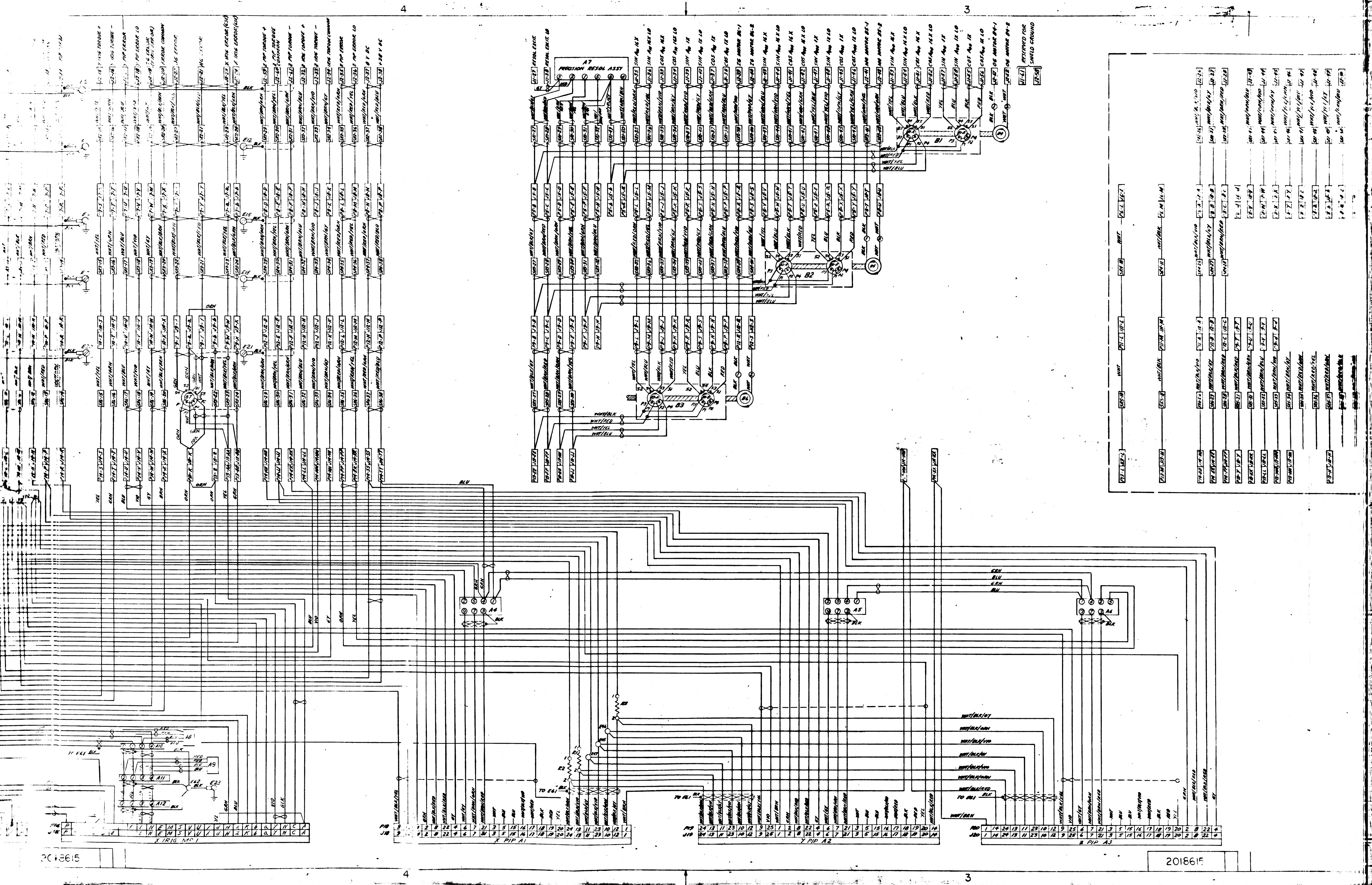
SCALE WT SHEET 1 OF 1

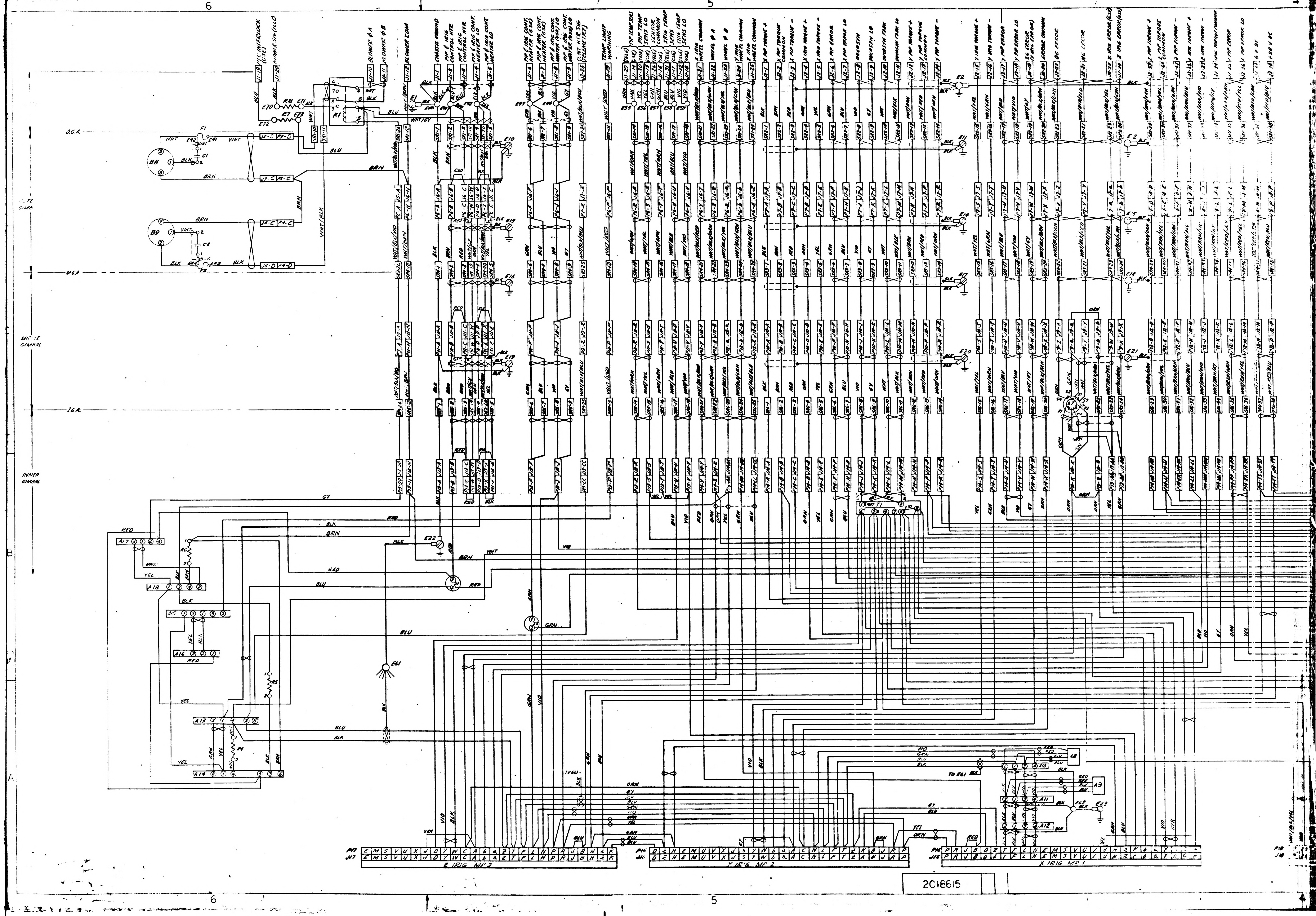
2018615


3
2
SPARES
SPARES
B1
B2
B3
B4
B5
B6
RESERVED FOR SHIELD GROUND
J1-61
J2-59
OG MOTOR B4-1
OG MOTOR B4-2
IG MOTOR B6-1
IG MOTOR B6-2
MG MOTOR B5-1
MG MOTOR B5-2
SIN Aog 16X
SIN Aog 16X LO
COS Aog 16X
COS Aog 16X LO
SIN Aog 1X
SIN Aog 1X LO
COS Aog 1X
COS Aog 1X LO
SIN Amg 16X
SIN Amg 16X LO
COS Amg 16X
COS Amg 16X LO
SIN Amg 1X
SIN Amg 1X LO
COS Amg 1X
COS Amg 1X LO
WHT/BLK
WHT/RED
WHT/YEL
WHT/BLU
A5
A6
GRN
BLU
GRN
BLU
BLK
WHT/BLK/GY
WHT/BLK/ORN
WHT/BLK/VIO
WHT/BLK/GY
WHT/BLK/VIO
WHT/BLK/ORN
WHT/BLK/RED
TO E61
WHT/BRN
P19
J19
Y PIP A2
P20
J20
Z PIP A3
VALUES SELECTED AT ASSY

2018615

REFERENCE DESIGNATION	
A1 A2, A3	PIP
A4, A5, A6	PIP PREAMP
A7	PRECISION
A8, A9	HEA
A10, A11 A12	HTR &
A13	TEMP CONTROL
A14	TEMP CON
A15	TEMP ALARM
A16	TEMP ALARM
A17	BLOWER
A18	BLOWER
B4	TORQUE
B1, B2, B3	RESOLVER,
B5, B6	TORQUE
B7	RESOLVER,
B8, B9	BLOWER
C1, C2	CAPACITOR
E1, E2	TERMINAL
E10 THRU E2	TERMINAL
E41 THRU E44	TERMINAL
E45 THRU E47	TERMINAL
E50 THRU E53	TERMINAL
E61, E62	SPLICE
F1, F2	FUSE
E70 THRU E73	TERMINAL
J1	CONNEC
J2	
J3, J4	
J5 THRU J12	
J13	
J14	
J15, J16, J17	
J18, J19, J20	
K1	RELAY
MP1, MP2, MP	RING
P3, P4	CONNECTOR,
P5 THRU P12	
P13	
P14	
P15, P16,	
P18, P19, P20	
R1	RESISTOR,
R2	
R3	
R4	
R5	
R6	
SR1, SR2	SLIP RING ASS
SR3, SR4	SLIP RING ASSY
SR5, SR6	SLIP RING ASS
S1, S2	SAFETY
T1	TRANSFORMER


4
3
A7
PRECISION RESOL ASSY
RESERVED FOR SHIELD GROUND
B1
B2
B3
B4
B5
B6
B7
A4
A5
A6
A8
A9
A10
A11
A12
E12
E15
E16
E21
E23
E62
R1
R2
R3
TO E61
X IRIG MP 1
X PIP A1
Y PIP A2
Z PIP A3
P16
J16
P18
J18
P19
J19
P20
J20
2018615
2018615


6
5
PTC INTERLOCK (GSE)
BLOWER SIG (TELE)
BLOWER φA
BLOWER φB
BLOWER COM
CHASSIS GROUND
PIP & IRIG CONTROL HTR
PIP & IRIG CONTROL HTR
PIP & IRIG CONT. HEATER LO
PIP & IRIG CONT. HEATER LO
PIP & IRIG CONT. HEATER (GSE)
PIP & IRIG CONT. HEATER (GSE)
PIP & IRIG CONT. HEATER (GSE) LO
PIP & IRIG CONT. HEATER (GSE) LO
CONT HTR SIG (TELEMETRY)
TEMP LIMIT WARNING
PIP TEMP SENS
PIP TEMP SENS LO
SENSOR COMMON
IRIG TEMP SENS
IRIG TEMP SENS LO
(TELE)
(GSE)
X IRIG WHEEL COMMON
WHEEL φ A
WHEEL φ B
Y IRIG WHEEL COMMON
Z IRIG WHEEL COMMON
X PIP TORQUE +
X PIP TORQUE COMMON
X PIP TORQUE −
X IRIG TORQUE +
X IRIG TORQUE −
X PIP ERROR
X PIP ERROR LO
DUCOSYN
DUCOSYN LO
DUCOSYN FDBK
DUCOSYN FDBK LO
Y PIP TORQUE +
Y PIP TORQUE COMMON
Y PIP TORQUE −
Y IRIG TORQUE +
Y IRIG TORQUE −
Y PIP ERROR
Y PIP ERROR LO
IG ERROR (Y IRIG ERROR)
ERROR COMMON
OG ERROR
MG ERROR
X IRIG ERROR (GSE)
Z IRIG ERROR (GSE)
Z PIP TORQUE +
Z PIP TORQUE COMMON
Z PIP TORQUE −
Z IRIG TORQUE +
Z IRIG TORQUE −
IRIG TORQUE COMMON
Z PIP ERROR
Z PIP ERROR LO
6 V DC
+28 V DC
J1-19
J1-20
J1-10
J1-11
J1-12
J1-1
J1-2
J1-3
J1-4
J1-5
J1-6
J1-7
J1-8
J1-9
J2-25
J1-13
J1-29
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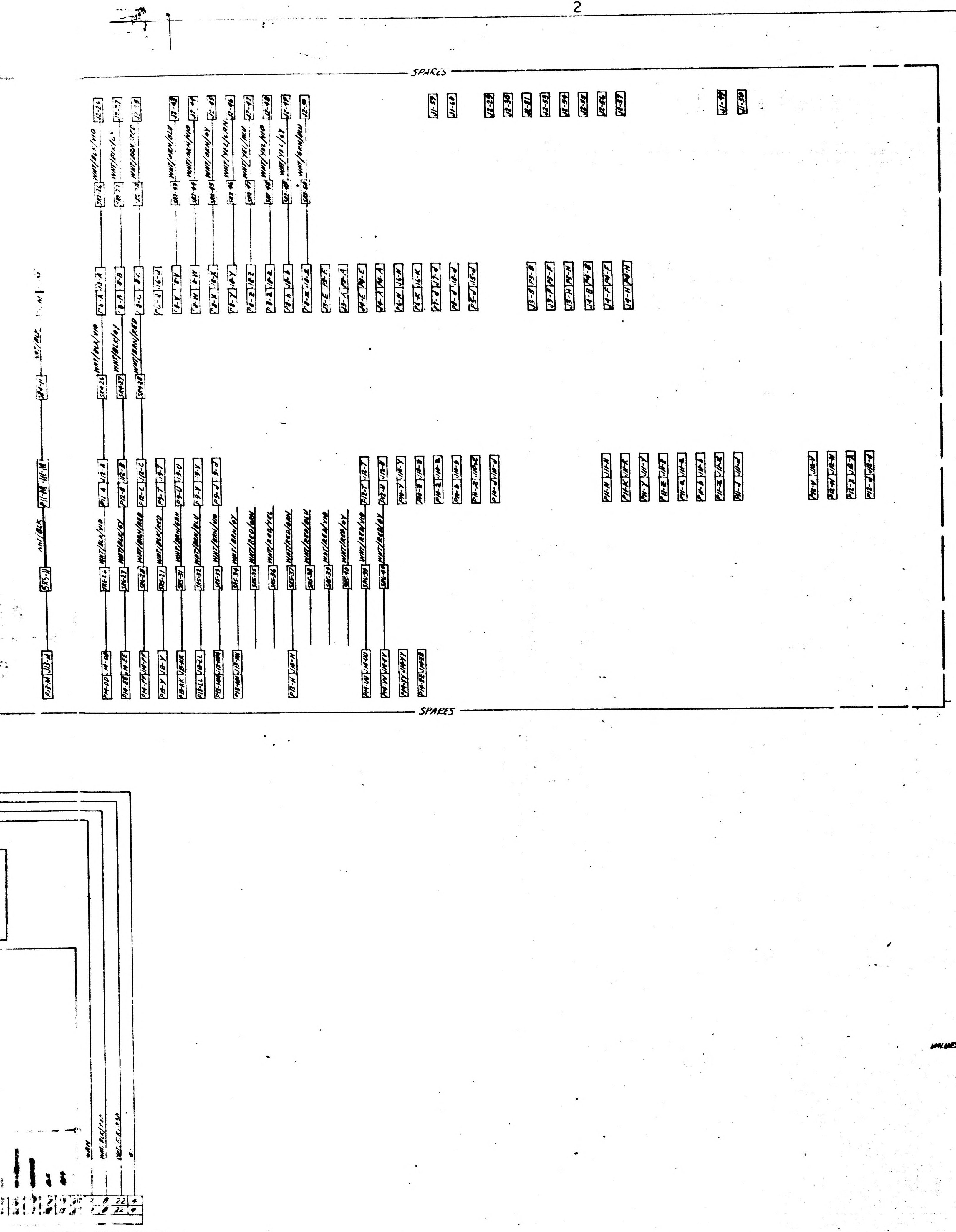
J2-59
J2-60
J2-61
J2-32
J2-33
J2-34
J2-35
J2-36
J2-38
OGA
OUTER GIMBAL
MGA
MIDDLE GIMBAL
IGA
INNER GIMBAL
B8
B9
F1
F2
C1
C2
K1
R5
R6
R7
R8
E1
E2
E5
E10
E11
E14
E16
E17
E19
E20
E21
E22
E23
E61
E62
E70
E71
E72
E73
A8
A9
A10
A11
A12
A13
A14
A15
A16
A17
A18
T1
TO E61
BLU
BLK
WHT
BRN
RED
YEL
GRN
ORN
VIO
GY
WHT/GY
WHT/BRN
WHT/RED
WHT/BLK
WHT/BLK/BLU
P17
J7
E M S V U X d D Y W C A b a Z T F L N P R J B H Ƶ K
Z IRIG MP 3
P16
J16
D Ƶ H E M U V X d S Y W b a A C N L F T Z K B J R P
Y IRIG MP 2
P15
J15
P R J B D Ƶ T F L N E M S V U / d H Ƶ K b a Y
X IRIG MP 1
P18
J18
B
A
2018615

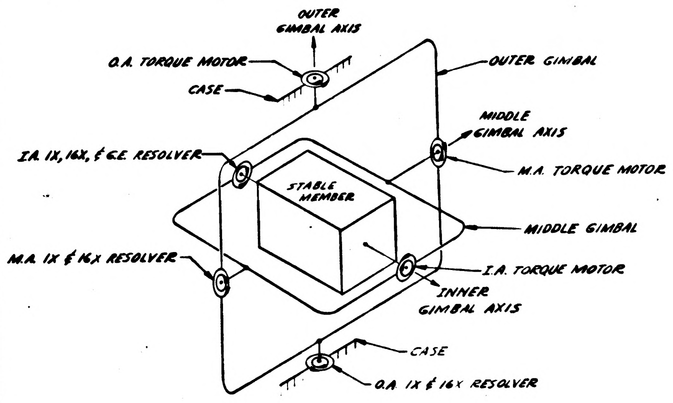
	2018615

SYM	REVISIONS TDRR DESCRIPTION	DATE	APPROVAL
-	REVISED PER TDRR 20659	[illegible]	[illegible]
3	REVISED PER TDRR 23343	[illegible]	[illegible]



REFERENCE DESIGNATION	DESCRIPTION	PART NUMBER	NO. REQ'D
A1, A2, A3	PIP	2018639	3
A4, A5, A6	PIP PREAMP	2007060	3
A7	PRECISION RESOLVER ASSY	2007204-011	1
A8, A9	HEATER	2018641	2
A10, A11, A12	HTR & TAPERED MOUNT ASSY, 25 IRIG	2018741	3
A13	TEMP CONTROL MODULE	2007064-011	1
A14	TEMP CONTROL THERMOSTAT	2018637	1
A15	TEMP ALARM MODULE	2007170-011	1
A16	TEMP ALARM THERMOSTAT	2018636	1
A17	BLOWER CONTROL MODULE	2007171-011	1
A18	BLOWER CONTROL THERMOSTAT	2018635	1
B4	TORQUE MOTOR	2018629	1
B1, B2, B3	RESOLVER, MULTIPLE SPEED (1X & 16X)	2018631	3
B5, B6	TORQUE MOTOR	2018623	2
B7	RESOLVER, GYRO ERROR	2018632	1
B8, B9	BLOWER	2018644	2
C1, C2	CAPACITOR	1010799-	2
E1, E2	TERMINAL LUG	1010717-1	4
E10 THRU E23	TERMINAL LUG	1010717-1	28
E41 THRU E44	TERMINAL	1001600-1	4
E45 THRU E47	TERMINAL	1001600-1	3
E50 THRU E59	TERMINAL	1000100-3	5
E61, E62	SPLICE	——	2
F1, F2	FUSE	1000170-12	2
E70 THRU E73	TERMINAL	1000100-3	4
J1	CONNECTOR - RECEPTACLE	1010783-1	1
J2		1010783-2	1
J3, J4		1011741-000	2
J5 THRU J12		1000122	8
J13		1000119-1	1
J14		1010813-1	1
J15, J16, J17		1010852-26	3
J18, J19, J20	PLUG	1001497-2	3
K1	RELAY	1010353-10	1
MP1, MP2, MP3	IRIG	2021500	3
P3, P4	CONNECTOR, PLUG	1011757-000	2
P5 THRU P12		1000123	8
P13		1000120-1	1
P14		1010813-4	1
P15, P16, P17	RECEPTACLE	1000121	3
P18, P19, P20	RECEPTACLE	1001497-1	3
R1	RESISTOR, FIXED	1010928-	1
R2			1
R3			1
R4			1
R5			1
R6			1
R7, R8		2021504-44	2
SR1, SR2	SLIP RING ASSY	2018625	2
SR3, SR4	SLIP RING ASSY	2018624	2
SR5, SR6	SLIP RING ASSY	2018634	2
S1, S2	SAFETY THERMOSTAT	1001485	2
T1	TRANSFORMER	2007019	1

VALUES SELECTED AT ASSY (R1 – R6)



NOTE 1. ARROWS ON RESOLVERS & TORQUE MOTORS INDICATE THE POSITIVE DIRECTION OF ROTATION OF THE INNER MEMBER WITH RESPECT TO THE OUTER MEMBER AND THE OUTER MEMBER WITH RESPECT TO THE INNER MEMBER WHEN VIEWED ALONG THE AXIS IN A POSITIVE DIRECTION.

DRAWINGS FOR REFERENCE:

2018601	IMU ASSY BLK II
2018796	WIRING HARNESS A
2018797	WIRING HARNESS B
2018798	WIRING HARNESS C

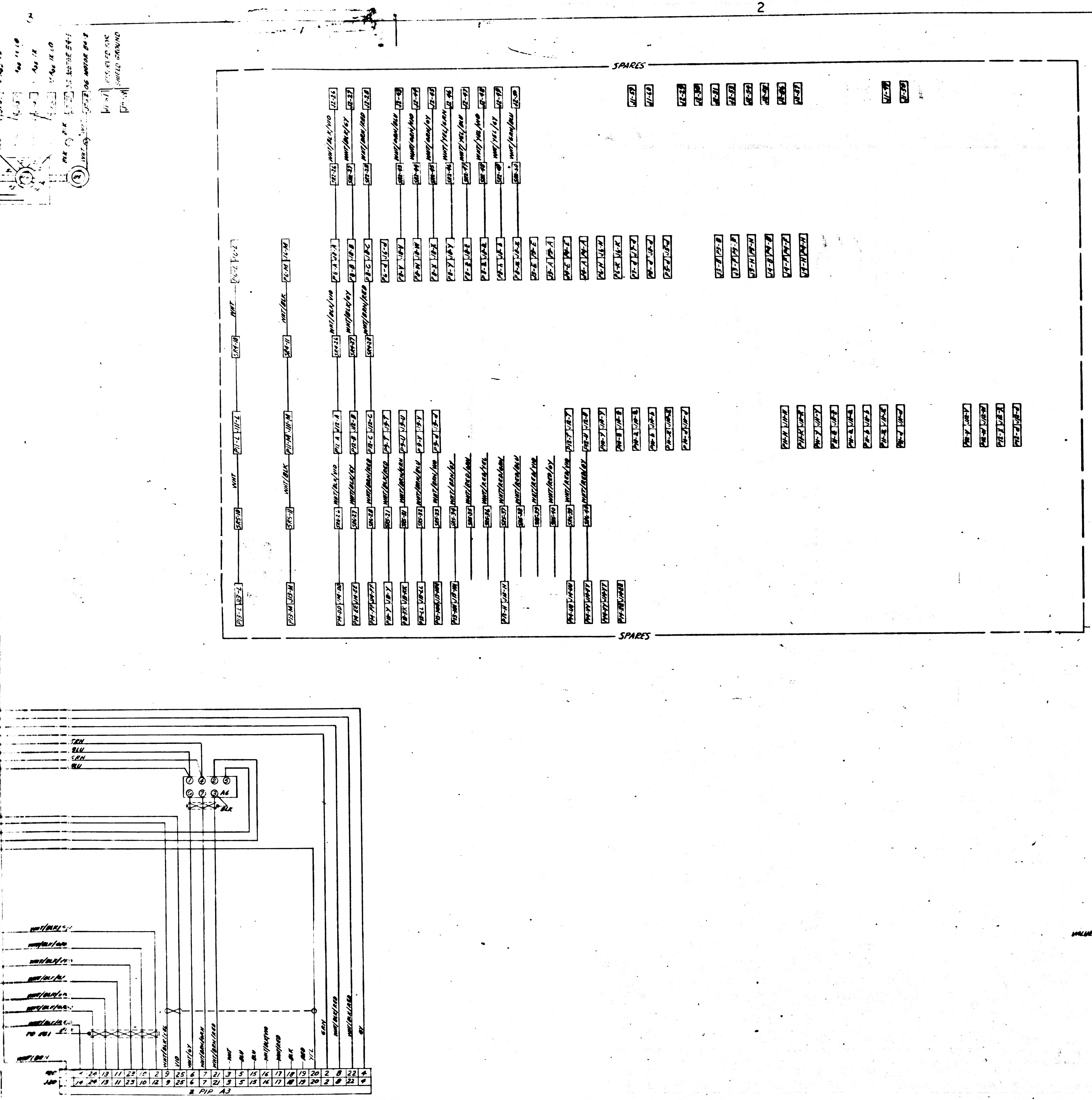
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO. CONTRACT

DRAWN THENO DATE [illegible]
CHECKED WINBERG
APPROVAL A. E. Winberg 3-8-65
APPROVAL [illegible]
NASA APPROVAL W. J. Rhine 3-23-65
MIT APPROVAL W Kupfer 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

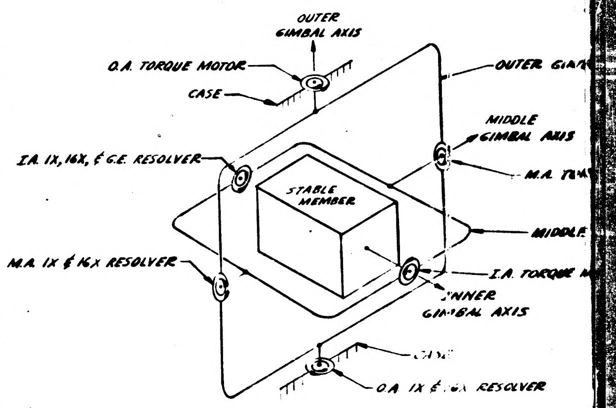
IMU WIRING DIAGRAM
BLOCK II

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018615
SCALE
WT
SHEET 1 OF 1


SPARES
SPARES
PIP A3
WHT
WHT/BLK
GRN
2018615
B

VALUES SELECTED AT ASSY (R1 thru R6)

REFERENCE DESIGNATION	DESCRIPTION	PART NUMBER	NO. REQ'D
A1, A2, A3	PIP	2018639	3
A4, A5, A6	PIP PREAMP	2007060	3
A7	PRECISION RESOLVER ASSY	2007204-011	1
A8, A9	HEATER	2018641	2
A10, A11, A12	HTR & TAPERED MOUNT ASSY, 25 IRIG	2018741	3
A13	TEMP CONTROL MODULE	2007064-011	1
A14	TEMP CONTROL THERMOSTAT	2018637	1
A15	TEMP ALARM MODULE	2007170-011	1
A16	TEMP ALARM THERMOSTAT	2018636	1
A17	BLOWER CONTROL MODULE	2007171-011	1
A18	BLOWER CONTROL THERMOSTAT	2018635	1
B4	TORQUE MOTOR	2018629	1
B1, B2, B3	RESOLVER, MULTIPLE SPEED (1X & 16X)	2018631	3
B5, B6	TORQUE MOTOR	2018623	2
B7	RESOLVER, GYRO ERROR	2018632	1
B8, B9	BLOWER	2018644	2
C1, C2	CAPACITOR	1010799-	2
E1, E2	TERMINAL LUG	1010717-1	4
E10 THRU E23	TERMINAL LUG	1010717-1	28
E41 THRU E44	TERMINAL	1001600-1	4
E45 THRU E47	TERMINAL	1001600-1	3
E50 THRU E59	TERMINAL	1000100-3	5
E61, E62	SPLICE	———	2
F1, F2	FUSE	1000170-12	2
E70 THRU E73	TERMINAL	1000100-3	4
J1	CONNECTOR - RECEPTACLE	1010783-1	1
J2		1010783-2	1
J3, J4		1011741-000	2
J5 THRU J12		1000122	8
J13		1000119-1	1
J14		1010813-1	1
J15, J16, J17		1010852-26	3
J18, J19, J20	PLUG	1001497-2	3
K1	RELAY	1010353-10	1
MP1, MP2, MP3	IRIG	2021500	3
P3, P4	CONNECTOR, PLUG	1011757-000	2
P5 THRU P12		1000123	8
P13		1000120-1	1
P14		1010813-4	1
P15, P16, P17	RECEPTACLE	1000121	3
P18, P19, P20	RECEPTACLE	1001497-1	3
R1	RESISTOR, FIXED	1010928-	1
R2			1
R3			1
R4			1
R5			1
R6			1
R7, R8		2021504-44	2
SR1, SR2	SLIP RING ASSY	2018625	2
SR3, SR4	SLIP RING ASSY	2018624	2
SR5, SR6	SLIP RING ASSY	2018634	2
S1, S2	SAFETY THERMOSTAT	1001485	2
T1	TRANSFORMER	2007019	1

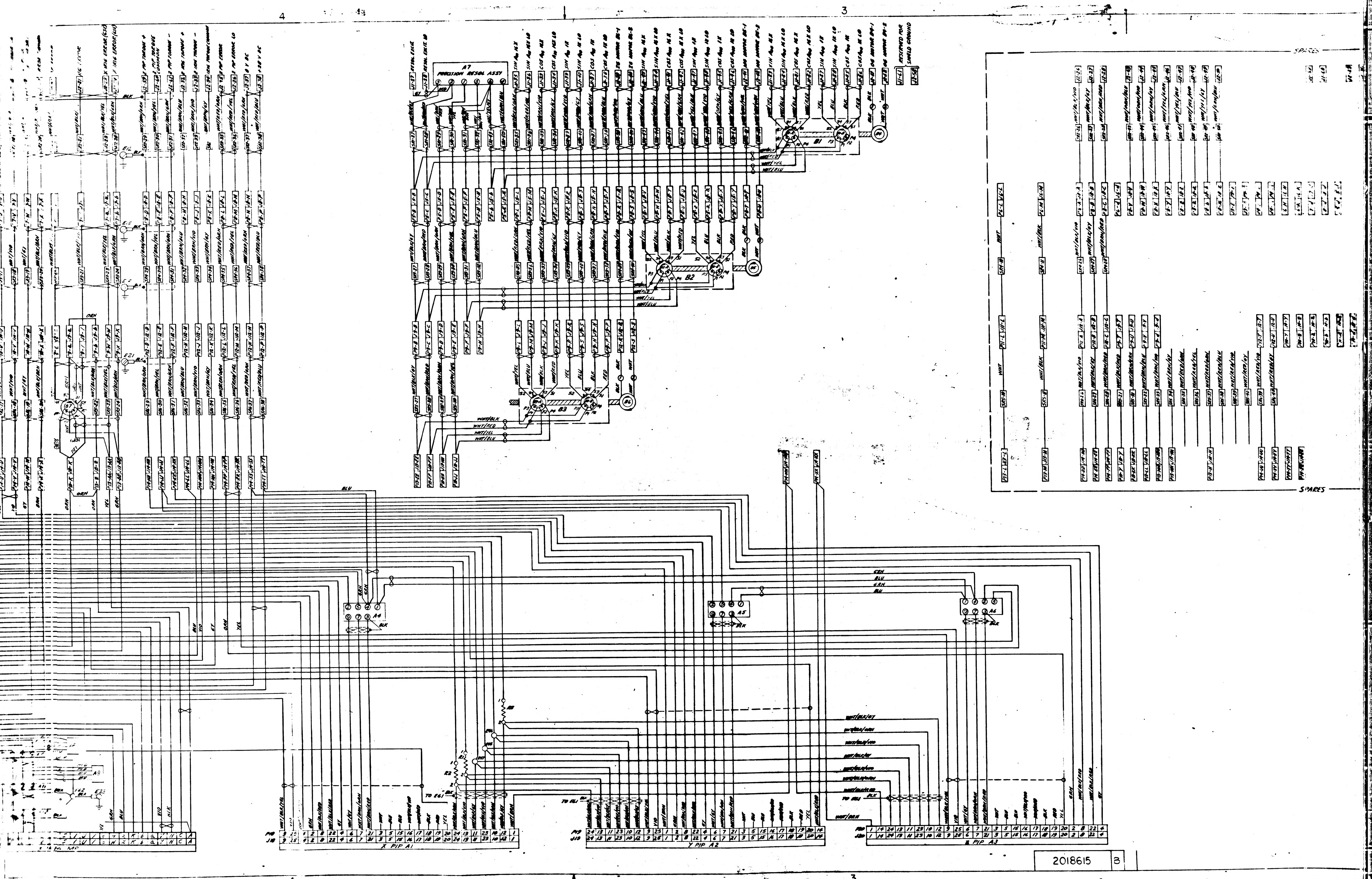

OUTER GIMBAL AXIS
O.A. TORQUE MOTOR
CASE
OUTER GIM
MIDDLE GIMBAL AXIS
M.A. TOR
I.A. 1X, 16X, & G.E. RESOLVER
STABLE MEMBER
MIDDLE
M.A. 1X & 16X RESOLVER
I.A. TORQUE M
INNER GIMBAL AXIS
CASE
O.A. 1X & 16X RESOLVER

NOTE 1. ARROWS ON RESOLVERS & TORQUE MOTORS INDICATE THE POSITIVE DIRECTION OF ROTATION OF THE INNER WITH RESPECT TO THE OUTER MEMBERS AND THE OUTER WITH RESPECT TO THE INNER MEMBER WHEN VIEWED THE AXIS IN A POSITIVE DIRECTION.

DRAWINGS FOR REFERENCE:
2018601 IMU ASSY BLK II
2018796 WIRING HARNESS
2018797 WIRING HARNESS
2018798 WIRING HARNESS

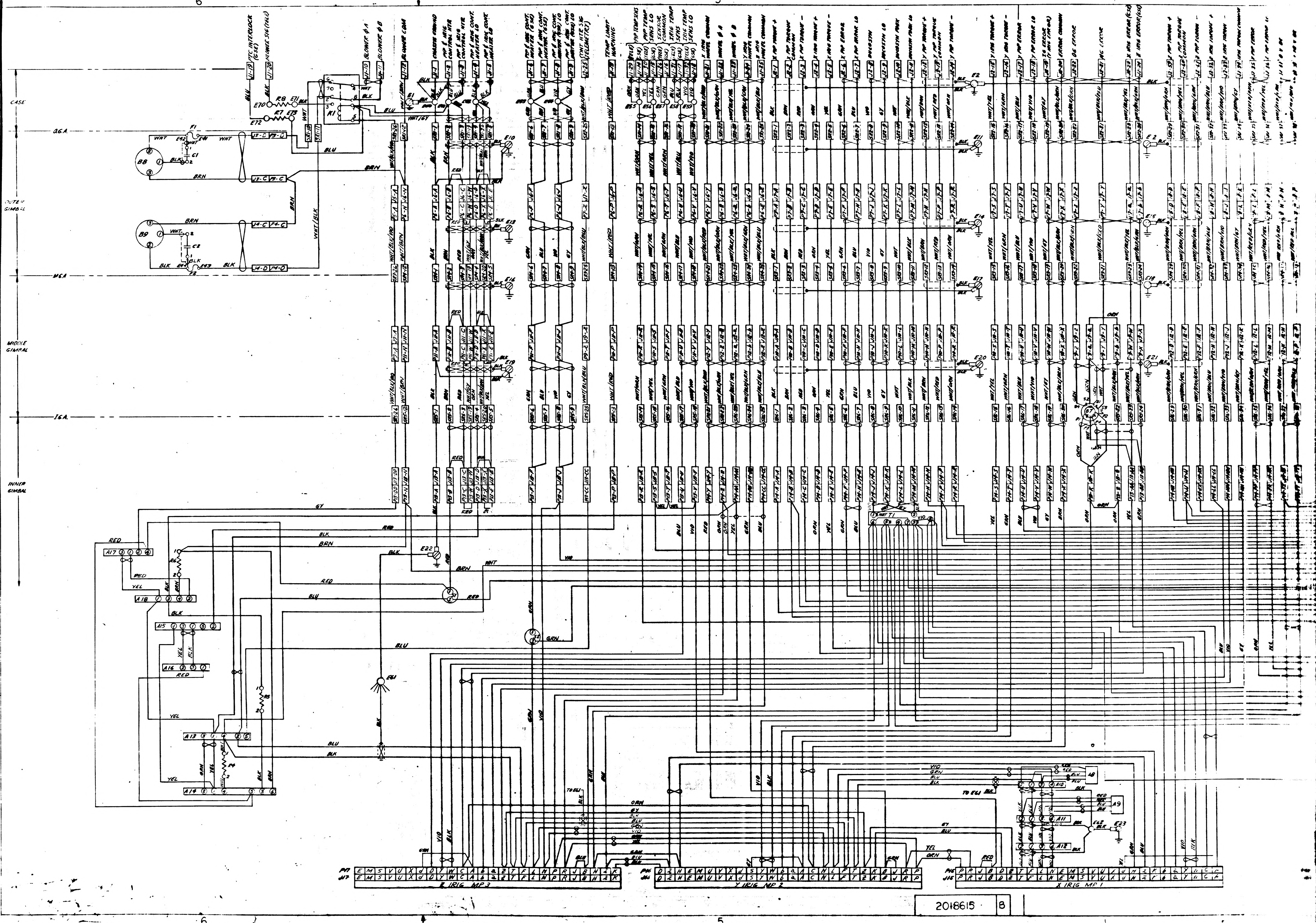
MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SP
DRAWN THENO DATE 8-27-?	IMU WIRIN BLO
CHECKED WINBERG	
APPROVAL D. E. Winberg 3-?-65	
APPROVAL Sarhoff	
NASA APPROVAL	CODE IDENT NO / SIZE J
MIT APPROVAL	SCALE / WT

2018615



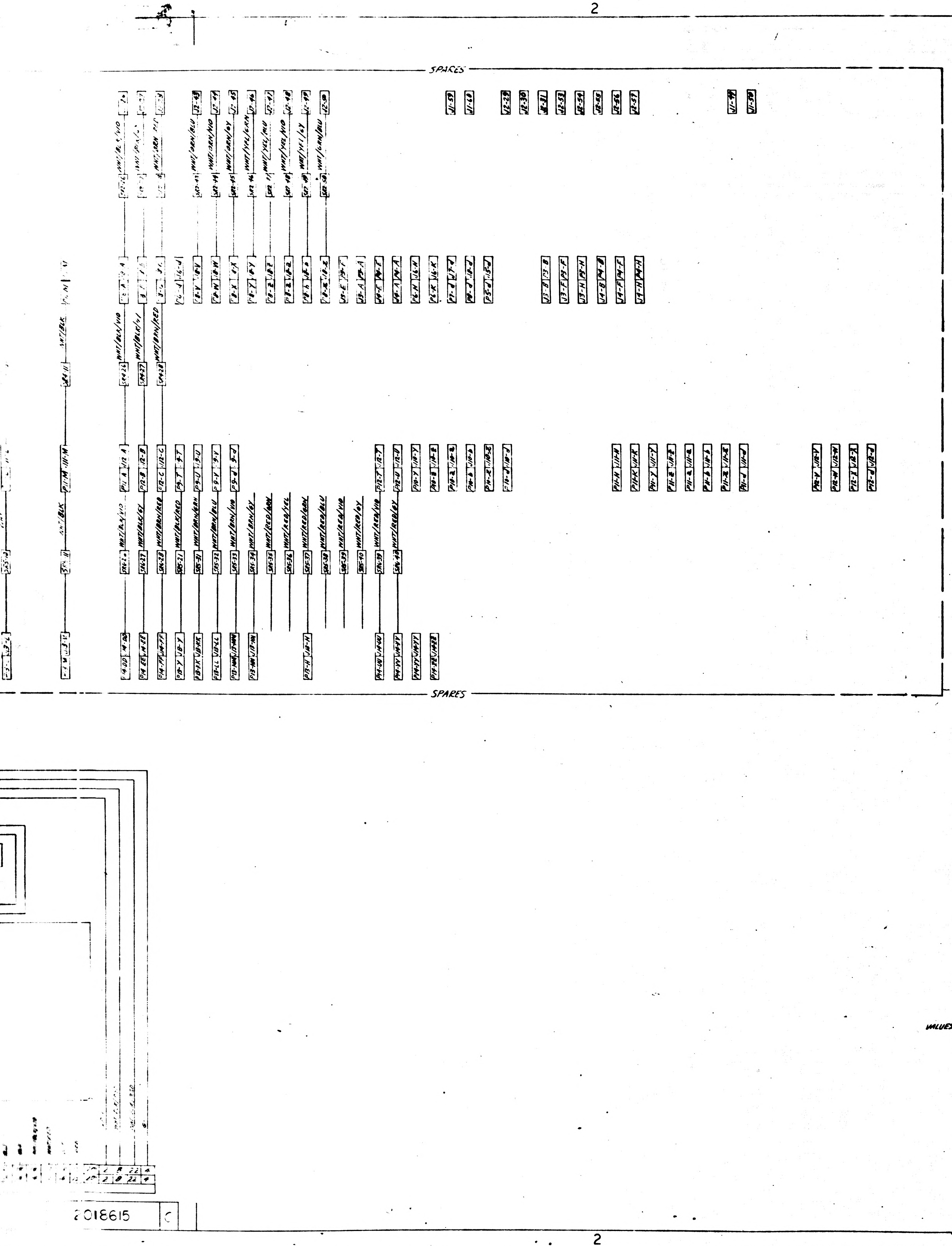
4
3
A7
PRECISION RESOL ASSY
B1
B2
B3
A4
A5
A6
SPARES
SPARES
RESERVED FOR SHIELD GROUND
TO E61
X PIP A1
Y PIP A2
Z PIP A3
P10
J10
BLU
GRN
ORN
YEL
VIO
BLK
WHT
RED
WHT/BLK
WHT/RED
WHT/YEL
WHT/BLU
R1
R2
R3
4
3

2018615 B


6
5
CASE
O.G.A.
OUTER GIMBAL
M.G.A.
MIDDLE GIMBAL
I.G.A.
INNER GIMBAL
TEC INTERLOCK (G&E)
BLOWER SIG (TELE)
BLOWER ØA
BLOWER ØB
BLOWER COM
K1
B8
B9
F1
F2
C1
C2
R7
R8
E70
E71
E72
E73
A17
A18
A15
A16
A13
A14
R4
R5
R6
E22
E61
A8
A9
A10
A11
A12
E23
T1
Z IRIG MP 3
Y IRIG MP 2
X IRIG MP 1
P17
J17
P16
J16
P15
J15
RED
BLK
BRN
WHT
BLU
YEL
GRN
GY
VIO
ORN
2018615
B

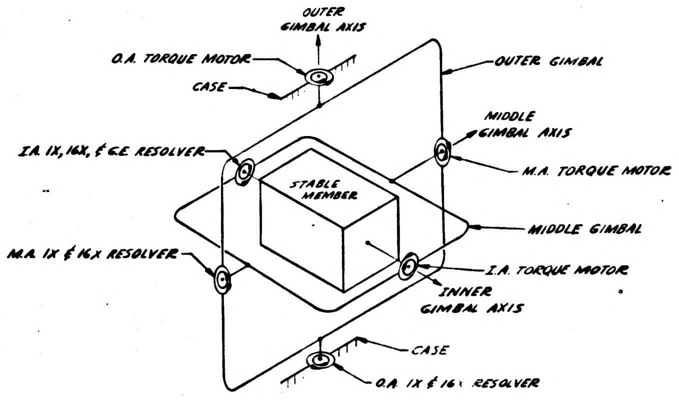
2018615	C		

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 17754			
-	REVISED PER TDRR 20659		
B	REVISED PER TDRR 23343	9Oct65	
C	REVISED PER TDRR 23864	23Nov65	



REFERENCE DESIGNATION	DESCRIPTION	PART NUMBER	NO. REQ'D
A1, A2, A3	PIP	2018639	3
A4, A5, A6	PIP PREAMP	2007060	3
A7	PRECISION RESOLVER ASSY	2007204-011	1
A8, A9	HEATER	2018641	2
A10, A11, A12	HTR & TAPERED MOUNT ASSY, 25 IRIG	2018741	3
A13	TEMP CONTROL MODULE	2007064-011	1
A14	TEMP CONTROL THERMOSTAT	2018637	1
A15	TEMP ALARM MODULE	2007170-011	1
A16	TEMP ALARM THERMOSTAT	2018636	1
A17	BLOWER CONTROL MODULE	2007171-011	1
A18	BLOWER CONTROL THERMOSTAT	2018635	1
B4	TORQUE MOTOR	2018629	1
B1, B2, B3	RESOLVER, MULTIPLE SPEED (1X & 16X)	2018631	3
B5, B6	TORQUE MOTOR	2018623	2
B7	RESOLVER, GYRO ERROR	2018632	1
B8, B9	BLOWER	2018644	2
C1, C2	CAPACITOR	1010799-	2
E1, E2	TERMINAL LUG	1010717-1	4
E10 THRU E23	TERMINAL LUG	1010717-1	28
E41 THRU E44	TERMINAL	1001600-1	4
E45 THRU E47	TERMINAL	1001600-1	3
E50 THRU E59	TERMINAL	1000100-3	5
E61, E62	SPLICE	————	2
F1, F2	FUSE	1000170-12	2
E70 THRU E73	TERMINAL	1000100-3	4
J1	CONNECTOR - RECEPTACLE	1010783-1	1
J2		1010783-2	1
J3, J4		1011741-000	2
J5 THRU J12		1000122	8
J13		1000119-1	1
J14		1010813-1	1
J15, J16, J17		1010852-26	3
J18, J19, J20	PLUG	1001497-2	3
K1	RELAY	1010353-10	1
MP1, MP2, MP3	IRIG	2021500	3
P3, P4	CONNECTOR, PLUG	1011757-000	2
P5 THRU P12		1000123	8
P13		1000120-1	1
P14		1010813-4	1
P15, P16, P17	RECEPTACLE	1000121	3
P18, P19, P20	RECEPTACLE	1001497-1	3
R1	RESISTOR, FIXED	1010928-	1
R2			1
R3			1
R4			1
R5			1
R6			1
R7, R8		2021504-44	2
SR1, SR2	SLIP RING ASSY	2018625	2
SR3, SR4	SLIP RING ASSY	2018624	2
SR5, SR6	SLIP RING ASSY	2018634	2
S1, S2	SAFETY THERMOSTAT	1001485	2
T1	TRANSFORMER	2007019	1

VALUES SELECTED AT ASSY



NOTE 1. ARROWS ON RESOLVERS & TORQUE MOTORS INDICATE THE POSITIVE DIRECTION OF ROTATION OF THE INNER MEMBER WITH RESPECT TO THE OUTER MEMBER AND THE OUTER MEMBER WITH RESPECT TO THE INNER MEMBER WHEN VIEWED ALONG THE AXIS IN A POSITIVE DIRECTION.

DRAWINGS FOR REFERENCE:
2018601 IMU ASSY BLK II
2018796 WIRING HARNESS A
2018797 WIRING HARNESS B
2018798 WIRING HARNESS C

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN THENO DATE 8-27-64
CHECKED WINBERG
APPROVAL A. E. Winberg 3-8-65
APPROVAL Sarhoff 23 Mar 65
NASA APPROVAL W. J. Rhine 3-23-65
MIT APPROVAL W Kupfer 23 Mar 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

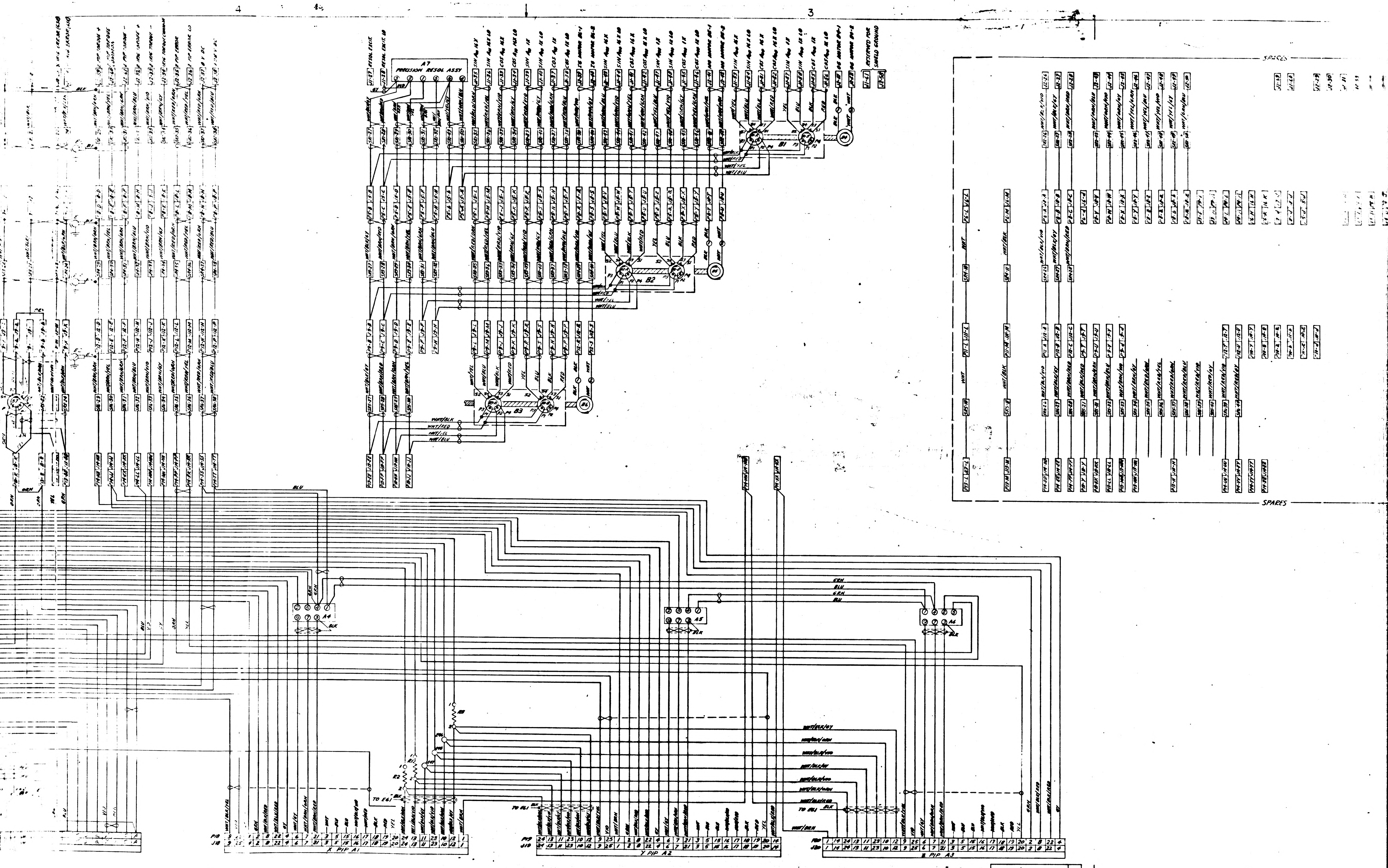
IMU WIRING DIAGRAM BLOCK II

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018615
SCALE
WT
SHEET 1 OF 1

2018615 | C

F-3

4 3

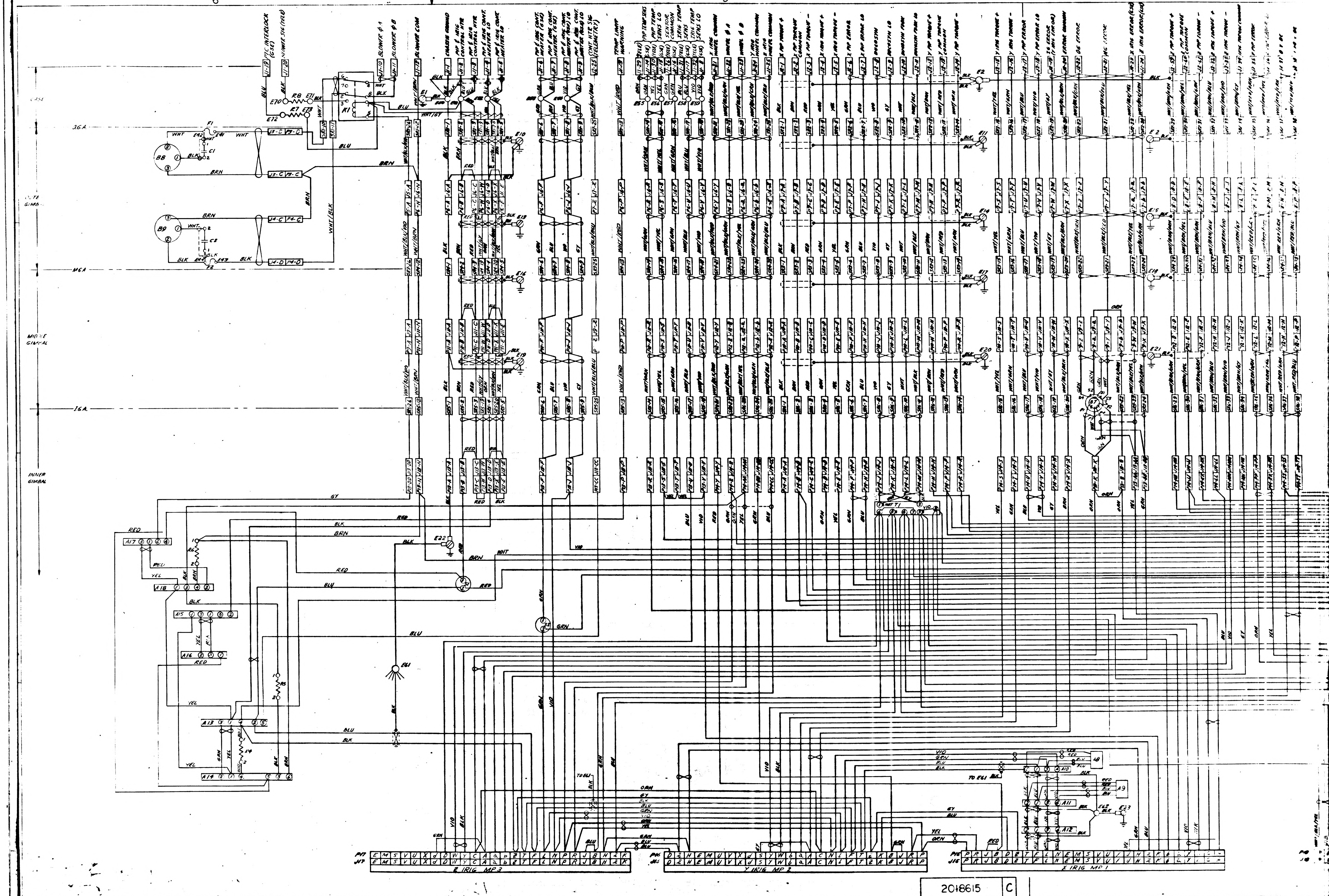


A7
PRECISION RESOL ASSY
RESERVED FOR SHIELD GROUND
B1
B2
B3
SPARES
A4
A5
A6
BLU
GRN
BLK
YEL
R1
R2
R3
TO E61
P18
J18
X PIP A1
P19
J19
Y PIP A2
P20
J20
Z PIP A3

2018615 C

4 3

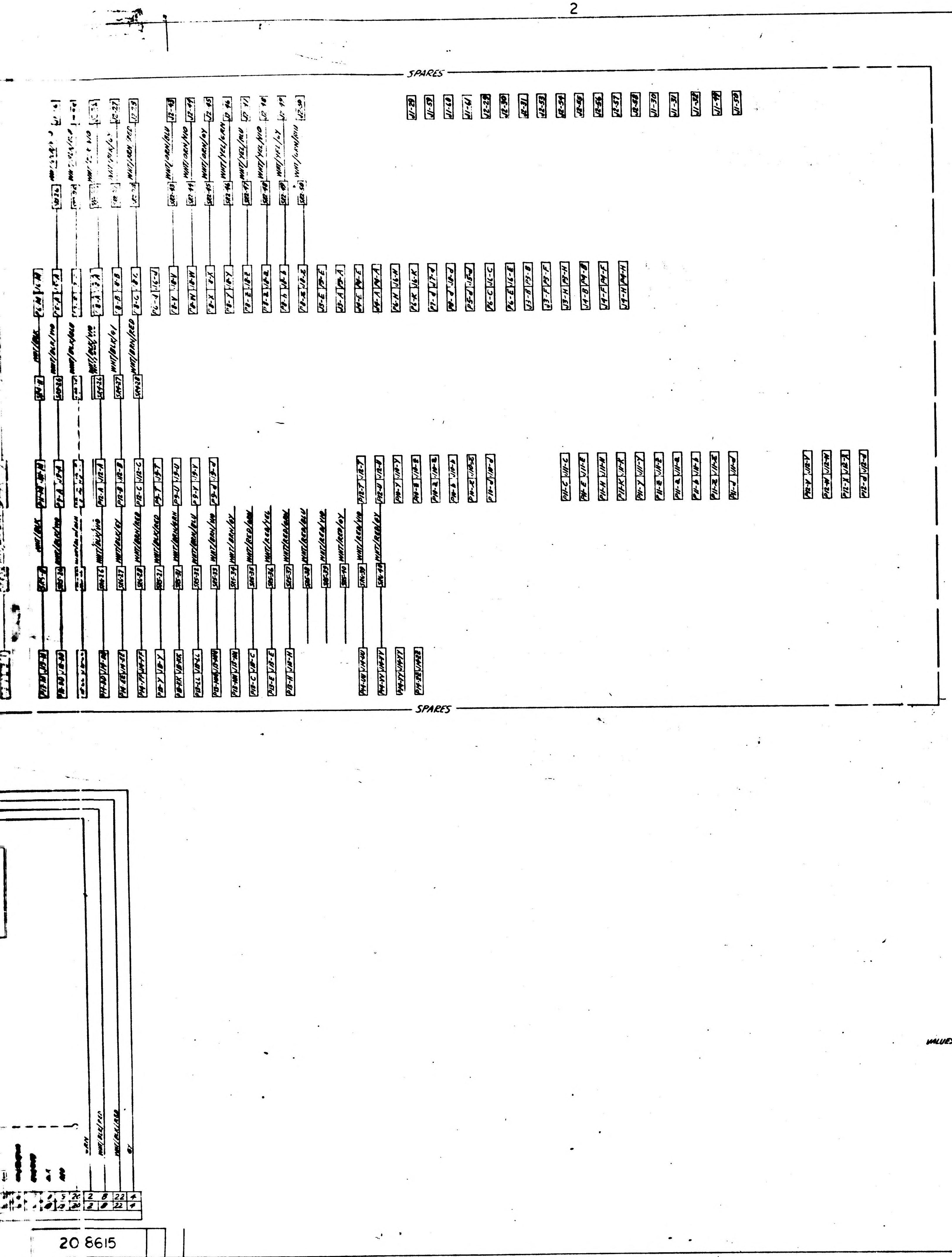
E2


6
5
CASE
O.G.A.
OUTER GIMBAL
M.G.A.
MIDDLE GIMBAL
I.G.A.
INNER GIMBAL
B8
B9
F1
F2
C1
C2
K1
R5
R6
R7
R8
R14
A8
A9
A10
A11
A12
A13
A14
A15
A16
A17
A18
E1
E2
E10
E22
E23
E61
T1
BLOWER φ A
BLOWER φ B
BLOWER COM
TEMP LIMIT WARNING
P17
J17
Z IRIG MP3
P16
J16
Y IRIG MP2
P15
J15
X IRIG MP1
RED
BLK
BRN
BLU
YEL
GRN
GY
VIO
WHT
ORN

2018615 C

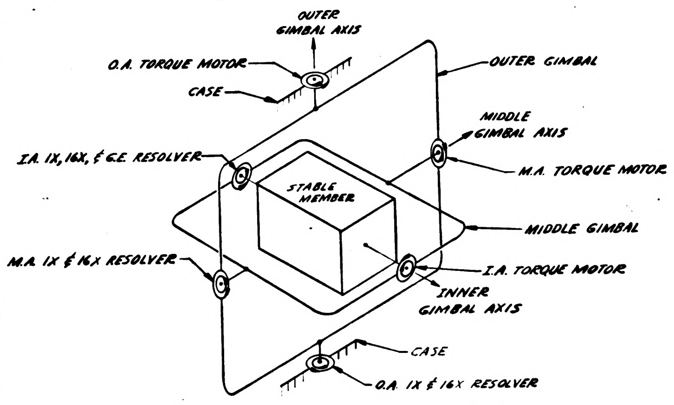
2018615

REVISIONS



REFERENCE DESIGNATION	DESCRIPTION	PART NUMBER	NO. REQ'D
A1, A2, A3	PIP	2018639	3
A4, A5, A6	PIP PREAMP	2007060	3
A7	PRECISION RESOLVER ASSY	2007001-011	1
A8, A9	HEATER	2018641	2
A10, A11, A12	HTR & TAPERED MOUNT ASSY, 25 IRIG	2018741	3
A13	TEMP CONTROL MODULE	2007064-011	1
A14	TEMP CONTROL THERMOSTAT	2018637	1
A15	TEMP ALARM MODULE	2007170-011	1
A16	TEMP ALARM THERMOSTAT	2018636	1
A17	BLOWER CONTROL MODULE	2007171-011	1
A18	BLOWER CONTROL THERMOSTAT	2018635	1
B4	TORQUE MOTOR	2018629	1
B1, B2, B3	RESOLVER, MULTIPLE SPEED (1X & 16X)	2018631	3
B5, B6	TORQUE MOTOR	2018623	2
B7	RESOLVER, GYRO ERROR	2018632	1
B8, B9	BLOWER	2018640	2
C1, C2	CAPACITOR	1010799-	2
E1, E2	TERMINAL LUG	1010717-1	4
E10 THRU E23	TERMINAL LUG	1010717-1	28
E41 THRU E44	TERMINAL	1001600-1	4
E45 THRU E47	TERMINAL	1001600-1	3
E50 THRU E54	TERMINAL	1000100-3	5
E61, E62	SPLICE	———	2
F1, F2	FUSE	1000170-10	2
J1	CONNECTOR - RECEPTACLE	1010783-1	1
J2		1010783-2	1
J3, J4		1011741-000	2
J5 THRU J12		1000122	8
J13		1000119-1	1
J14		1010813-1	1
J15, J16, J17		1010852-26	3
J18, J19, J20	PLUG	1001497-2	3
K1	RELAY	1010353-10	1
MP1, MP2, MP3	IRIG	2021500	3
P3, P4	CONNECTOR, PLUG	1011757-000	2
P5 THRU P12		1000123	8
P13		1000120-1	1
P14		1010813-4	1
P15, P16, P17	RECEPTACLE	1000121	3
P18, P19, P20	RECEPTACLE	1001497-1	3
R1	RESISTOR, FIXED	1010928-	1
R2			1
R3			1
R4			1
R5			1
R6			1
SR1, SR2	SLIP RING ASSY	2018625	2
SR3, SR4	SLIP RING ASSY	2018624	2
SR5, SR6	SLIP RING ASSY	2018634	2
S1, S2	SAFETY THERMOSTAT	1001485	2
T1	TRANSFORMER	2007019	1

VALUES SELECTED AT ASSY



NOTE 1. ARROWS ON RESOLVERS & TORQUE MOTORS INDICATE THE POSITIVE DIRECTION OF ROTATION OF THE INNER MEMBER WITH RESPECT TO THE OUTER MEMBER AND THE OUTER MEMBER WITH RESPECT TO THE INNER MEMBER WHEN VIEWED ALONG THE AXIS IN A POSITIVE DIRECTION.

DRAWINGS FOR REFERENCE:

2018601	IMU ASSY BLK II
2018796	WIRING HARNESS A
2018797	WIRING HARNESS B
2018798	WIRING HARNESS C

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS

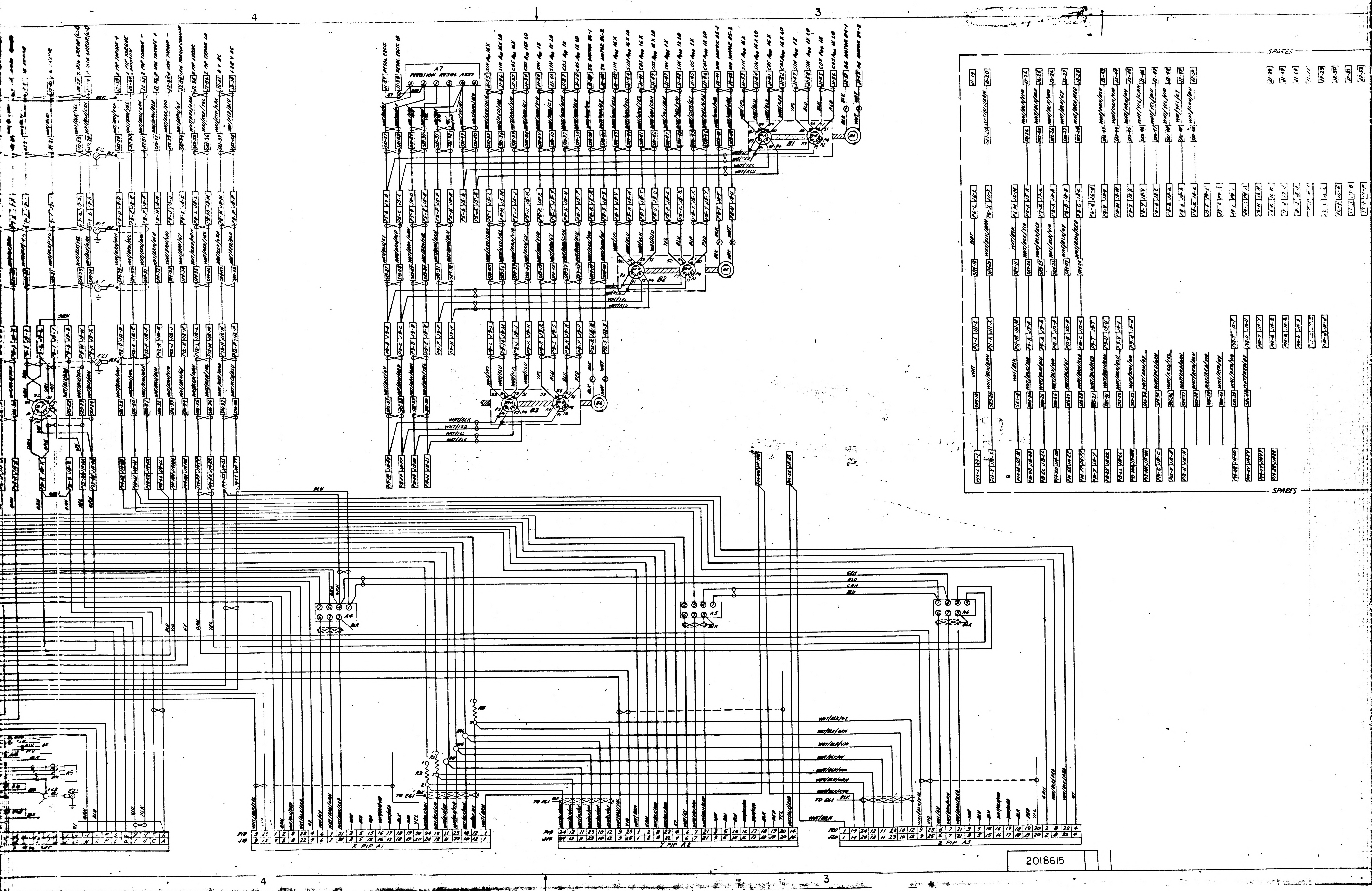
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN THENO DATE 8-27-64
CHECKED WINBERG
APPROVAL A. E. Winberg 3-8-65
APPROVAL Sarhoff
NASA APPROVAL W. J. Rhine 3-21-65
MIT APPROVAL

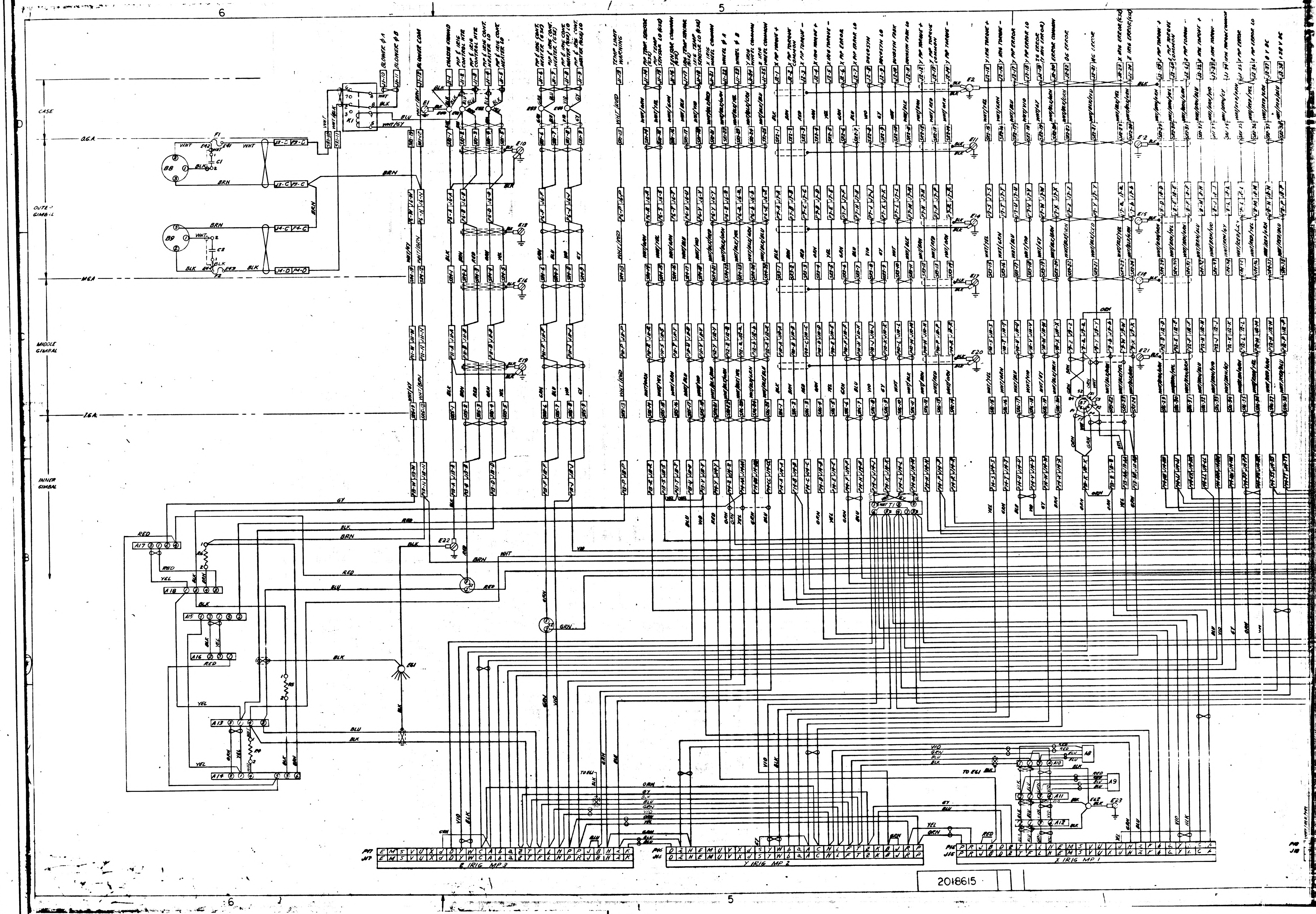
IMU WIRING DIAGRAM BLOCK II

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018615
SCALE
WT
SHEET 1 OF 1

2018615

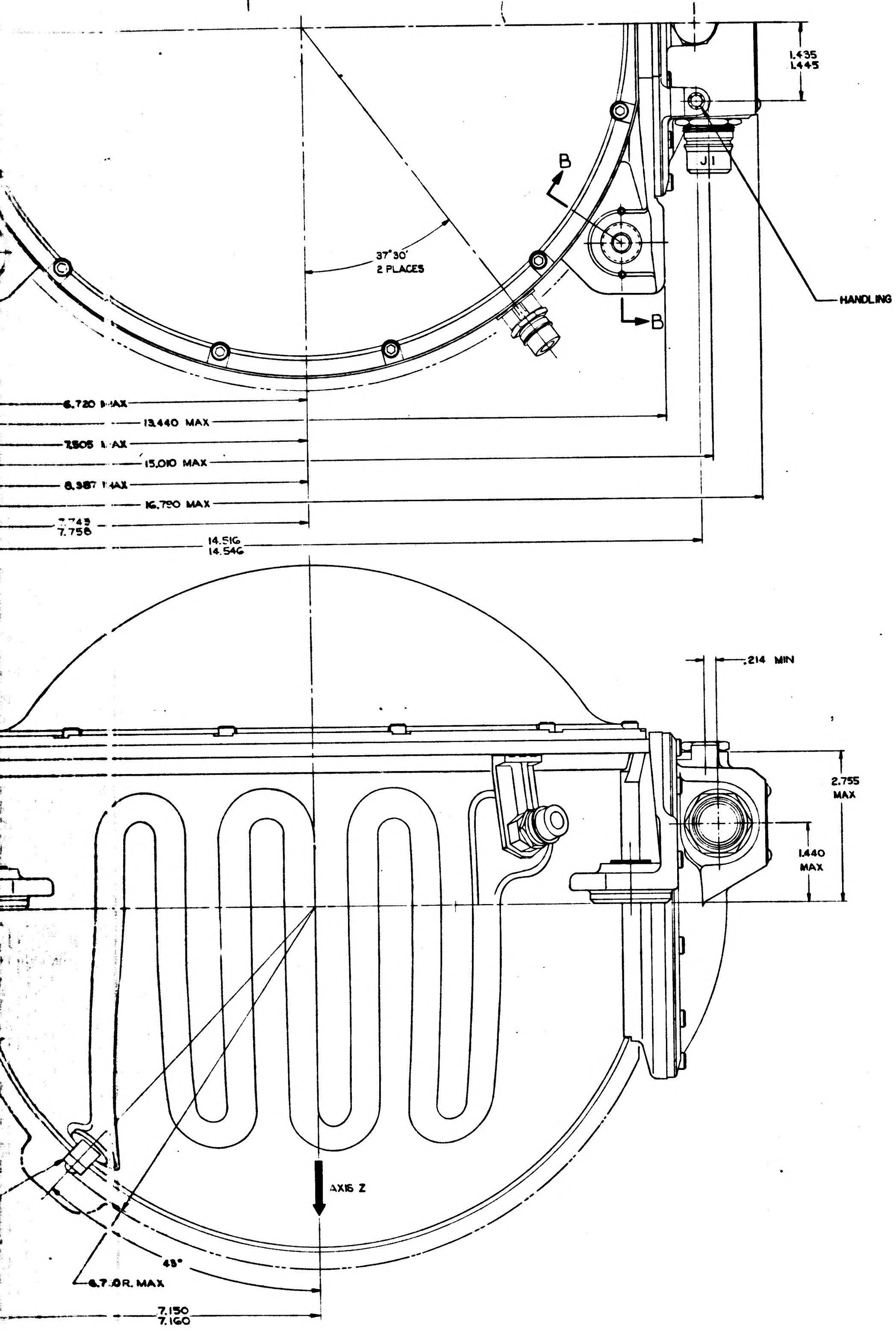

4
3
A7
PRECISION RESOL ASSY
B1
B2
B3
A4
A5
A6
SPARES
TO E61
X PIP A1
Y PIP A2
Z PIP A3
P19
J18
P20
J20
4
3

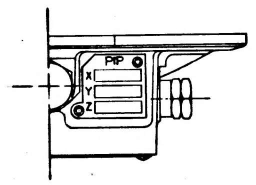
2018615


6
5
CASE
O.G.A.
OUTER GIMBAL
M.G.A.
MIDDLE GIMBAL
I.G.A.
INNER GIMBAL
B8
B9
F1
F2
C1
C2
E41
E42
E43
E44
K1
BLOWER ϕ A
BLOWER ϕ B
BLOWER COM
CHASSIS GROUND
PIP & IRIG CONTROL HTR
PIP & IRIG CONTROL HTR
PIP & IRIG CONT. HEATER LO
PIP & IRIG CONT. HEATER LO
PIP & IRIG CONT. HEATER (GSE)
PIP & IRIG CONT. HEATER (GSE)
PIP & IRIG CONT. HEATER (GSE) LO
PIP & IRIG CONT. HEATER (GSE) LO
TEMP LIMIT WARNING
PIP TEMP SENSOR (GSE)
PIP TEMP SENSOR LO (GSE)
SENSOR COMMON (GSE)
IRIG TEMP SENSOR (GSE)
IRIG TEMP SENSOR LO (GSE)
X IRIG WHEEL COMMON
WHEEL ϕ A
WHEEL ϕ B
Y IRIG WHEEL COMMON
Z IRIG WHEEL COMMON
X PIP TORQUE +
X PIP TORQUE COMMON
X PIP TORQUE −
X IRIG TORQUE +
X IRIG TORQUE −
X PIP ERROR
X PIP ERROR LO
DUCOSYN
DUCOSYN LO
DUCOSYN FDBK
DUCOSYN FDBK LO
Y PIP TORQUE +
Y PIP TORQUE COMMON
Y PIP TORQUE −
Y IRIG TORQUE +
Y IRIG TORQUE −
Y PIP ERROR
Y PIP ERROR LO
IG ERROR (Y IRIG ERROR)
ERROR COMMON
OG ERROR
MG ERROR
X IRIG ERROR (GSE)
Z IRIG ERROR (GSE)
Z PIP TORQUE +
Z PIP TORQUE COMMON
Z PIP TORQUE −
Z IRIG TORQUE +
Z IRIG TORQUE −
IRIG TORQUE COMMON
Z PIP ERROR
Z PIP ERROR LO
0 V DC
+28 V DC
E1
E2
E10
E11
E12
E13
E14
E15
E16
E17
E18
E19
E20
E21
E22
E23
E61
E62
E63
E64
A8
A9
A10
A11
A12
A13
A14
A15
A16
A17
A18
R5
R6
R9
S1
S2
S3
T1
TO E61
P17
J17
Z IRIG MP3
P16
J16
Y IRIG MP 2
P15
J15
X IRIG MP 1
P18
J18
WHT
BLK
BRN
RED
YEL
ORN
GRN
BLU
VIO
GY
WHT/BRN
WHT/GY
WHT/RED
WHT/YEL
WHT/GRN
WHT/BLU
WHT/VIO
2018615

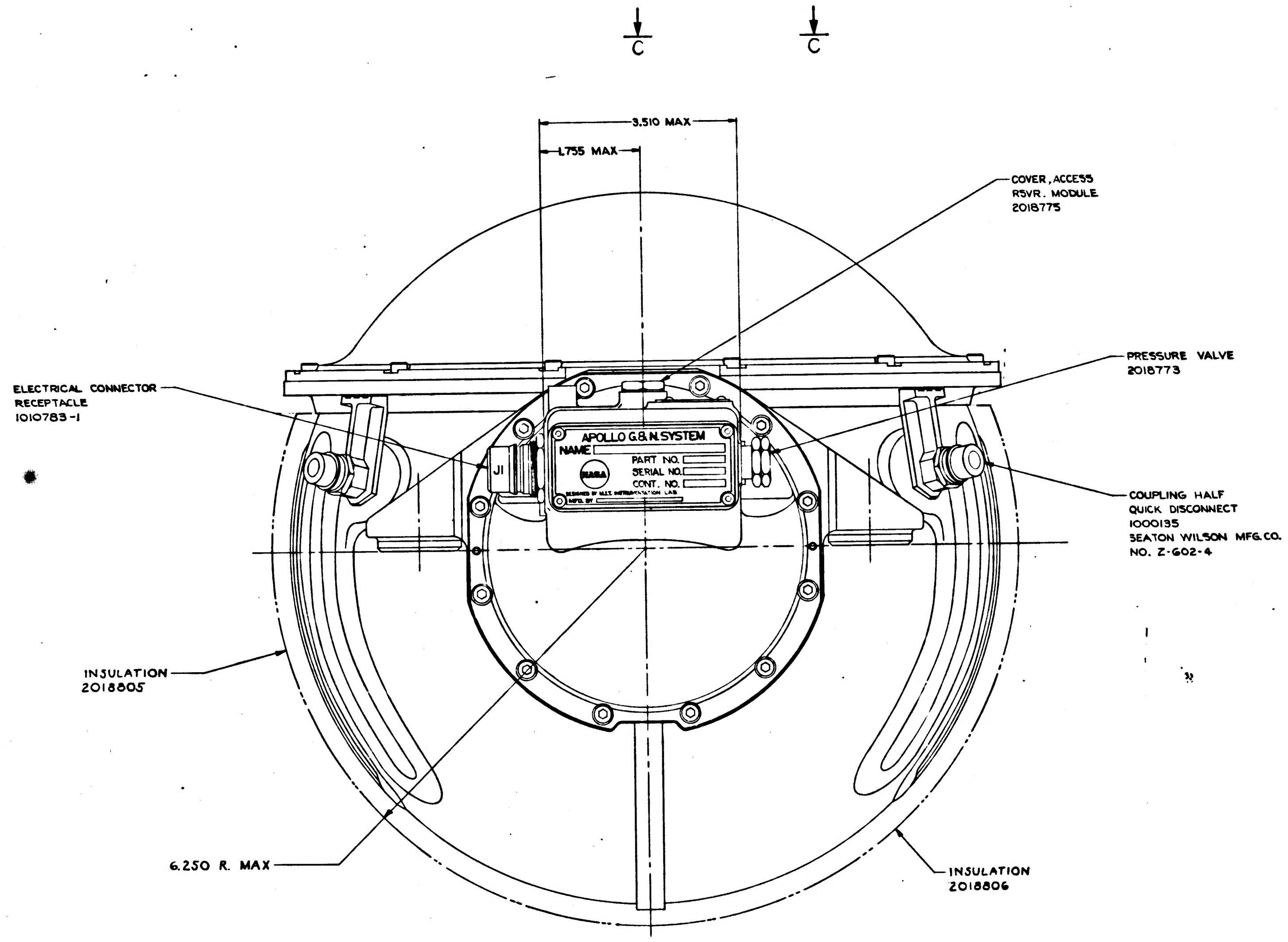
REVISIONS TDRR 16813

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16903	5-25-65	


1.435
1.445
B
B
37°30'
2 PLACES
J1
HANDLING HOLE
6.720 MAX
13.440 MAX
7.505 MAX
15.010 MAX
8.387 MAX
16.790 MAX
7.743
7.758
14.516
14.546
.214 MIN
2.755
MAX
1.440
MAX
AXIS Z
45°
6.70 R. MAX
7.150
7.160



VIEW C-C


C
C
3.510 MAX
1.755 MAX
COVER, ACCESS
RSVR. MODULE
2018775
ELECTRICAL CONNECTOR
RECEPTACLE
1010783-1
PRESSURE VALVE
2018773
APOLLO G.& N. SYSTEM
NAME
PART NO.
SERIAL NO.
CONT. NO.
NASA
DESIGNED BY M.I.T. INSTRUMENTATION LAB
MFD. BY
J1
COUPLING HALF
QUICK DISCONNECT
1000135
SEATON WILSON MFG. CO.
NO. Z-602-4
INSULATION
2018805
6.250 R. MAX
INSULATION
2018806

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R.G.S. DATE 1-25-65
CHECKED
APPROVAL 2/4/65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

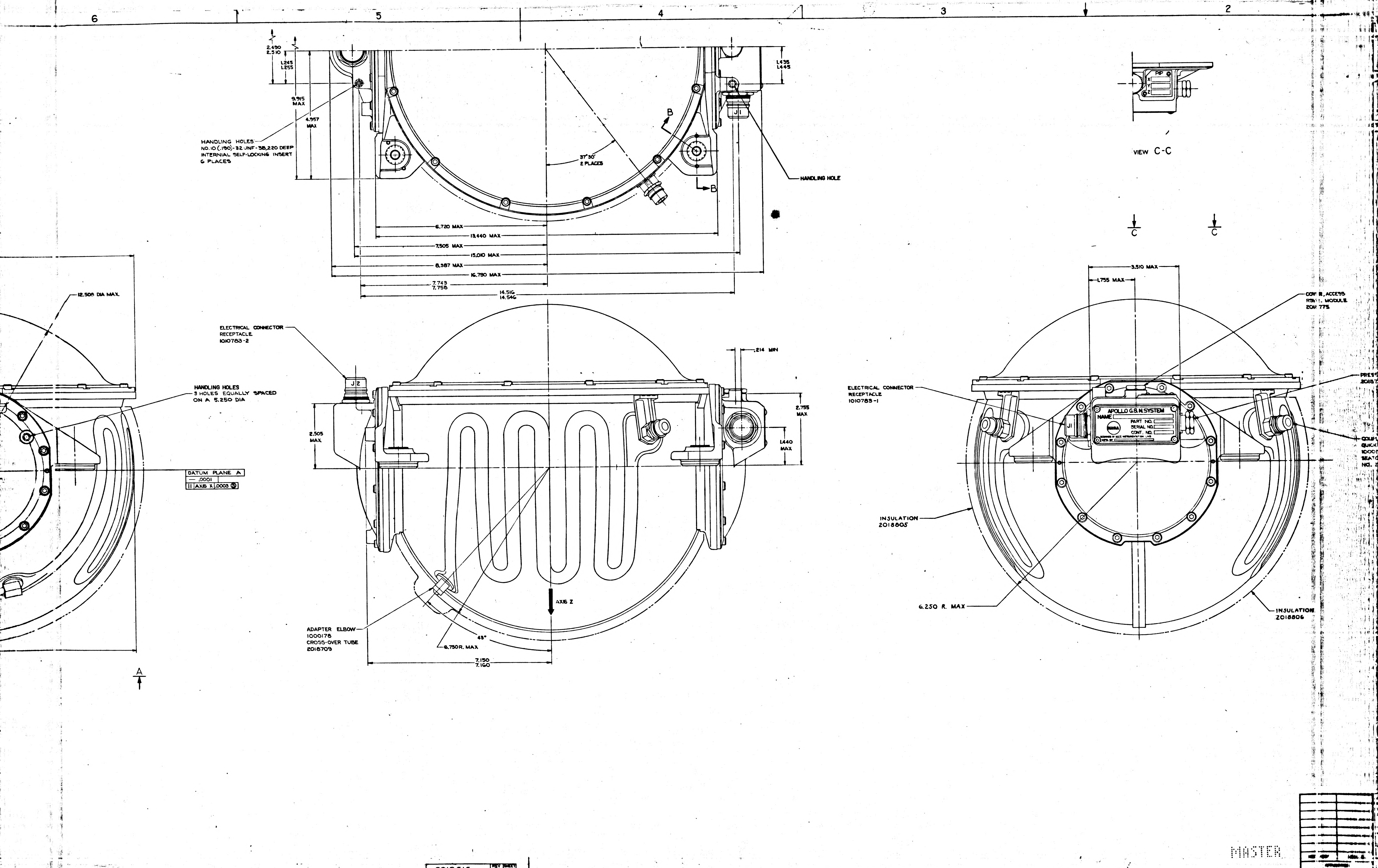
GIMBAL ASSEMBLY
OUTLINE
BLK II IMU

CODE IDENT NO. 80230
SIZE
NASA DRAWING NO. 2018616
SCALE 1/1
WT
SHEET 1 OF 1

MASTER

F3

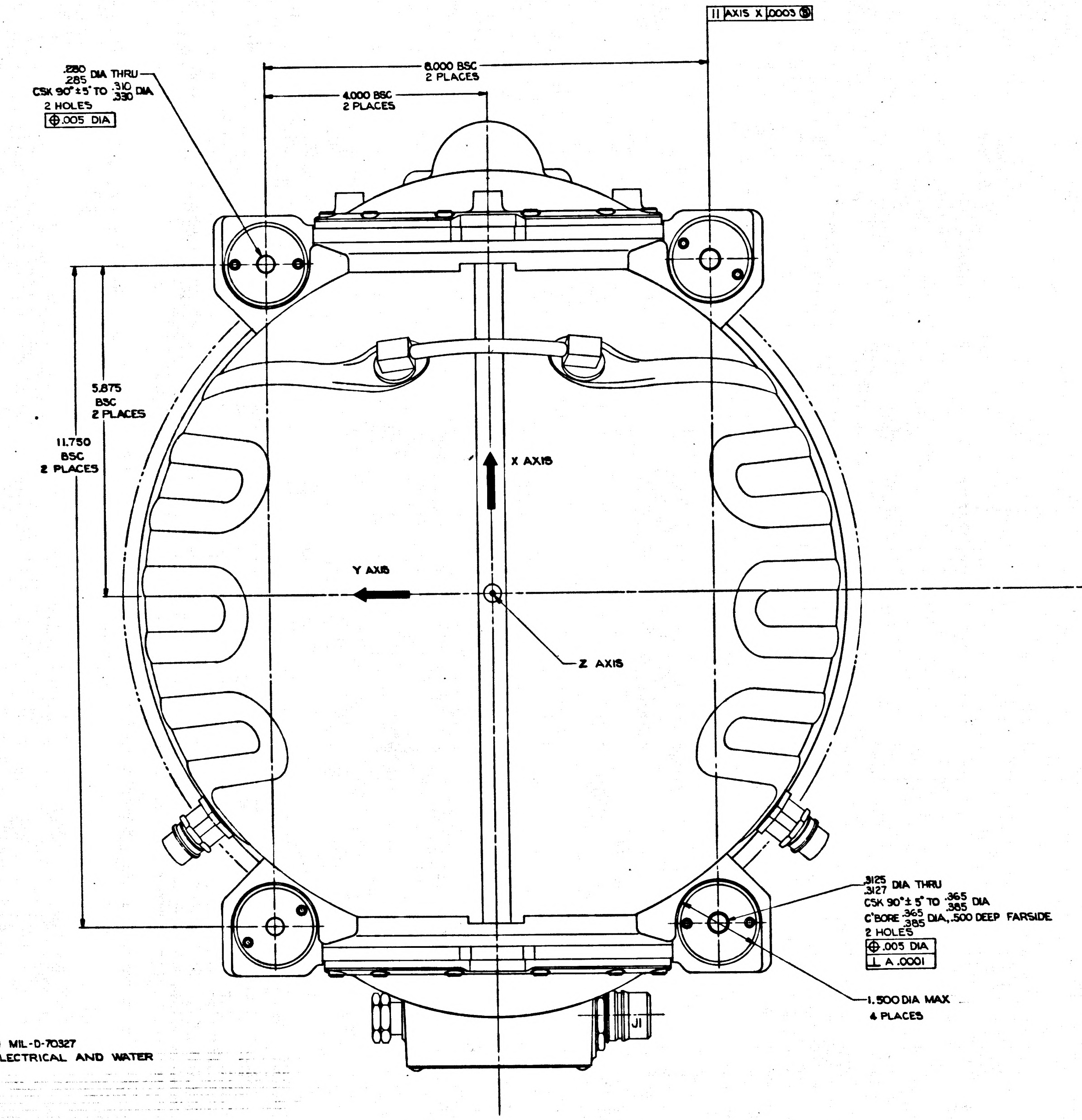
3H



6
5
4
3
2
2.490
2.510
1.245
1.255
9.915
MAX
4.957
MAX
1.435
1.445
HANDLING HOLES
NO. 10 (.190)-32 UNF-3B, .220 DEEP
INTERNIAL SELF-LOCKING INSERT
6 PLACES
B
B
J1
37°30'
2 PLACES
HANDLING HOLE
6.720 MAX
13.440 MAX
7.505 MAX
15.010 MAX
8.387 MAX
16.790 MAX
7.743
7.758
14.516
14.546
VIEW C-C
PIP
X
Y
Z
C
C
12.508 DIA MAX.
HANDLING HOLES
3 HOLES EQUALLY SPACED
ON A 5.250 DIA
DATUM PLANE A
— .0001
‖ AXIS X .0003 Ⓢ
A
ELECTRICAL CONNECTOR
RECEPTACLE
1010783-2
J2
2.505
MAX
.214 MIN
2.755
MAX
1.440
MAX
AXIS Z
45°
6.750 R. MAX
7.150
7.160
ADAPTER ELBOW
1000178
CROSS-OVER TUBE
2018709
3.510 MAX
1.755 MAX
COVER, ACCESS
RSVR. MODULE
2018775
ELECTRICAL CONNECTOR
RECEPTACLE
1010783-1
J1
APOLLO G.& N. SYSTEM
NAME
PART NO.
SERIAL NO.
CONT. NO.
NASA
DESIGNED BY M.I.T. INSTRUMENTATION LAB
MFD. BY
PRESS
2018
COUPL
QUICK
1000
SEATC
NO. 2
INSULATION
2018805
6.250 R. MAX
INSULATION
2018806

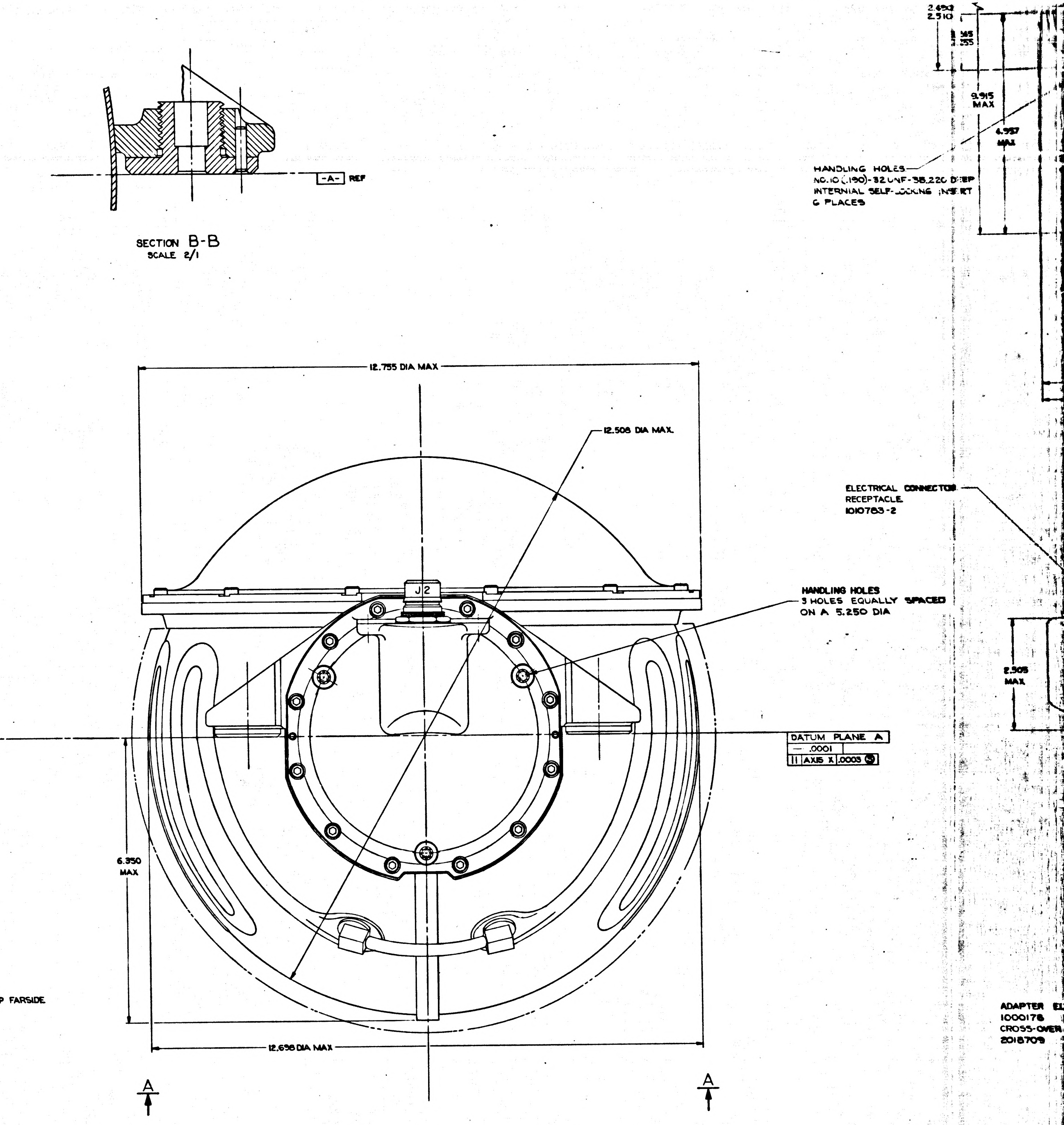
MASTER

2018616 REV A SHEET 1


.280
.285 DIA THRU
CSK 90° ± 5° TO .310
.330 DIA
2 HOLES
⊕ .005 DIA
8.000 BSC
2 PLACES
4.000 BSC
2 PLACES
|| AXIS X .0003 Ⓢ
5.875
BSC
2 PLACES
11.750
BSC
2 PLACES
X AXIS
Y AXIS
Z AXIS
.3125
.3127 DIA THRU
CSK 90° ± 5° TO .365
.385 DIA
C'BORE .365
.385 DIA, .500 DEEP FARSIDE
2 HOLES
⊕ .005 DIA
⊥ A .0001
1.500 DIA MAX
4 PLACES
J1

VIEW A-A

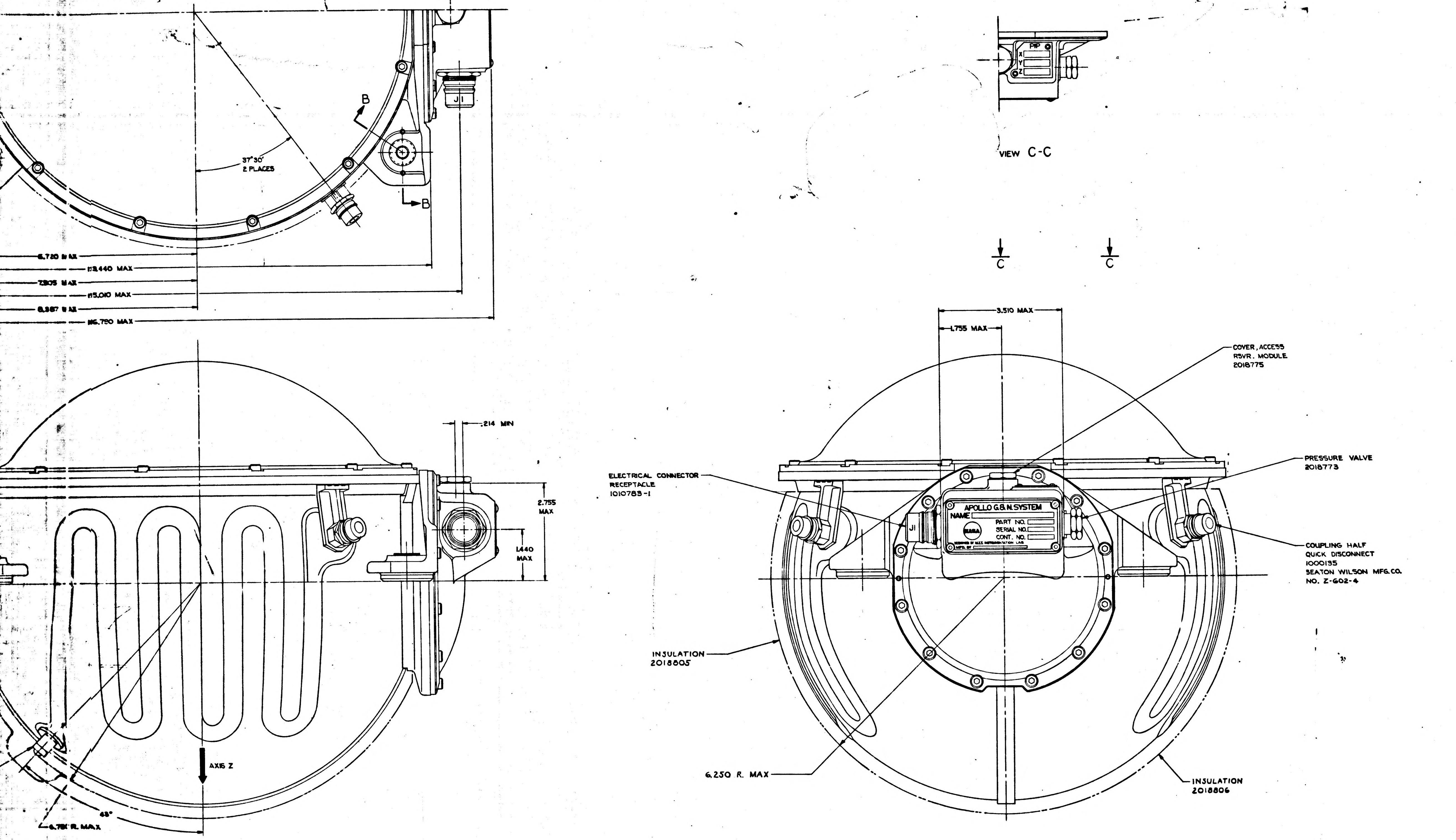
NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. PROTECTIVE CAPS INSTALLED OVER ELECTRICAL AND WATER CONNECTORS AND MOUNTING PADS


-A- REF
12.755 DIA MAX
12.508 DIA MAX.
J2
HANDLING HOLES
3 HOLES EQUALLY SPACED
ON A 5.250 DIA
DATUM PLANE A
— .0001
|| AXIS X .0003 Ⓢ
6.350
MAX
12.698 DIA MAX
A
A
2.490
2.510
.365
.355
9.915
MAX
4.957
MAX
HANDLING HOLES
NO. 10 (.190)-32 UNF-3B .220 DEEP
INTERNIAL SELF-LOCKING INSERT
6 PLACES
ELECTRICAL CONNECTOR
RECEPTACLE
1010783-2
2.505
MAX
ADAPTER
1000178
CROSS-OVER
2018709

SECTION B-B
SCALE 2/1

3H

REVISIONS TDRR 10813			
SYM	DESCRIPTION	DATE	APPROVAL


37°30'
2 PLACES
B
B
J1
6.720 MAX
12.440 MAX
7.305 MAX
15.010 MAX
8.387 MAX
16.790 MAX
VIEW C-C
PIP
X
Y
Z
C
C
3.510 MAX
1.755 MAX
COVER, ACCESS
RSVR. MODULE
2018775
PRESSURE VALVE
2018773
ELECTRICAL CONNECTOR
RECEPTACLE
1010783-1
APOLLO G.& N. SYSTEM
NAME
PART NO.
SERIAL NO.
CONT. NO.
NASA
DESIGNED BY M.I.T. INSTRUMENTATION LAB.
MFD. BY
J1
COUPLING HALF
QUICK DISCONNECT
1000135
SEATON WILSON MFG. CO.
NO. Z-602-4
INSULATION
2018805
INSULATION
2018806
6.250 R. MAX
.214 MIN
2.755
MAX
1.440
MAX
AXIS Z
45°
6.781 R. MAX

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R.G.S. DATE 1-29-65
CHECKED
APPROVAL [illegible] 3/1/65
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GIMBAL ASSEMBLY
OUTLINE
BLK II IMU

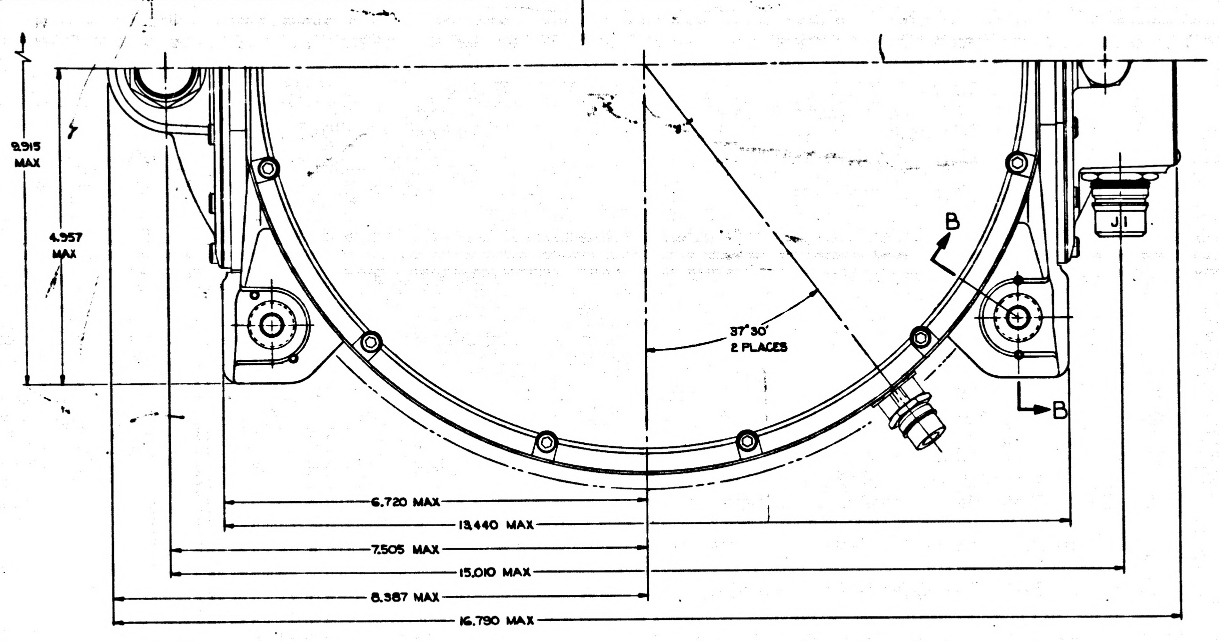
CODE IDENT NO.
SIZE
NASA DRAWING NO. 2018616
SCALE 1/1
WT
SHEET 1 OF 1

2018616

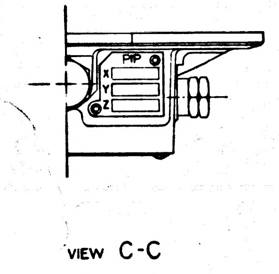
2018616 | REV | SHEET 1

3H

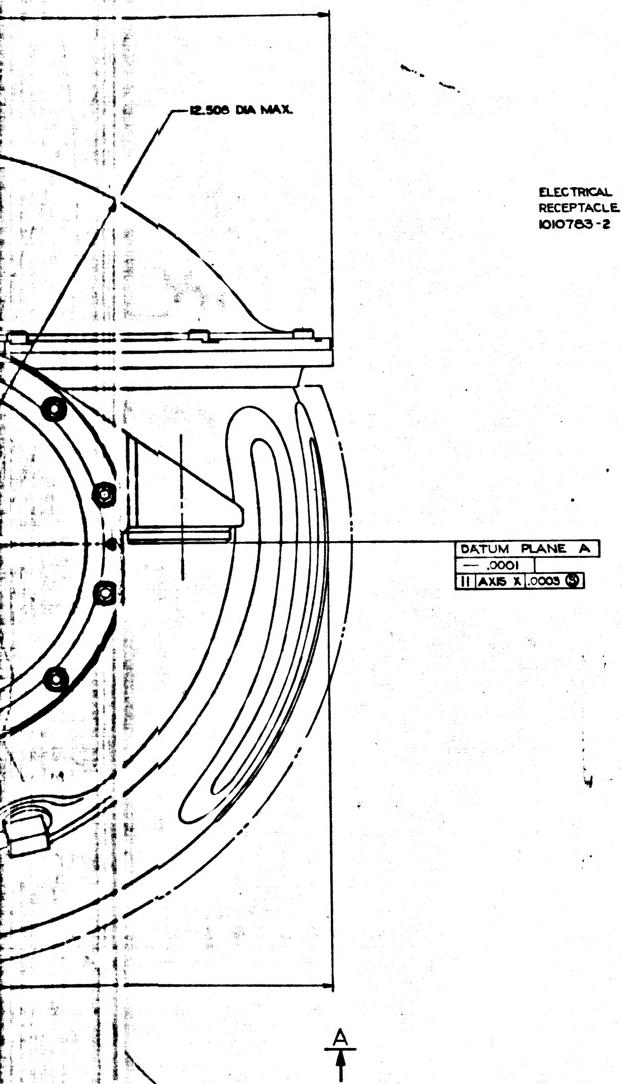
F3



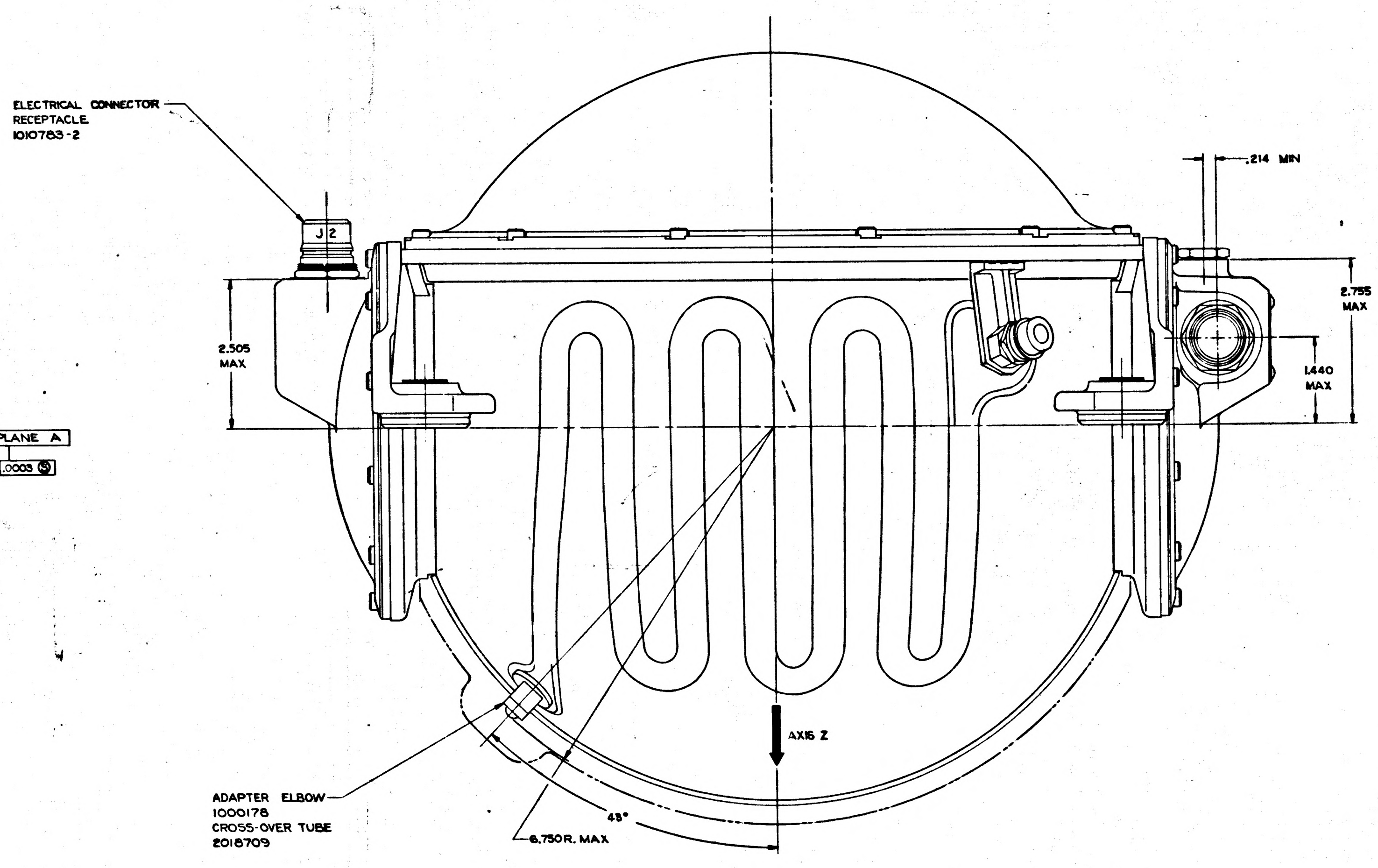
9.915
MAX
4.957
MAX
37°30'
2 PLACES
B
B
J1
6.720 MAX
13.440 MAX
7.505 MAX
15.010 MAX
8.387 MAX
16.790 MAX



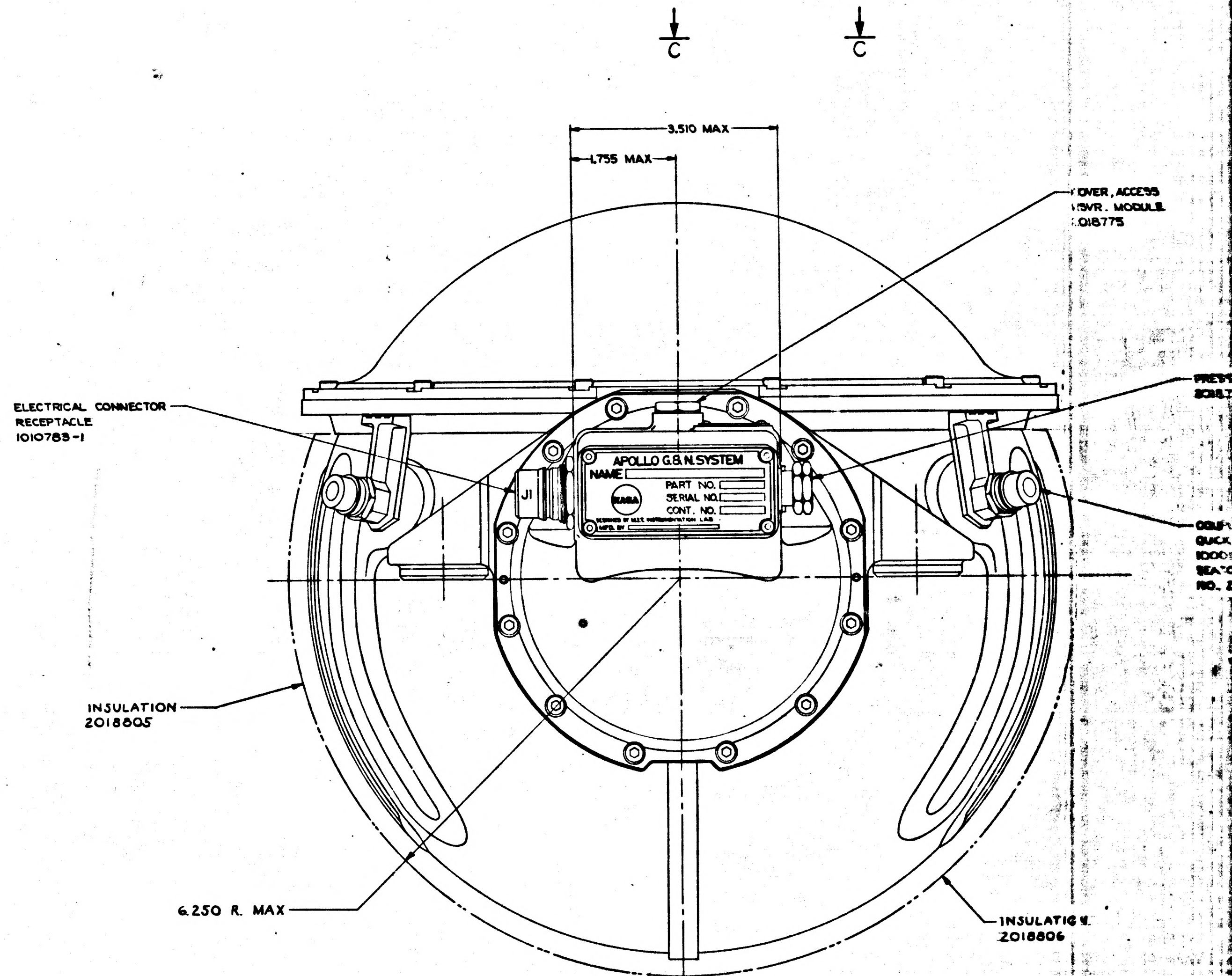
VIEW C-C



12.508 DIA MAX.
DATUM PLANE A
— .0001
// AXIS X .0003 (S)
A



ELECTRICAL CONNECTOR
RECEPTACLE
1010783-2
J2
.214 MIN
2.505
MAX
2.755
MAX
1.440
MAX
AXIS Z
ADAPTER ELBOW
1000178
CROSS-OVER TUBE
2018709
45°
6.750 R. MAX

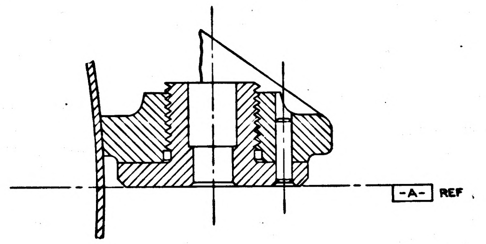


C
C
3.510 MAX
1.755 MAX
OVER, ACCESS
SVR. MODULE
.018775
ELECTRICAL CONNECTOR
RECEPTACLE
1010783-1
J1
APOLLO G.& N. SYSTEM
NAME
PART NO.
SERIAL NO.
CONT. NO.
NASA
INSULATION
2018805
6.250 R. MAX
INSULATION
2018806

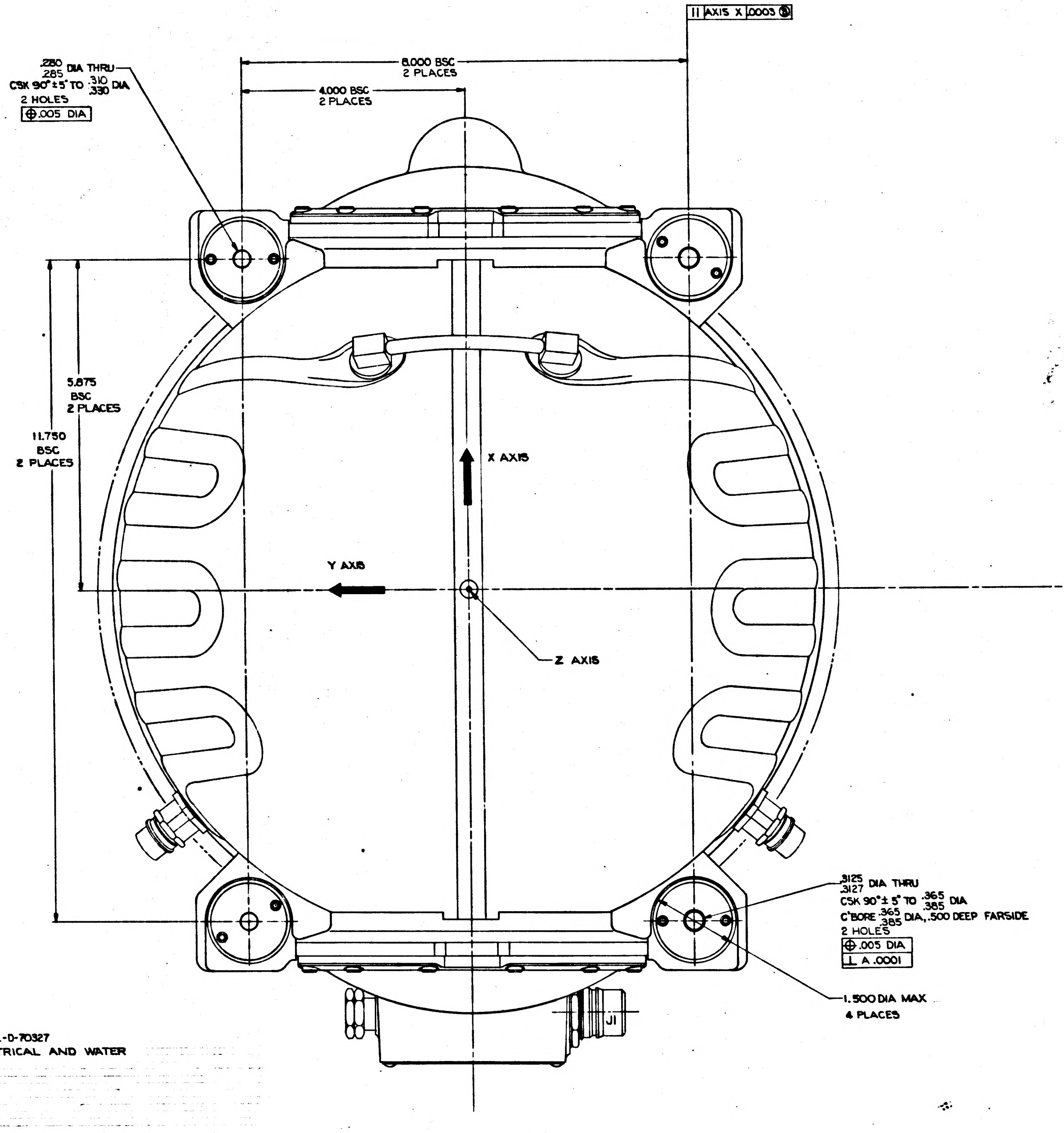
MASTER

2018616 REV SHEET 1

F-2

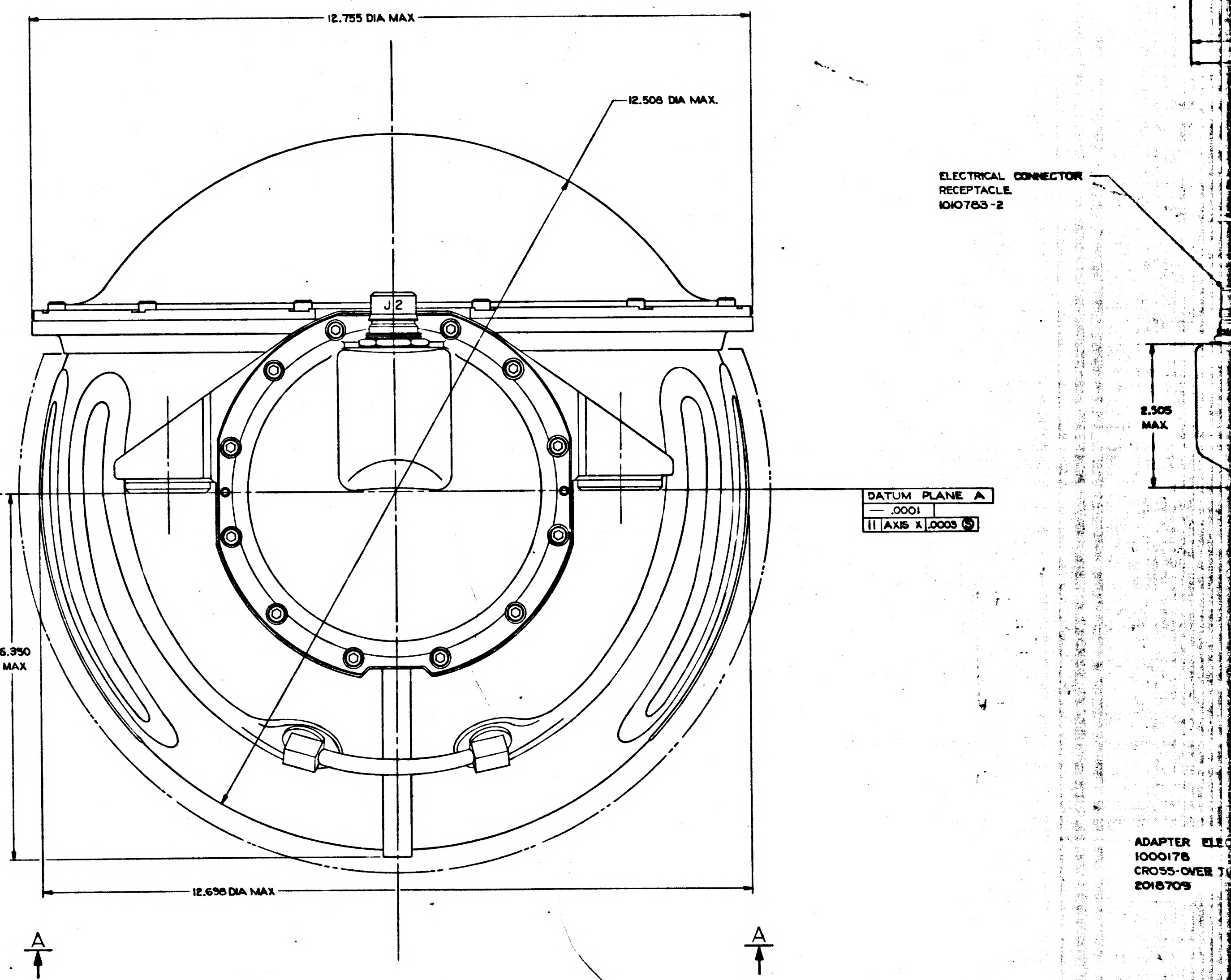


SECTION B-B
SCALE 2/1


// AXIS X .0003 Ⓢ
.280 .285 DIA THRU
CSK 90° ± 5° TO .310 .330 DIA
2 HOLES
⊕ .005 DIA
8.000 BSC 2 PLACES
4.000 BSC 2 PLACES
5.875 BSC 2 PLACES
11.750 BSC 2 PLACES
X AXIS
Y AXIS
Z AXIS
.3125 .3127 DIA THRU
CSK 90° ± 5° TO .365 .385 DIA
C'BORE .365 .385 DIA, .500 DEEP FARSIDE
2 HOLES
⊕ .005 DIA
⊥ A .0001
1.500 DIA MAX 4 PLACES
J1

VIEW A-A

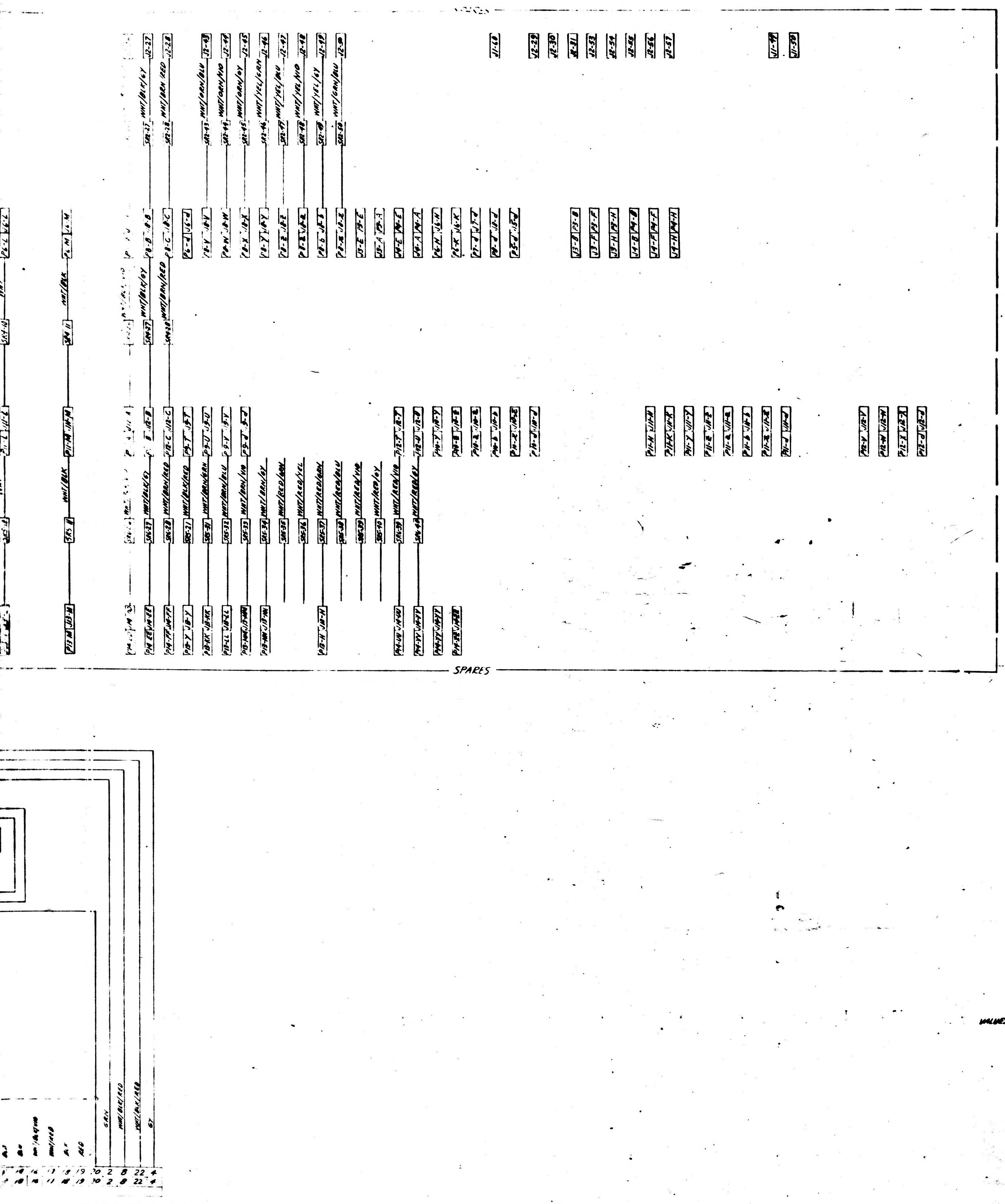
NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. PROTECTIVE CAPS INSTALLED OVER ELECTRICAL AND WATER CONNECTORS AND MOUNTING PADS


12.755 DIA MAX
12.508 DIA MAX.
J2
DATUM PLANE A
— .0001
// AXIS X .0003 Ⓢ
6.350 MAX
12.698 DIA MAX
A
A
ELECTRICAL CONNECTOR RECEPTACLE 1010783-2
2.505 MAX
2.515 MAX
4.987 MAX
ADAPTER ELE
1000178
CROSS-OVER T
2018709

3H

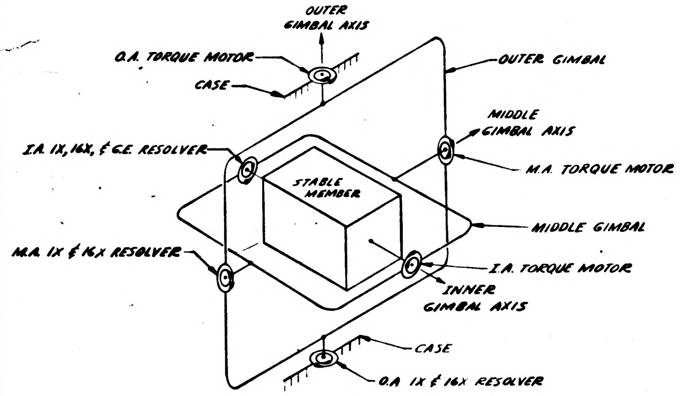
2018616	REV	SHEET 1

2018618	TDRR 23.63 REVISIONS		
SYM	DESCRIPTION	DATE	APPROVAL
1	REDRAWN & REPLACES RE. — WITH CHANGES TDRR 24311	23 Nov 65	



REFERENCE DESIGNATION	DESCRIPTION	PART NUMBER	NO. REQ'D
A1, A2, A3	PIP	2018639	3
A4, A5, A6	PIP PREAMP	2007060	3
A7	PRECISION RESOLVER ASSY	2007204-011	1
A8, A9	HEATER	2018641	2
A10, A11, A12	HTR & TAPERED MOUNT ASSY, 25 IRIG	2018741	3
A13	TEMP CONTROL MODULE	2007064-011	1
A14	TEMP CONTROL THERMOSTAT	2018826	1
A15	TEMP ALARM MODULE	2007170-011	1
A16	TEMP ALARM THERMOSTAT (LOW)	2018824	1
A17	BLOWER CONTROL MODULE	2007171-011	1
A18	BLOWER CONTROL THERMOSTAT	2018825	1
A19	TEMP ALARM THERMOSTAT (HIGH)	2018823	1
B4	TORQUE MOTOR	2018629	1
B1, B2, B3	RESOLVER, MULTIPLE SPEED (1X & 16X)	2018631	3
B5, B6	TORQUE MOTOR	2018623	2
B7	RESOLVER, GYRO ERROR	2018632	1
B8, B9	BLOWER	2018644	2
C1, C2	CAPACITOR	1010799-	2
E1, E2	TERMINAL LUG	1010717-1	4
E10 THRU E23	TERMINAL LUG	1010717-1	28
E41 THRU E44	TERMINAL	1001600-1	4
E45 THRU E47	TERMINAL	1001600-1	3
E50 THRU E59	TERMINAL	1000100-3	5
E61, E62	SPLICE	——	2
F1, F2	FUSE	1000170-12	2
E70 THRU E73	TERMINAL	1000100-3	4
J1	CONNECTOR - RECEPTACLE	1010783-1	1
J2		1010783-2	1
J3, J4		1011741-000	2
J5 THRU J12		1000122	8
J13		1000119-1	1
J14		1010813-1	1
J15, J16, J17		1010852-26	3
J18, J19, J20	PLUG	1001497-2	3
K1	RELAY	1010353-10	1
MP1, MP2, MP3	IRIG	2021500	3
P3, P4	CONNECTOR, PLUG	1011757-000	2
P5 THRU P12		1000123	8
P13		1000120-1	1
P14		1010813-4	1
P15, P16, P17	RECEPTACLE	1000121	3
P18, P19, P20	RECEPTACLE	1001497-1	3
R1	RESISTOR, FIXED	1010928-	1
R2			1
R3			1
R4			1
R5			1
R6			1
R9			1
R10			1
R7 & R8		2021504-44	2
SR1, SR2	SLIP RING ASSY	2018625	2
SR3, SR4	SLIP RING ASSY	2018624	2
SR5, SR6	SLIP RING ASSY	2018634	2
S1, S2	SAFETY THERMOSTAT	1001485	2
T1	TRANSFORMER	2007019	1

VALUES SELECTED AT ASSY (R1 THRU R10)



NOTE 1. ARROWS ON RESOLVERS & TORQUE MOTORS INDICATE THE POSITIVE DIRECTION OF ROTATION OF THE INNER MEMBER WITH RESPECT TO THE OUTER MEMBER AND THE OUTER MEMBER WITH RESPECT TO THE INNER MEMBER WHEN VIEWED ALONG THE AXIS IN A POSITIVE DIRECTION.

DRAWINGS FOR REFERENCE:
2018601 IMU ASSY BLK II
2018828 WIRING HARNESS A
2018797 WIRING HARNESS B
2018798 WIRING HARNESS C

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

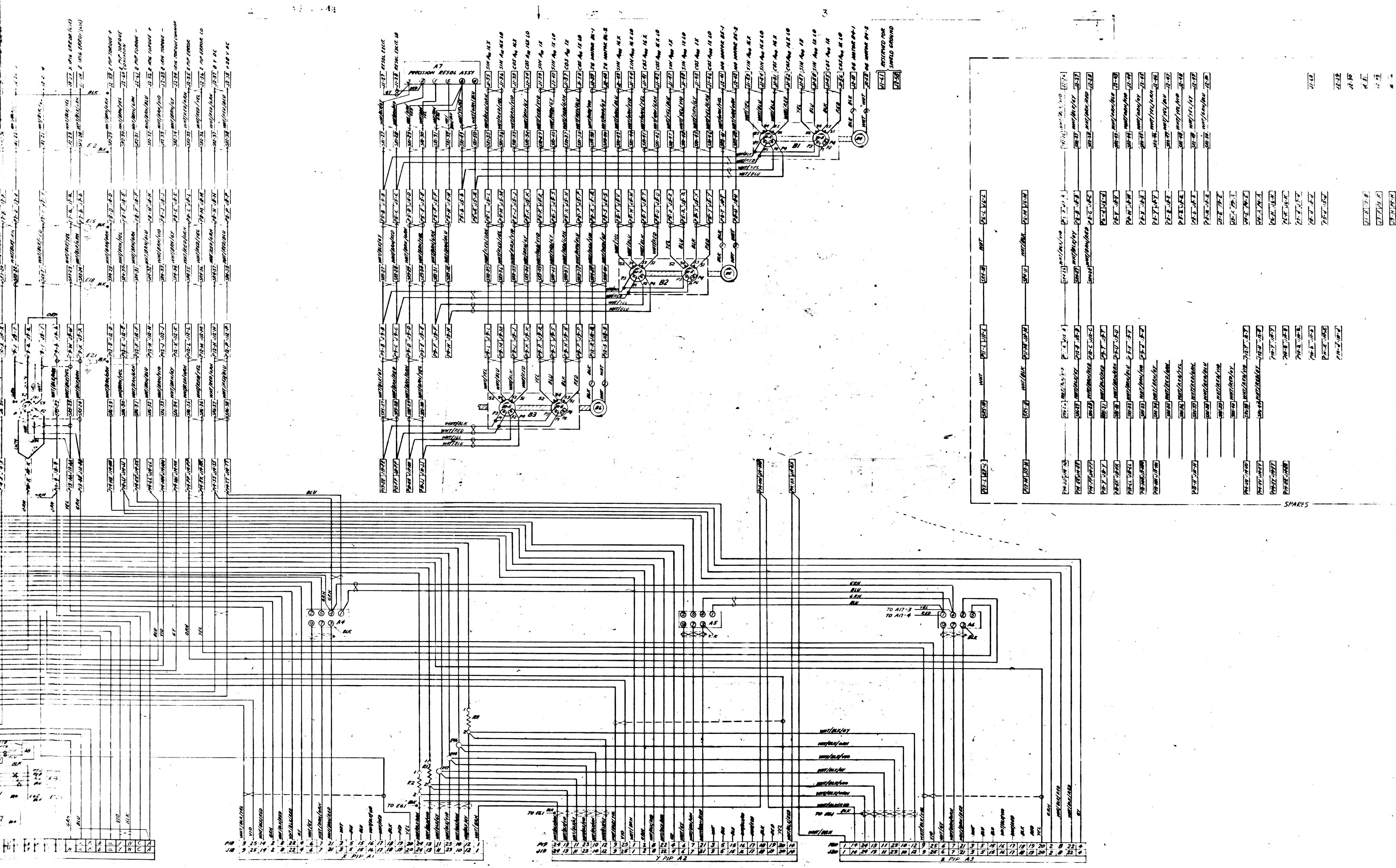
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

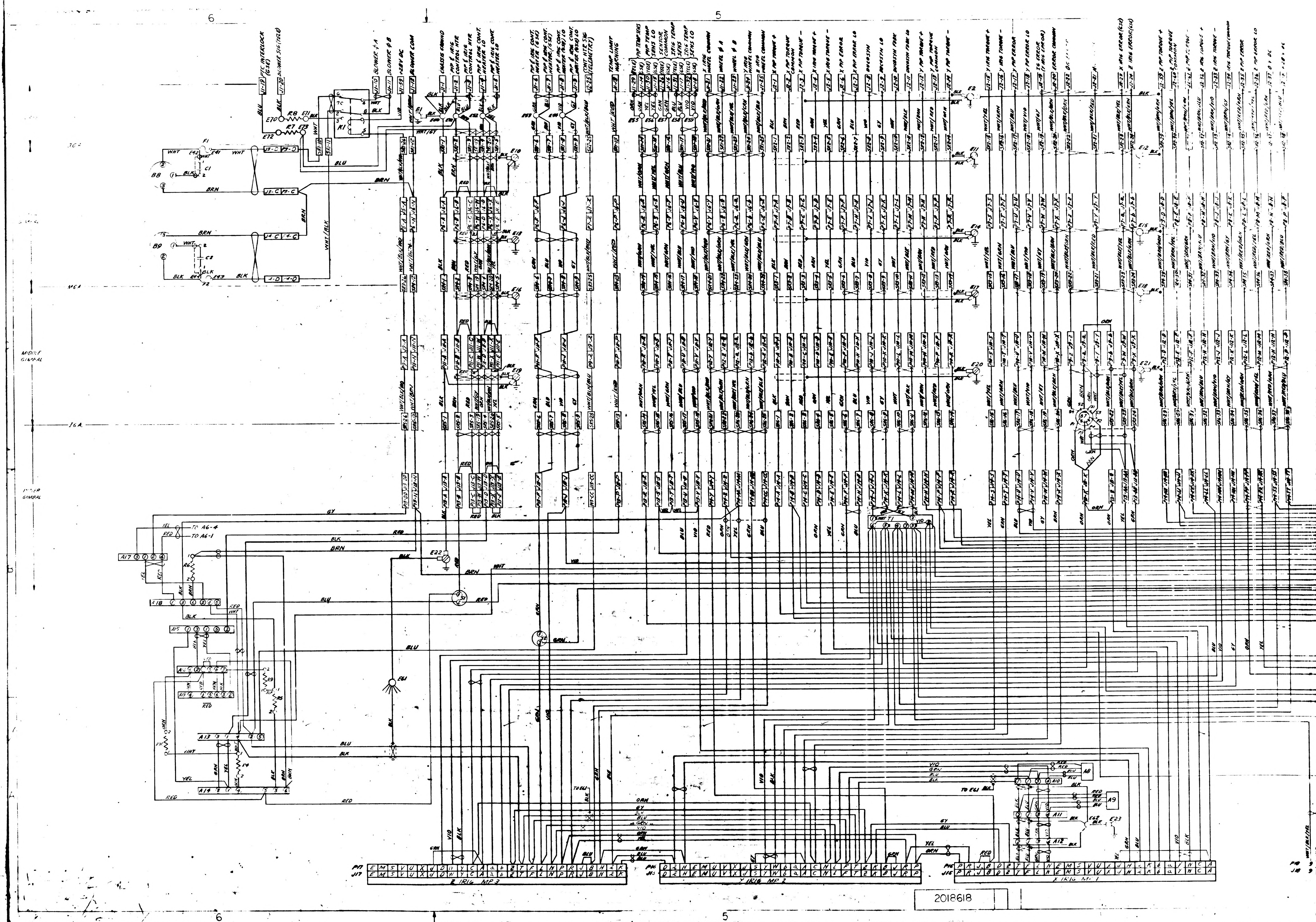
DRAWN THENO DATE 2/15/65
CHECKED WINBERG
APPROVAL A. E. Winberg
APPROVAL

IMU WIRING DIAGRAM BLOCK II

NASA APPROVAL
MIT APPROVAL W Kupfer 23 Nov 65
CODE IDENT NO
SIZE J
NASA DRAWING NO 2018618
SCALE
WT
SHEET 1 OF 1

2018618


X IRIG ERROR (65E)
Z IRIG ERROR (65E)
Z PIP TORQUE +
Z PIP TORQUE COMMON
Z PIP TORQUE -
Z IRIG TORQUE +
Z IRIG TORQUE -
IRIG TORQUE COMMON
Z PIP ERROR
Z PIP ERROR LO
0 V DC
+28 V DC
RESOL EXCIT.
RESOL. EXCIT. LO
A7
PRECISION RESOL ASSY
SIN A16 16X
SIN A16 16X LO
COS A16 16X
COS A16 16X LO
SIN A16 1X
SIN A16 1X LO
COS A16 1X
COS A16 1X LO
IG MOTOR B6-1
IG MOTOR B6-2
MG MOTOR B5-1
MG MOTOR B5-2
OG MOTOR B4-1
OG MOTOR B4-2
RESERVED FOR SHIELD GROUND
J1-61
J2-58
B1
B2
B3
B4
B5
B6
A4
A5
A6
TO A17-3
TO A17-4
TO E61
R2
R3
SPARES
X PIP A1
Y PIP A2
Z PIP A3
P19
J19
3
4



6
5
PFC INTERLOCK (G3E)
BLOWER SIG (TELE)
BLOWER φA
BLOWER φB
+28V DC
BLOWER COM
CHASSIS GROUND
PIP & IRIG CONTROL HTR
TEMP LIGHT WARNING
K1
B8
B9
F1
F2
C1
C2
MIDDLE GIMBAL
INNER GIMBAL
TO A6-4
TO A6-1
A17
A18
A15
A16
A13
A14
E22
E61
TO E61
A8
A9
A10
A11
A12
E23
T1
P17
J17
Z IRIG MP 3
P16
J16
Y IRIG MP 2
P18
J18
X IRIG MP 1
2018618
6
5

SYM	TDRR 23163 REVISIONS DESCRIPTION	DATE	APPROVAL
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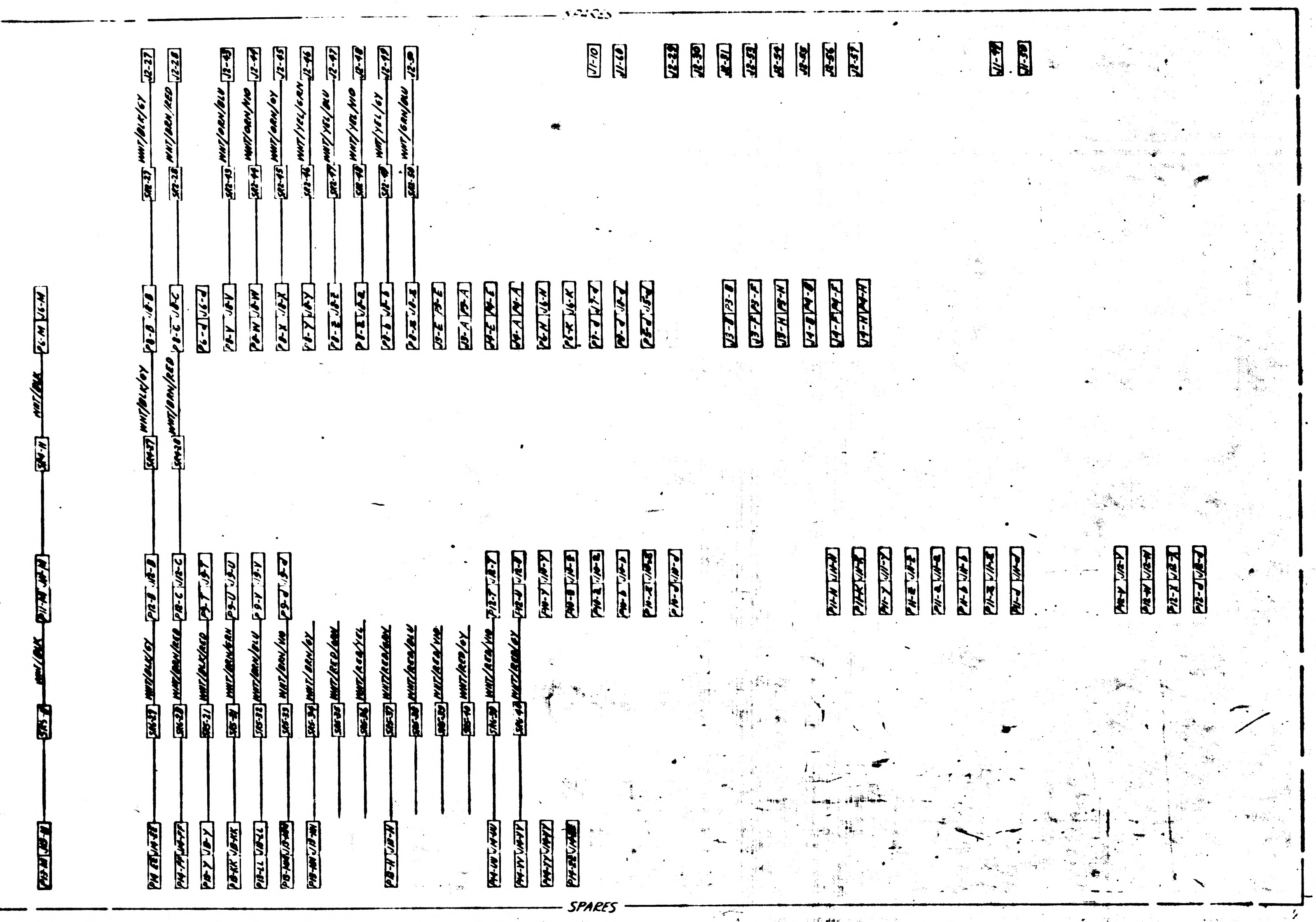
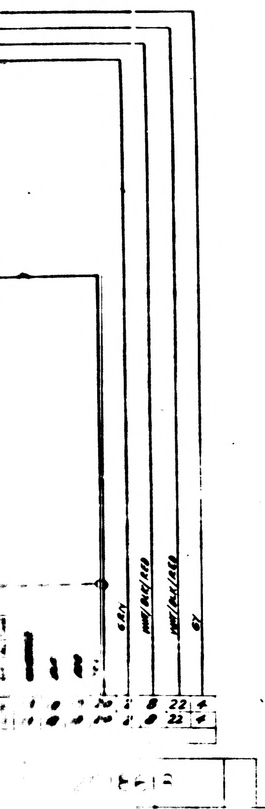
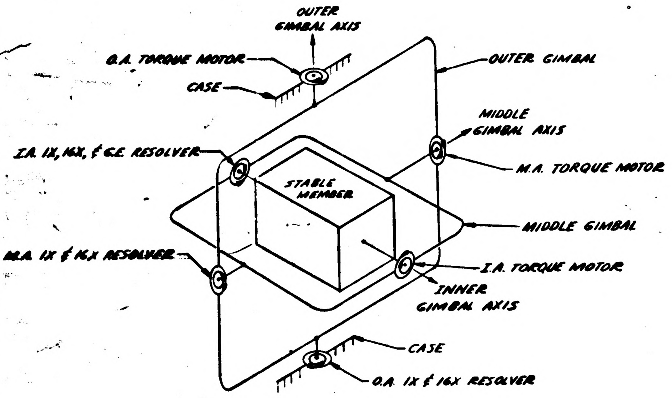
B	REVISED TDRR 26251	2 Dec	





REFERENCE DESIGNATION	DESCRIPTION	PART NUMBER	NO. REQ'D
A1, A2, A3	PIP	2018639	3
A4, A5, A6	PIP PREAMP	2007060	3
A7	PRECISION RESOLVER ASSY	2007204-011	1
A8, A9	HEATER	2018641	2
A10, A11, A12	HTR & TAPERED MOUNT ASSY, 25 IRIG	2018741	3
A13	TEMP CONTROL MODULE	2007064-011	1
A14	TEMP CONTROL THERMOSTAT	2018826	1
A15	TEMP ALARM MODULE	2007170-011	1
A16	TEMP ALARM THERMOSTAT (LOW)	2018824	1
A17	BLOWER CONTROL MODULE	2007171-011	1
A18	BLOWER CONTROL THERMOSTAT	2018825	1
A19	TEMP ALARM THERMOSTAT (HIGH)	2018823	1
B4	TORQUE MOTOR	2018629	1
B1, B2, B3	RESOLVER, MULTIPLE SPEED (1X & 16X)	2018631	3
B5, B6	TORQUE MOTOR	2018623	2
B7	RESOLVER, GYRO ERROR	2018632	1
B8, B9	BLOWER	2018644	2
C1, C2	CAPACITOR	1010789-	2
E1, E2	TERMINAL LUG	1010717-1	4
E10 THRU E23	TERMINAL LUG	1010717-1	28
E41 THRU E44	TERMINAL	1001600-1	4
E45 THRU E47	TERMINAL	1001600-1	3
E50 THRU E59	TERMINAL	1000100-3	5.
E61, E62	SPLICE	———	2
F1, F2	FUSE	1000170-12	2
E70 THRU E73	TERMINAL	1000100-3	4
J1	CONNECTOR - RECEPTACLE	1010783-1	1
J2		1010783-2	1
J3, J4		1011741-000	2
J5 THRU J12		1000122	8
J13		1000119-1	1
J14		1010813-1	1
J15, J16, J17		1010852-26	3
J18, J19, J20	PLUG	1001497-2	3
K1	RELAY	1010353-10	1
MP1, MP2, MP3	IRIG	2021500	3.
P3, P4	CONNECTOR, PLUG	1011757-000	2
P5 THRU P12		1000123	8
P13		1000120-1	1
P14		1010813-4	1
P15, P16, P17	RECEPTACLE	1000121	3
P18, P19, P20	RECEPTACLE	1001497-1	3
R1	RESISTOR, FIXED	1010928-	1
R2			1
R3			1
R4			1
R5			1
R6			1
R9			1
R10			1
R7 & R8		2021504-44	2
SR1, SR2	SLIP RING ASSY	2018625	2
SR3, SR4	SLIP RING ASSY	2018624	2
SR5, SR6	SLIP RING ASSY	2018634	2
S1, S2	SAFETY THERMOSTAT	1001485	2
T1	TRANSFORMER	2007019	1

VALUES SELECTED AT ASSY (R1 THRU R6, R9, R10)



NOTE 1. ARROWS ON RESOLVERS & TORQUE MOTORS INDICATE THE POSITIVE DIRECTION OF ROTATION OF THE INNER MEMBER WITH RESPECT TO THE OUTER MEMBER AND THE OUTER MEMBER WITH RESPECT TO THE INNER MEMBER WHEN VIEWED ALONG THE AXIS IN A POSITIVE DIRECTION.

DRAWINGS FOR REFERENCE:

2018601	IMU ASSY BLK II
2018828	WIRING HARNESS A
2018797	WIRING HARNESS B
2018798	WIRING HARNESS C

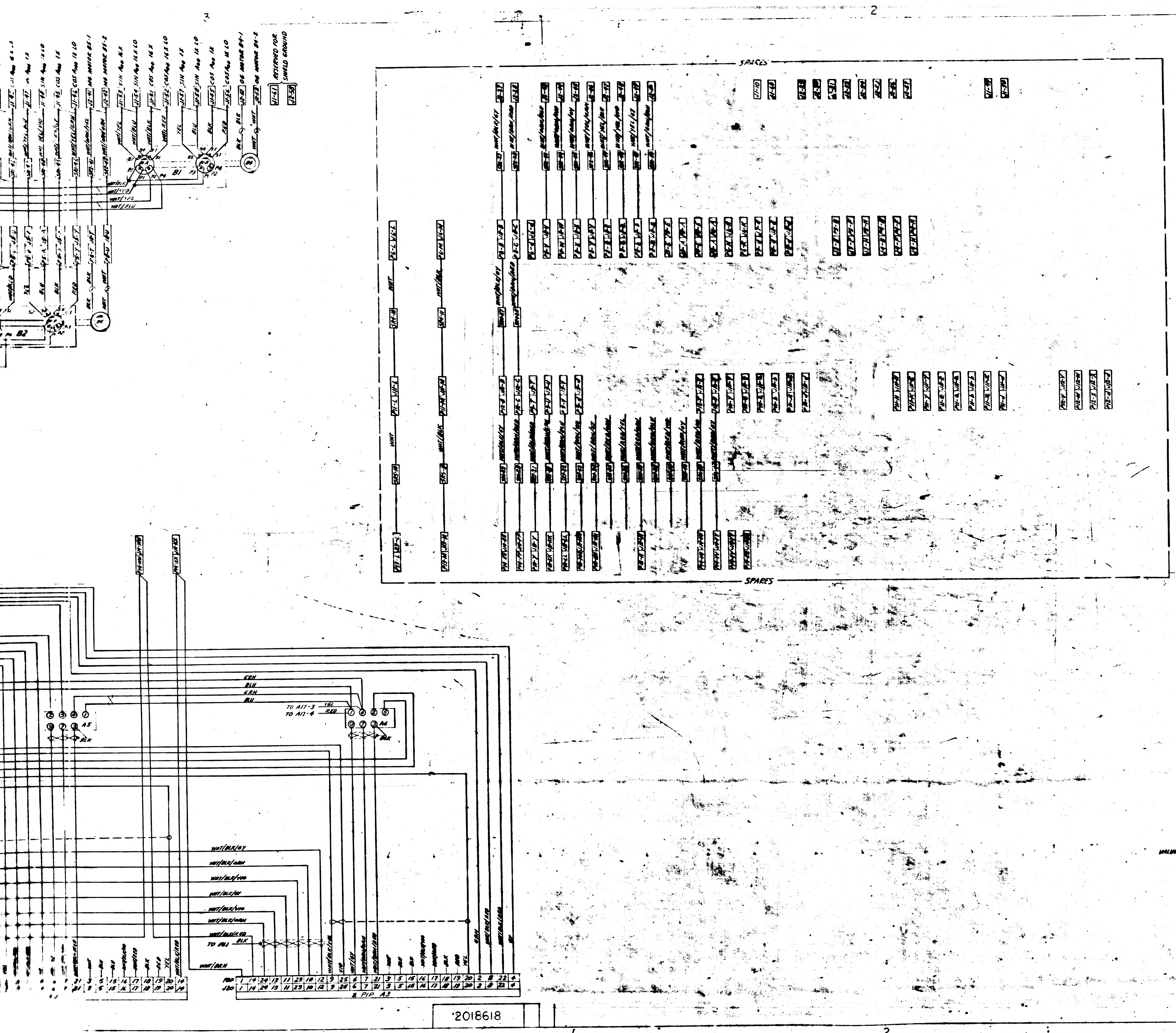
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN THENO DATE 10-18-65
CHECKED WINBERG
APPROVAL A.E. Winberg
APPROVAL Edward E. Miller
NASA APPROVAL A. C. METZGER
MIT APPROVAL W Kupfer 23 Nov

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

IMU WIRING DIAGRAM BLOCK II

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 2018618
SCALE
WT
SHEET 1 OF 1

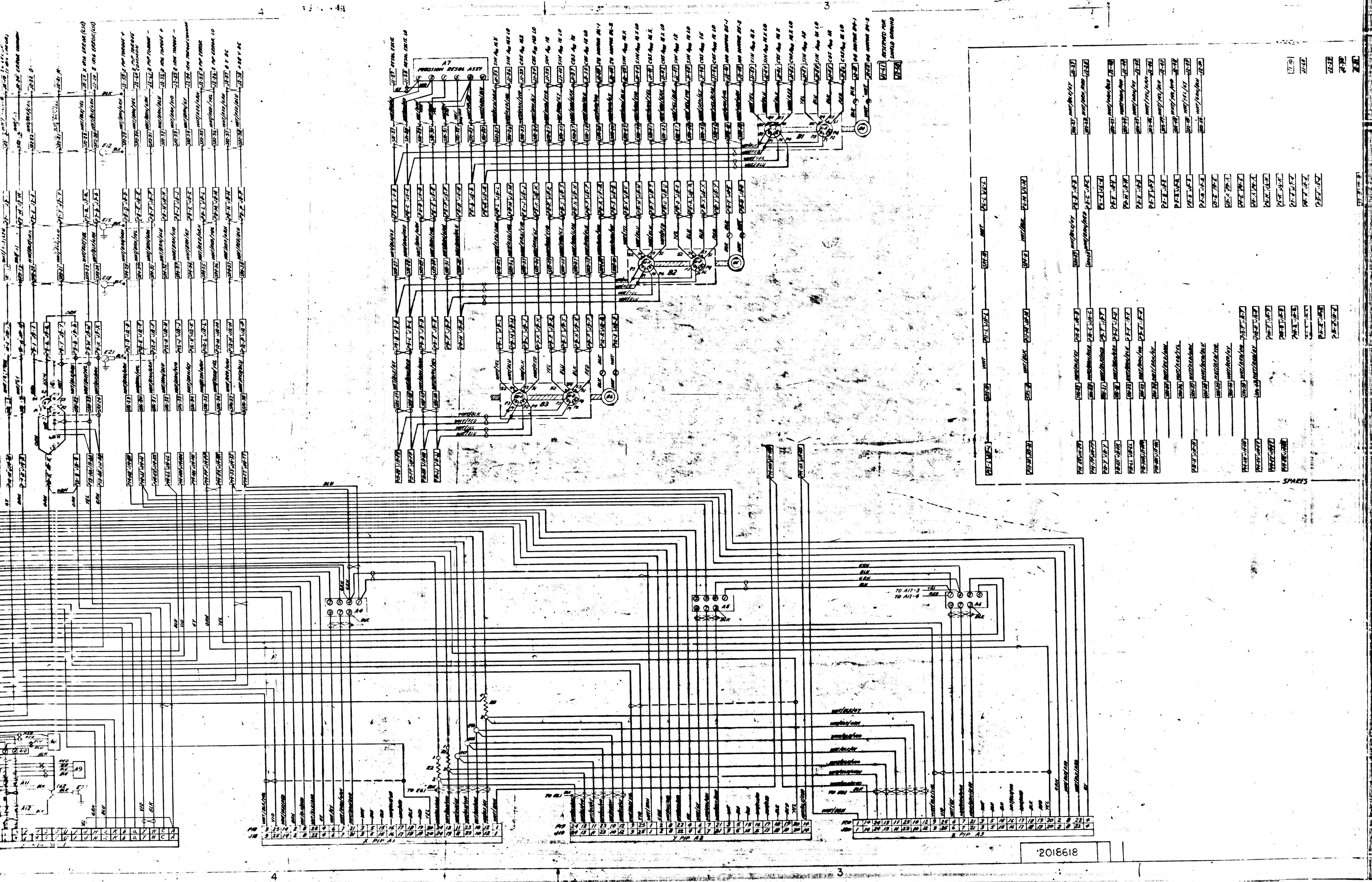


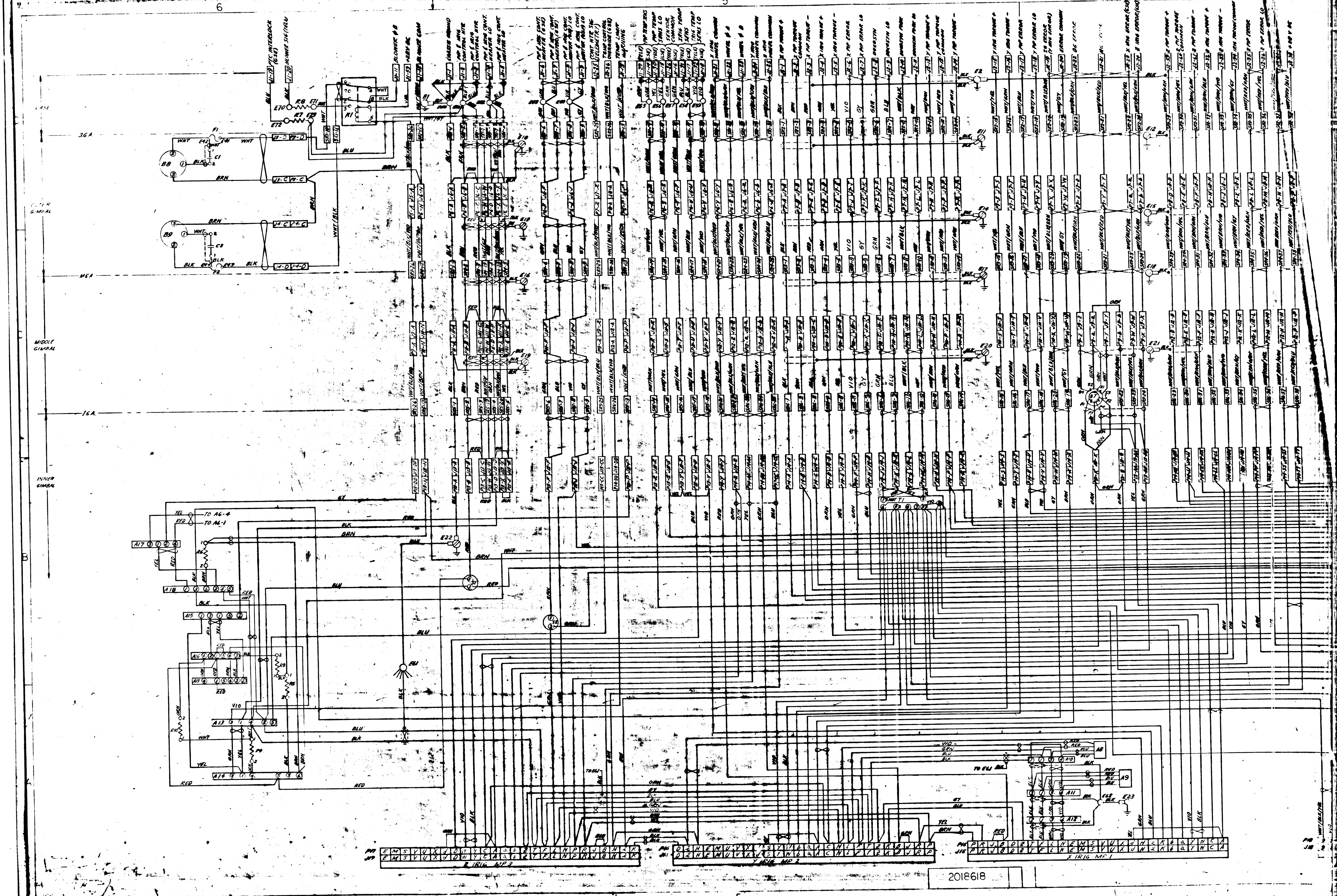
REFERENCE DESIGNATION	DESCRIPTION	PART NUMBER	NO. REQ'D
A1, A2, A3	PIP	2018639	3
A4, A5, A6	PIP PREAMP	2007060	3
A7	PRECISION RESOLVER ASSY	2007204-011	1
A8, A9	HEATER	2018641	2
A10, A11, A12	HTR & TAPERED MOUNT ASSY, 25 IRIG	2018741	3
A13	TEMP CONTROL MODULE	2007064-011	1
A14	TEMP CONTROL THERMOSTAT	2018826	1
A15	TEMP ALARM MODULE	2007170-011	1
A16	TEMP ALARM THERMOSTAT (LOW)	2018824	1
A17	BLOWER CONTROL MODULE	2007171-011	1
A18	BLOWER CONTROL THERMOSTAT	2018825	1
A19	TEMP ALARM THERMOSTAT (HIGH)	2018823	1
B4	TORQUE MOTOR	2018629	1
B1, B2, B3	RESOLVER, MULTIPLE SPEED (1X & 16X)	2018631	3
B5, B6	TORQUE MOTOR	2018623	2
B7	RESOLVER, GYRO ERROR	2018632	1
B8, B9	BLOWER	2018644	2
C1, C2	CAPACITOR	1010799-	2
E1, E2	TERMINAL LUG	1010717-1	4
E10 THRU E23	TERMINAL LUG	1010717-1	28
E41 THRU E44	TERMINAL	1001600-1	4
E45 THRU E47	TERMINAL	1001600-1	3
E50 THRU E59	TERMINAL	1000100-3	5
E61, E62	SPLICE		2
F1, F2	FUSE	1000170-12	2
E70 THRU E73	TERMINAL	1000100-3	4
J1	CONNECTOR - RECEPTACLE	1010783-1	1
J2		1010783-2	1
J3, J4		1011741-000	2
J5 THRU J12		1000122	8
J13		1000119-1	1
J14		1010813-1	1
J15, J16, J17		1010852-26	3
J18, J19, J20	PLUG	1001497-2	3
K1	RELAY	1010353-10	1
MP1, MP2, MP3	IRIG	2021500	3
P3, P4	CONNECTOR, PLUG	1011757-000	2
P5 THRU P12		1000123	8
P13		1000120-1	1
P14		1010813-4	1
P15, P16, P17	RECEPTACLE	1000121	3
P18, P19, P20	RECEPTACLE	1001497-1	3
R1	RESISTOR, FIXED	1010926-	1
R2			1
R3			1
R4			1
R5			1
R6			1
R9			
R10			
R7 & R8		[illegible]-44	2
SR1, SR2	SLIP RING ASSY	2018625	2
SR3, SR4	SLIP RING ASSY	2018624	2
SR5, SR6	SLIP RING ASSY	2018634	2
S1, S2	SAFETY THERMOSTAT	1001485	2
T1	TRANSFORMER	2007019	1

VALUES SELECTED AT ASSY

2018618

F-3

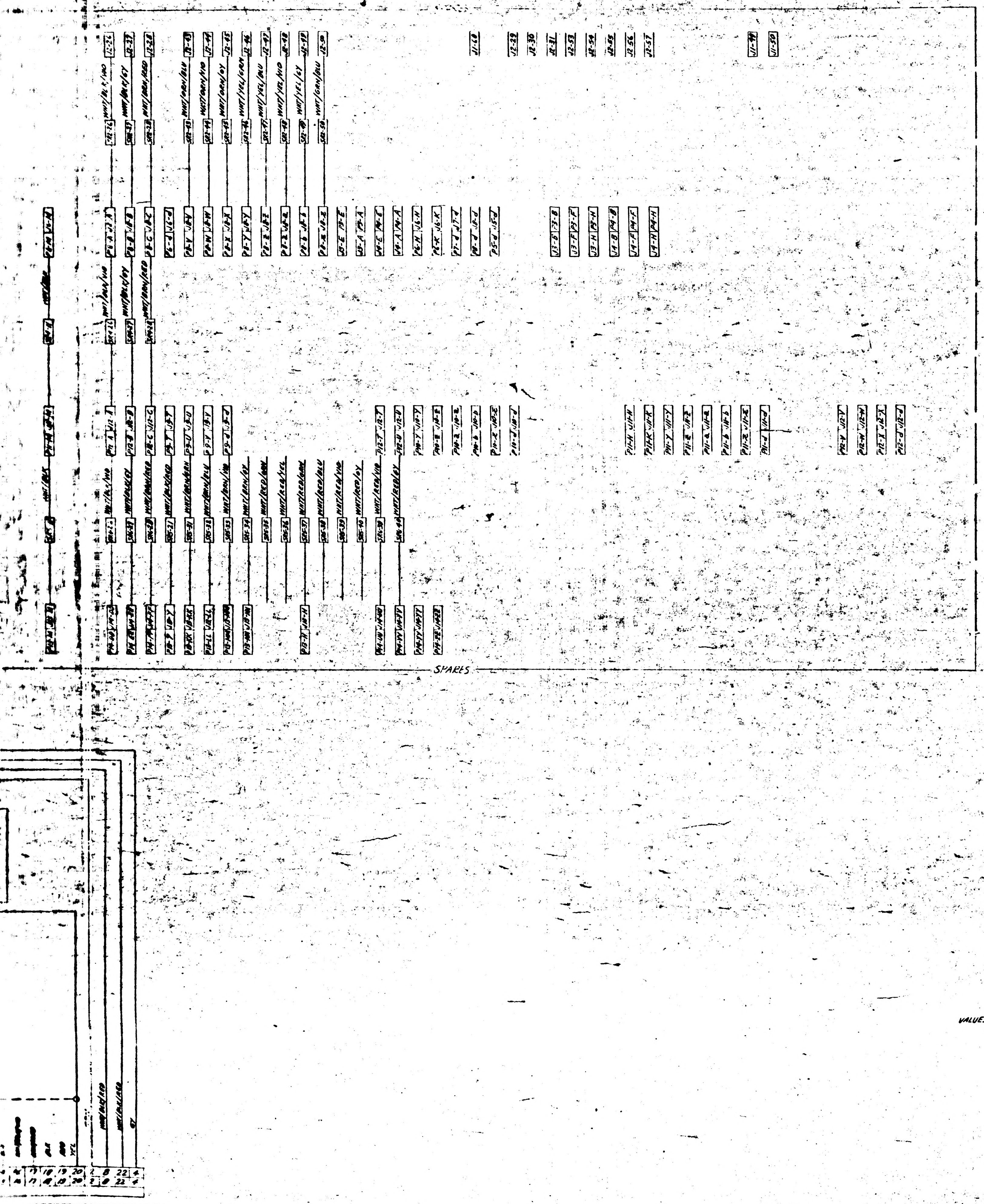

A7
PRECISION RESOL ASSY
RESOL EXCIT.
RESOL EXCIT. LO
RESERVED FOR SHIELD GROUND
B1
B2
B3
B4
A4
A5
A6
A9
A11
A12
E12
E15
E18
E21
TO A17-3
TO A17-4
SPARES
X PIP A1
Y PIP A2
Z PIP A3
P18
J18
P19
J19
P20
J20
2018618
4
3


CASE
OUTER GIMBAL
MIDDLE GIMBAL
INNER GIMBAL
B8
B9
A1
F1
F2
C1
C2
A9
A11
A12
A13
A14
A15
A16
A17
A18
A19
T1
E23
BLK
BLU
BRN
WHT
RED
YEL
GRN
VIO
GY
WHT/BLK
TO A6-4
TO A6-1
Z IRIG MP3
Y IRIG MP 2
X IRIG MF 1
P17
J17
P16
J16
P15
J15
P18
J18

2018618

2018618

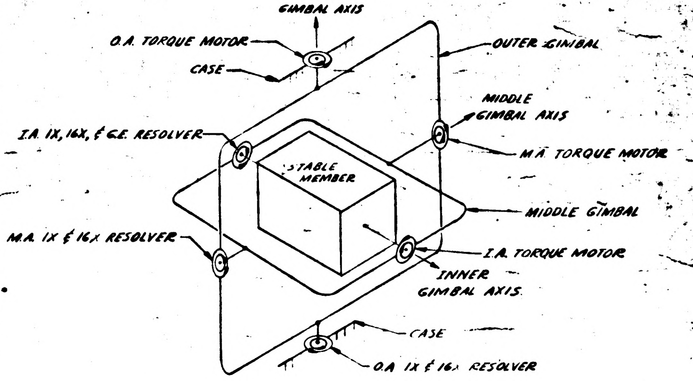
REVISIONS TDRR 23163			
SYM	DESCRIPTION	DATE	APPROVAL



2018618

REFERENCE DESIGNATION	DESCRIPTION	[illegible]	REQ'D
A1 A2 A3	PIP	2018639	3
A4, A5 A6	PIP PREAMP	2007060	3
A7	PRECISION RESOLVER ASSY	2007204 011	1
A8, A9	HEATER	2018641	2
A10 A11 A12	HTR & TAPERED MOUNT ASSY 25 IRIG	2018741	3
A13	TEMP CONTROL MODULE	2007064-011	1
A14	TEMP CONTROL THERMOSTAT	2018826	1
A15	TEMP ALARM MODULE	2007170 011	1
A16	TEMP ALARM THERMOSTAT (LOW)	2018824	1
A17	BLOWER CONTROL MODULE	2007171-011	1
A18	BLOWER CONTROL THERMOSTAT	2018825	1
A19	TEMP ALARM THERMOSTAT (HIGH)	2018823	1
B4	TORQUE MOTOR	2018629	1
B1, B2 B3	RESOLVER. MULTIPLE SPEED (1X & 16X)	2018631	3
B5 B6	TORQUE MOTOR	2018623	2
B7	RESOLVER, GYRO ERROR	2018632	1
B8, B9	BLOWER	2018644	2
C1 C2	CAPACITOR	1010799-	2
E1, E2	TERMINAL LUG	1010717-1	4
E10 THRU E23	TERMINAL LUG	1010717-1	28
E41 THRU E44	TERMINAL	1001600-1	4
E45 THRU E47	TERMINAL	1001600-1	3
E50 THRU E59	TERMINAL	1000100-3	5
E61, E62	SPLICE		2
F1 . F2	FUSE	1000170-12	2
E70 THRU E73	TERMINAL	1000100-3	4
J1	CONNECTOR - RECEPTACLE	1010783-1	1
J2		1010783-2	1
J3 J4		1011741-000	2
J5 THRU J12		1000122	8
J13		1000119-1	1
J14		1010813-1	1
J15. J16. J17		1010852-26	3
J18. J19 J20	PLUG	1001497-2	3
K1	RELAY	1010353-10	1
MP1 MP2, MP3	IRIG	2021500	3
P3 P4	CONNECTOR . PLUG	1011757-000	2
P5 THRU P12		1000123	8
P13		1000120-1	1
P14		1010813-4	1
P15 P16 P17	RECEPTACLE	1000121	3
P18 P19. P20	RECEPTACLE	1001497-1	3
R1	RESISTOR . FIXED	1010[illegible]-	1
R2			1
R3			1
R4			1
R5			1
R6			1
R7, R8		2021504-44	2
R9		1010928-	1
R10		1010928-	1
SR1 SR2	SLIP RING ASSY	2018625	2
SR3 , SR4	SLIP RING ASSY	2018624	2
SR5 , SR6	SLIP RING ASSY	2018634	2
S1 . S2	SAFETY THERMOSTAT	1001485	2
T1	TRANSFORMER	2007019	1

VALUES SELECTED AT ASSY



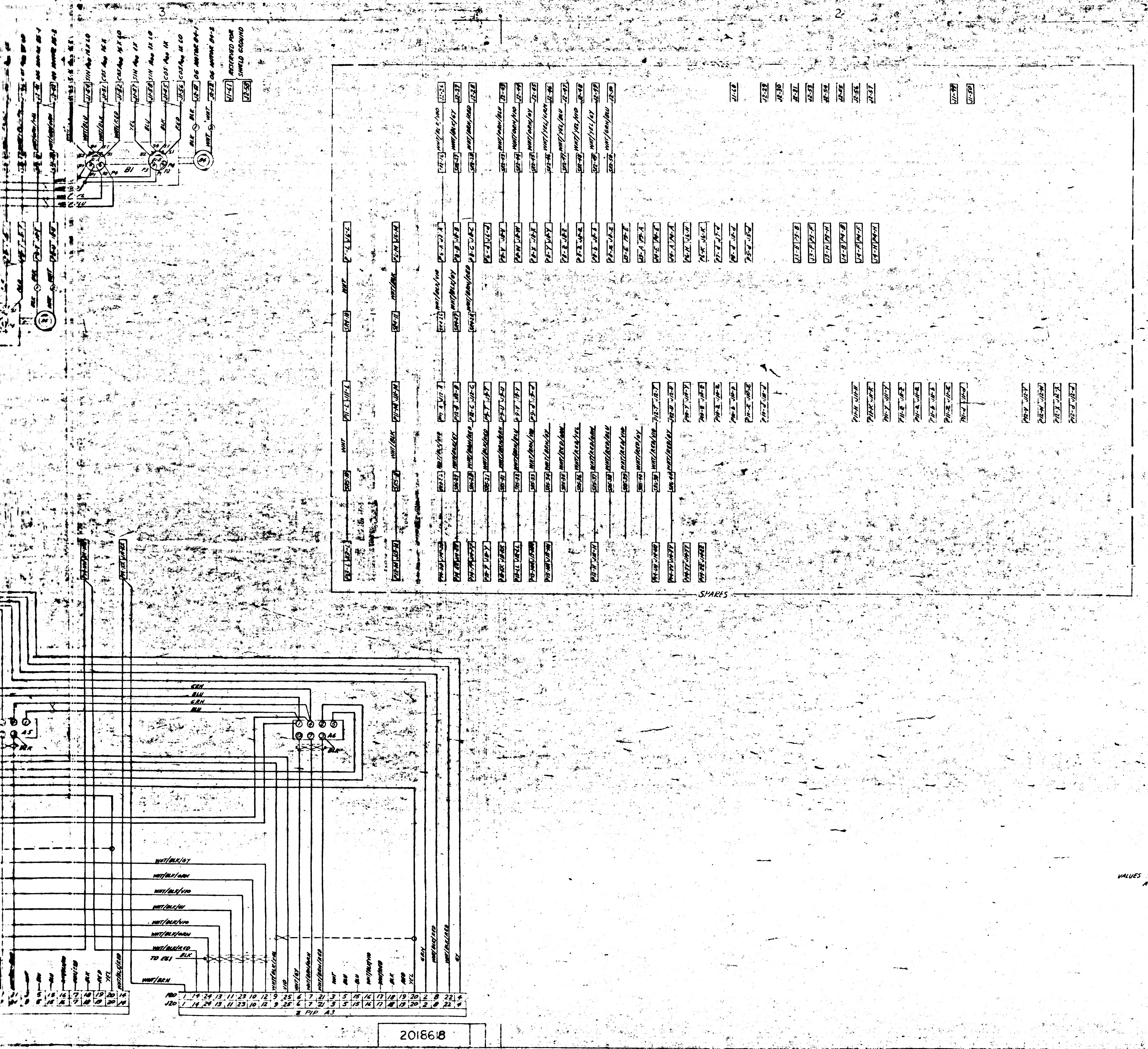
NOTE 1. ARROWS ON RESOLVERS & TORQUE MOTORS INDICATE THE POSITIVE DIRECTION OF ROTATION OF THE INNER MEMBER WITH RESPECT TO THE OUTER MEMBER AND THE OUTER MEMBER WITH RESPECT TO THE INNER MEMBER WHEN VIEWED ALONG THE AXIS IN A POSITIVE DIRECTION.

DRAWINGS FOR REFERENCE:
2018601-001 IMU ASSY BLK II
2018828 WIRING HARNESS A
2018797 WIRING HARNESS B
2018798 WIRING HARNESS C

DUPLICATE
MASTER

MASTER

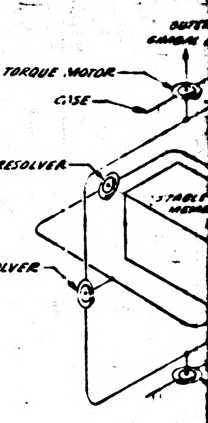
MIT INSTRUMENTATION LAB Cambridge Mass DWG NO CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DRAWN W.S.W. DATE CHECKED WINBERG APPROVAL A. E. Winberg APPROVAL	IMU WIRING DIAGRAM BLOCK II
~~NOT REQUIRED PER LETTER~~ NASA PP7-65-612 MIT APPROVAL W.G. Morley 12-13-65	CODE IDENT NO — SIZE J — NASA DRAWING NO 2018618
	SCALE — WT — SHEET 1 OF 1



2018618

REFERENCE DESIGNATION	DESCRIPTION	[illegible]	[illegible]
A1 A2 A3	PIP	2018639	3
A4 A5 A6	PIP PREAMP	2007060	3
A7	PRECISION RESOLVER ASSY	2007204 011	1
A8 A9	HEATER	2018641	2
A10 A11 A12	HTR & TAPERED MOUNT ASSY 25 IRIG	2018741	3
A13	TEMP CONTROL MODULE	2007064-011	1
A14	TEMP CONTROL THERMOSTAT	2018826	1
A15	TEMP ALARM MODULE	2007170 011	1
A16	TEMP ALARM THERMOSTAT (LOW)	2018824	1
A17	BLOWER CONTROL MODULE	2007171-011	1
A18	BLOWER CONTROL THERMOSTAT	2018825	1
A19	TEMP ALARM THERMOSTAT (HIGH)	2018823	1
B4	TORQUE MOTOR	2018629	1
B1. B2 B3	RESOLVER. MULTIPLE SPEED (1X & 16X)	2018631	3
B5 B6	TORQUE MOTOR	2018623	2
B7	RESOLVER. GYRO ERROR	2018632	1
B8, B9	BLOWER	2018644	2
C1 C2	CAPACITOR	1010799-	2
E1, E2	TERMINAL LUG	1010717-1	4
E10 THRU E23	TERMINAL LUG	1010717-1	25
E41 THRU E44	TERMINAL	1001600-1	4
E45 THRU E47	TERMINAL	1001600-1	3
E50 THRU E59	TERMINAL	1000100-3	5
E61. E62	SPLICE		2
F1. F2	FUSE	1000170-12	2
E70 THRU E73	TERMINAL	1000100-3	4
J1	CONNECTOR - RECEPTACLE	1010783-1	1
J2		1010783-2	1
J3 J4		1011741-000	2
J5 THRU J12		1000122	8
J13		1000119-1	1
J14		1010813-1	1
J15 J16 J17		1010852-26	3
J18 J19 J20	PLUG	1001497-2	3
K1	RELAY	1010353-10	1
MP1 MP2, MP3	IRIG	2021500	3
P3 P4	CONNECTOR. PLUG	1011757-000	2
P5 THRU P12		1000123	8
P13		1000120-1	1
P14		1010813-4	1
P15 P16 P17	RECEPTACLE	1000121	3
P18 P19. P20	RECEPTACLE	1001497-1	3
R1	RESISTOR FIXED	1010[illegible]	1
R2			1
R3			1
R4			1
R5			1
R6			1
R7, R8		2021504-44	2
R9		1010928-	1
R10		1010928-	1
SR1 SR2	SLIP RING ASSY	2018625	2
SR3, SR4	SLIP RING ASSY	2018624	2
SR5, SR6	SLIP RING ASSY	2018634	2
S1. S2	SAFETY THERMOSTAT	1001485	2
T1	TRANSFORMER	2007019	1

VALUES SELECTED AT ASSY



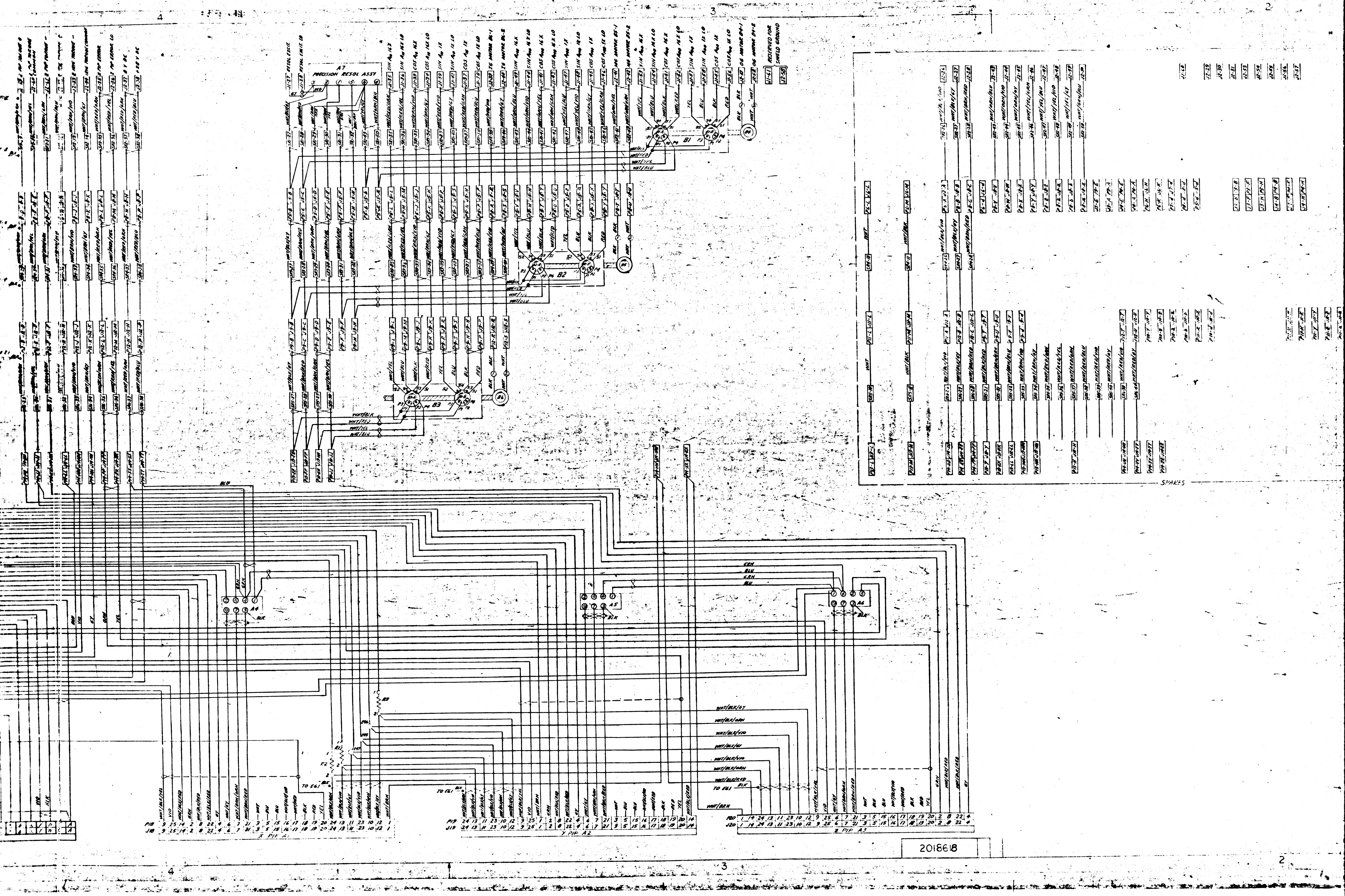
NOTE 1. ARROWS ON RESOLVER
THE POSITIVE DIRECTIO
WITH RESPECT TO THE
WITH RESPECT TO THE
THE AXIS IN A POSITIV

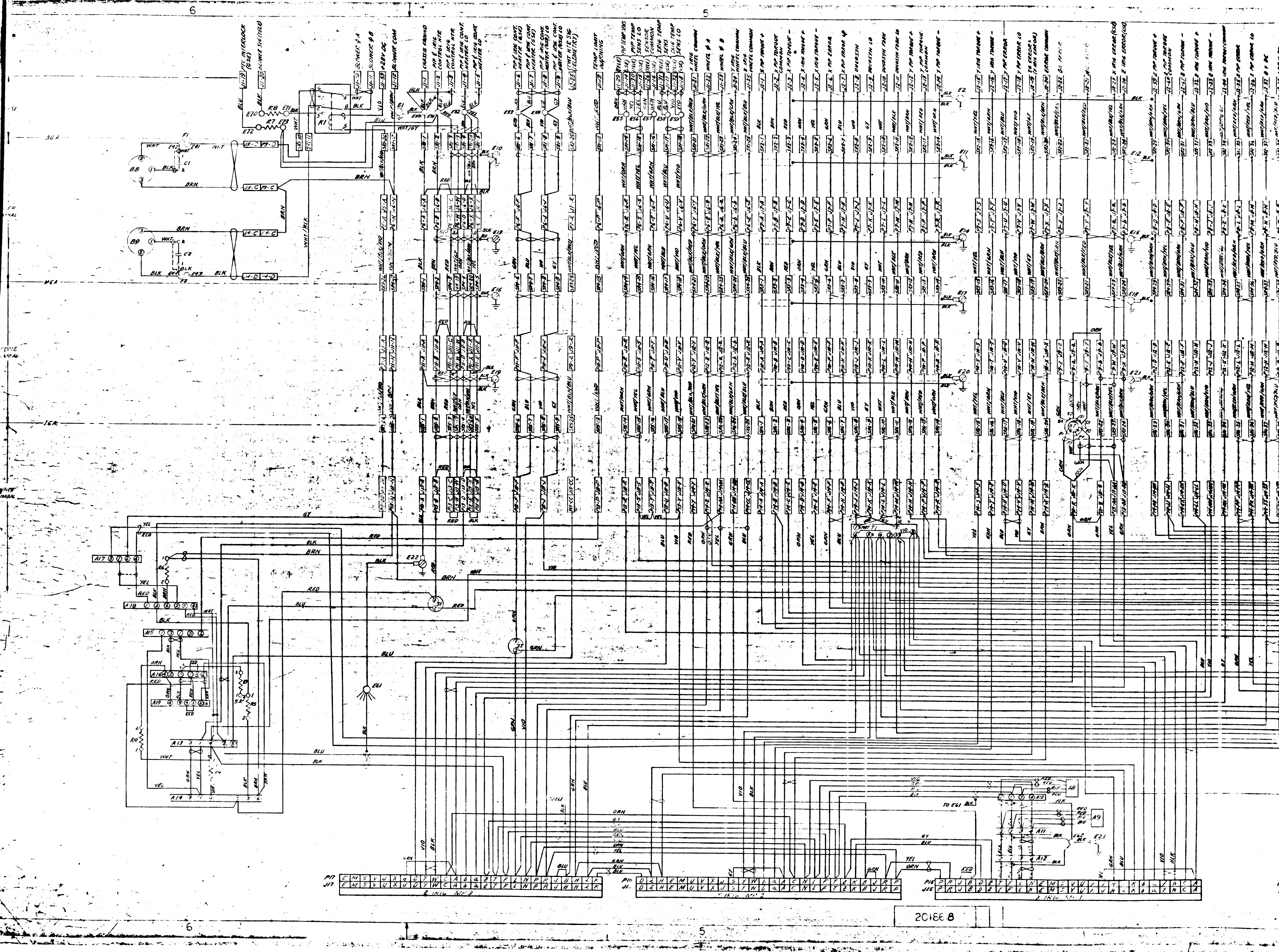
DRAWINGS FOR REFE
2018601-011 IMU
2018828 WIRIN
2018797 WIRIN
2018798 WIRIN

DUPLI
MAS

MASTER

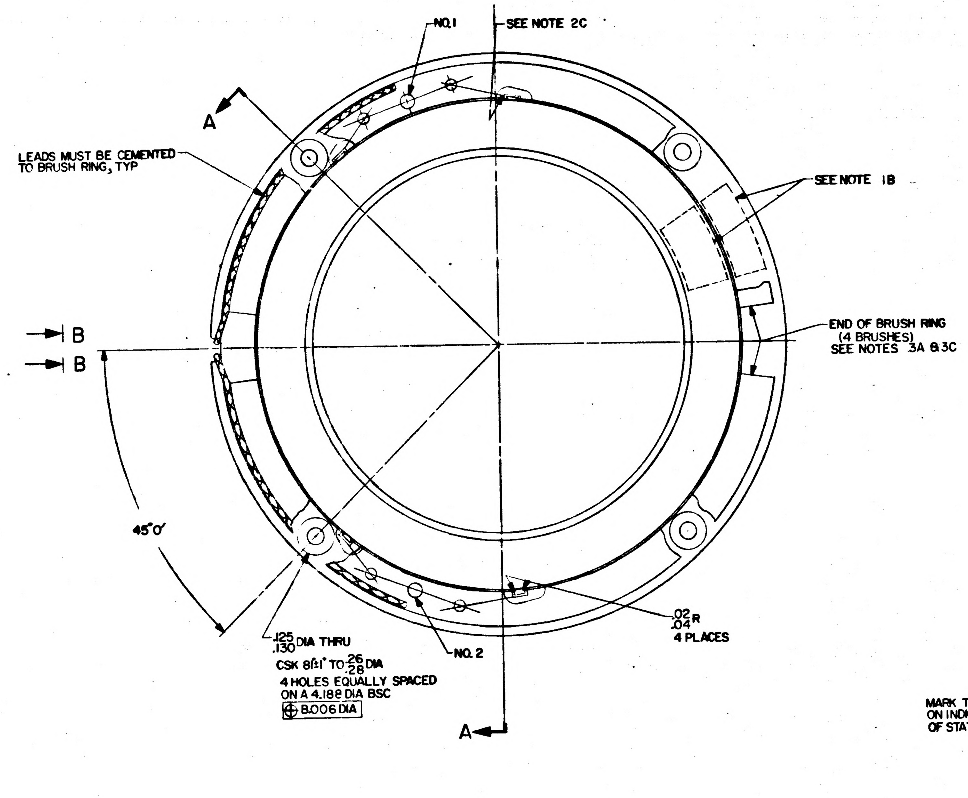
DRAWN
CHECKED
APPROVED
APPROVED
NOT
NASA


4
3
2
A7
PRECISION RESOL ASSY
RESOL EXCIT.
RESOL. EXCIT. LO
SIN ANG 16X
SIN ANG 16X LO
COS ANG 16X
COS ANG 16X LO
SIN ANG 1X
SIN ANG 1X LO
COS ANG 1X
COS ANG 1X LO
IG MOTOR B6-1
IG MOTOR B6-2
MG MOTOR B5-1
MG MOTOR B5-2
OG MOTOR B4-1
OG MOTOR B4-2
RESERVED FOR SHIELD GROUND
+28 V DC
B1
B2
B3
B4
B5
B6
WHT/BLK
WHT/RED
WHT/YEL
WHT/BLU
A4
A5
A6
GRN
BLU
BLK
R1
R2
R3
TO E61
P18
J18
X PIP A1
P19
J19
Y PIP A2
P20
J20
Z PIP A3
SPARES
2018618

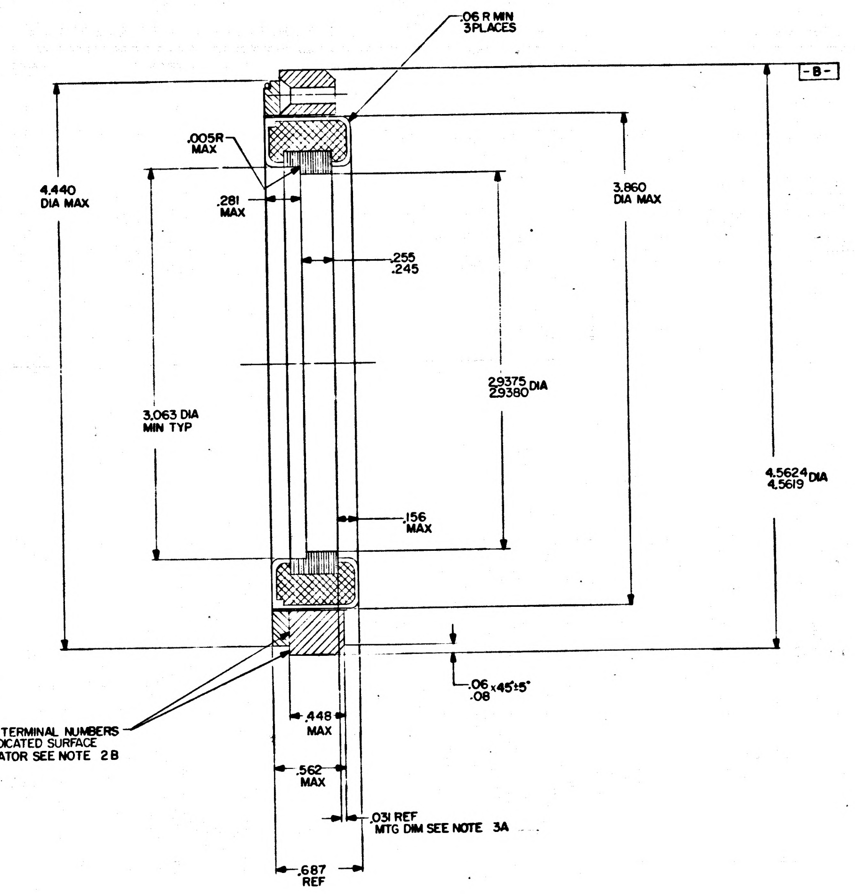


6
5
PIP INTERLOCK (GSE)
BLOWER SIG (FLEE)
BLOWER φA
BLOWER φB
+28V DC
BLOWER COM
CHASSIS GROUND
K1
R7
R8
F1
F2
B8
B9
C1
C2
E22
E61
A17
A18
A15
A16
A19
A13
A14
R10
R15
S1
S2
T1
A8
A9
A10
A11
A12
E23
E62
TO E61
P17
J17
Z IRIG NO 3
P16
J16
Y IRIG NO 2
P15
J15
X IRIG NO 1
20186 8

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED		
	B	NOTES REVISED RELEASED PER TDRR 15715		

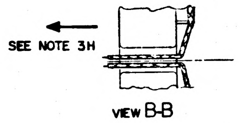


NO.1
SEE NOTE 2C
A
LEADS MUST BE CEMENTED TO BRUSH RING, TYP
SEE NOTE 1B
END OF BRUSH RING (4 BRUSHES) SEE NOTES 3A & 3C
B
B
45°0'
.125 .130 DIA THRU
CSK 81°±1° TO .26 .28 DIA
4 HOLES EQUALLY SPACED ON A 4.188 DIA BSC
⊕ B .006 DIA
NO. 2
.02 .04 R 4 PLACES
A



.06 R MIN 3 PLACES
-B-
.005R MAX
4.440 DIA MAX
.281 MAX
3.860 DIA MAX
.255 .245
3.063 DIA MIN TYP
2.9375 2.9380 DIA
.156 MAX
4.5624 4.5619 DIA
.06 .08 x 45°±5°
MARK TERMINAL NUMBERS ON INDICATED SURFACE OF STATOR SEE NOTE 2B
.448 MAX
.562 MAX
.031 REF MTG DIM SEE NOTE 3A
.687 REF

SECTION A-A



VIEW B-B

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO. AND MANUFACTURERS SYMBOL AT INDICATED LOCATION PER ND1002023 (SILK SCREEN OR RUBBER STAMP DIRECTLY ON PARTS)
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS2018623.
   - D. PREPARATION FOR DELIVERY PER ND1002215 CLASS I.
   - E. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
2. INSPECTION AND ACCEPTANCE:
   - A. INSPECTION SHALL BE PER PS2018623.
   - B. LEADS: PER MIL-W-16878 TYPE E-24.
     - LENGTH: 6 INCHES MIN.
     - COLOR: BLACK LEAD AT TERMINAL NO. 1
       WHITE LEAD AT TERMINAL NO. 2
   - C. BRUSH FORCE: 30 - 50 GRAMS WHEN CHECKED AT HEEL OF BRUSH.
   - D. STATOR TO BE INSPECTED BY USING GAGE (LATER) OF $\frac{4.5625}{4.5627}$ ID AND MUST BE $\boxed{◉ .003 \text{ TIR}}$ WITH GAGE SURFACE. MOUNTING SCREWS TO BE INSTALLED FOR THIS INSPECTION. ROTOR MUST GO ON ARBOR OF $\frac{2.9374}{2.9372}$ DIA AND MUST BE $\boxed{◉ .0015 \text{ TIR}}$ WITH ARBOR SURFACE.
3. DESIGN REQUIREMENTS:
   - A. A VARIATION OF ±.025 IN .031 MOUNTING DIM WILL RESULT IN NOT LESS THAN 100% OF THE BRUSH WIDTH REMAINING ON THE COMMUTATOR. UNDER THESE CONDITIONS THE BRUSH WILL NOT INTERFERE WITH THE INSULATION OF THE ARMATURE.
   - B. MOTOR TO MEET REQUIREMENTS OF PS2018623 WHEN THE STATOR AND ROTOR AXES ARE ECCENTRIC BY .002 AND OUT OF PARALLEL BY .5 MILLIRADIANS.
   - C. BRUSH RING TO BE 2 SEGMENTS.
   - D. BRUSH RING TO BE FASTENED TO STATOR USING NASA PART NO. 1010628-4
   - E. A +DC VOLTAGE AT TERMINAL NO. 1 WILL RESULT IN A CCW ROTATION OF THE INNER RING WHEN VIEWED FROM THE COMMUTATOR SIDE.
   - F. COMMUTATOR: ONE OF THE FOLLOWING MATERIALS OR FINISHES MUST BE USED
     1. GOLD PLATE PER MIL-G-45204 TYPE I OR II CLASS 3
     2. SILVER PER MIL-S-13282
     3. COIN SILVER
   - G. BREAK CORNERS $\frac{.005}{.015}$
   - H. LEAD PULL: LEADS SHALL WITHSTAND A FOUR(4) POUND PULL IN DIRECTION SHOWN WHEN APPLIED GRADUALLY FOR TEN(10) SECONDS.
4. SPECIAL INSTRUCTIONS AND INFORMATION:
   - A. CAUTION: DO NOT REMOVE STATOR FROM ROTOR WITHOUT FIRST REPLACING BRUSH RING WITH A MAGNETIC KEEPER RING.

PROCURE ONLY FROM APPROVED SOURCES
LISTED IN ND1002034 FOR THIS DRAWING

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018610	
2018611	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — DECIMALS — ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153
DATE
APPROVED 6-12-64
CHECKED
DRAWN DTB 3-9-64
APPROVED FOR MSC
MIT/IL APPROVAL
DATE

MOTOR, TORQUE
DC, FRAMELESS
SPECIFICATION CONTROL DRAWING

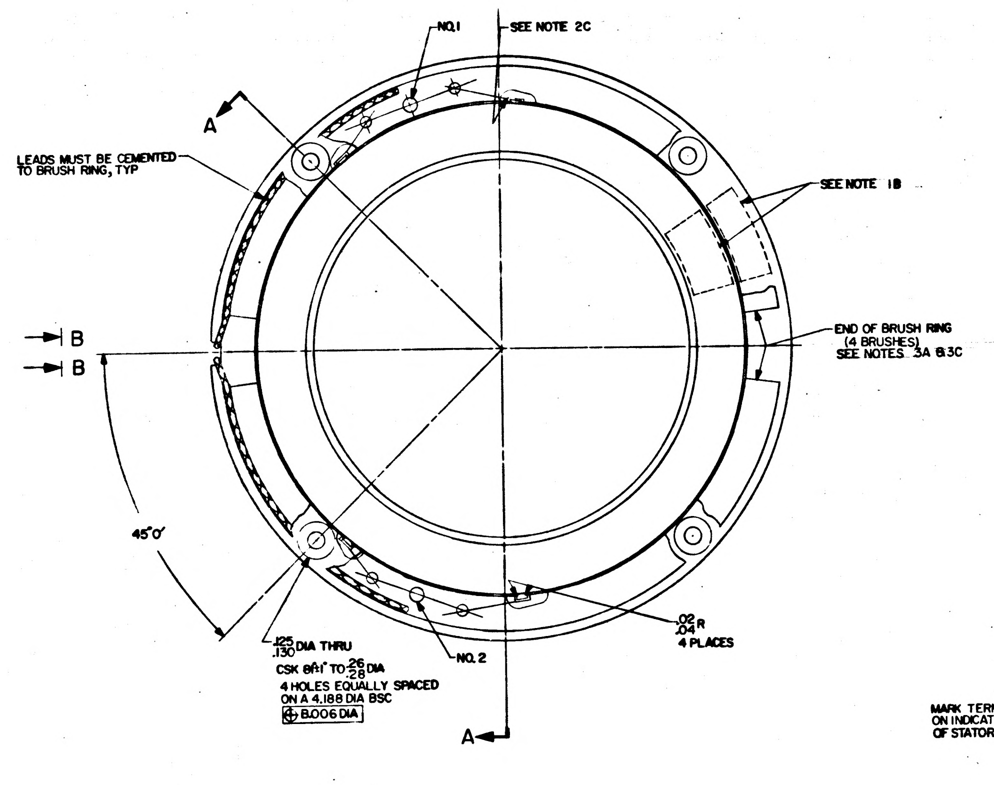
SCALE 2/1
UNIT WT.
CODE IDENT.

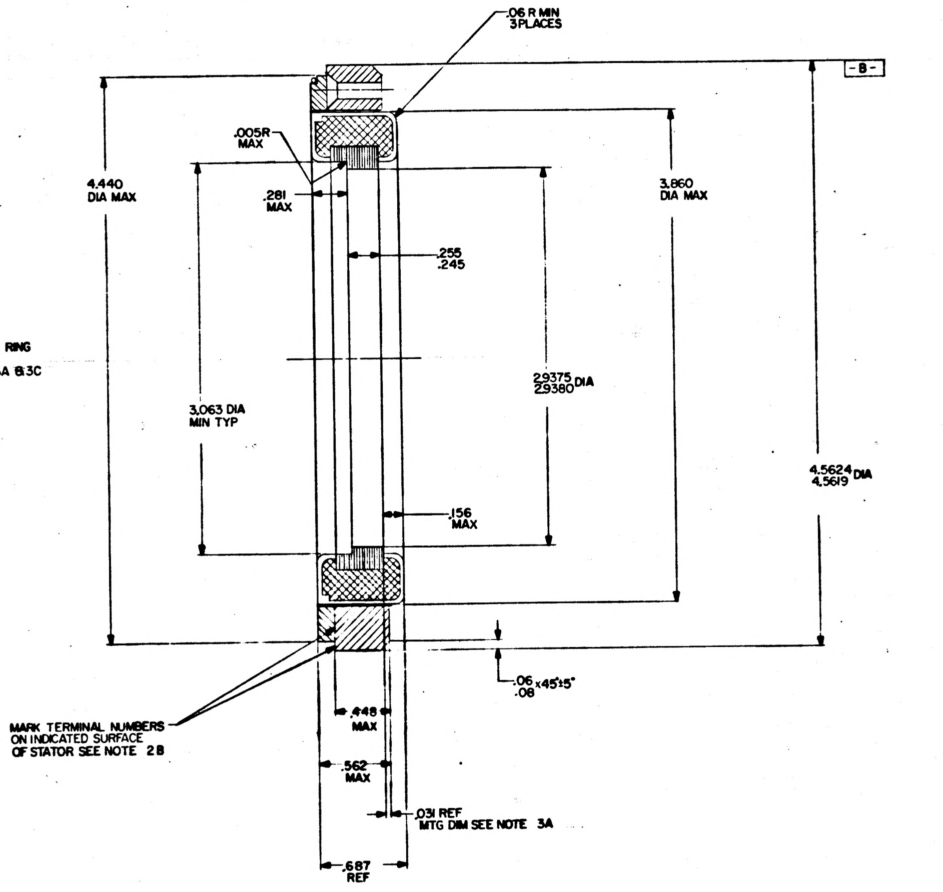
MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018623
SHEET 1 OF 1

2018623

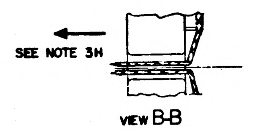
4 OFF

REVISIONS					
ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	A	REVISED			
	B	NOTES REVISED RELEASED PER TDRR 15715			
	C	REVISED TDRR 8316	21 May 6		


NO.1
SEE NOTE 2C
A
LEADS MUST BE CEMENTED TO BRUSH RING, TYP
SEE NOTE 1B
END OF BRUSH RING (4 BRUSHES) SEE NOTES 3A & 3C
B
B
45°0'
.125 .130 DIA THRU
CSK 82°±1° TO .26 .28 DIA
4 HOLES EQUALLY SPACED ON A 4.188 DIA BSC
⊕ B .006 DIA
NO. 2
.02 .04 R 4 PLACES
A


.06 R MIN 3 PLACES
-B-
.005R MAX
4.440 DIA MAX
.281 MAX
.255 .245
3.860 DIA MAX
2.9375 2.9380 DIA
3.063 DIA MIN TYP
4.5624 4.5619 DIA
.156 MAX
.06 .08 x45°±5°
MARK TERMINAL NUMBERS ON INDICATED SURFACE OF STATOR SEE NOTE 2B
.448 MAX
.562 MAX
.031 REF MTG DIM SEE NOTE 3A
.687 REF

SECTION A-A



VIEW B-B

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO. AND MANUFACTURERS SYMBOL AT INDICATED LOCATION PER ND1002023 (SILK SCREEN OR RUBBER STAMP DIRECTLY ON PARTS)
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS2018623.
   - D. PREPARATION FOR DELIVERY PER ND1002215 CLASS I.
   - E. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
2. INSPECTION AND ACCEPTANCE:
   - A. INSPECTION SHALL BE PER PS2018623.
   - B. LEADS: PER MIL-W-16878 TYPE E-24.

     LENGTH: 6 INCHES MIN.

     COLOR: BLACK LEAD AT TERMINAL NO. 1
     WHITE LEAD AT TERMINAL NO. 2
   - C. BRUSH FORCE: 30 - 50 GRAMS WHEN CHECKED AT HEEL OF BRUSH.
   - D. STATOR TO BE INSPECTED BY USING GAGE (LATER) OF $\begin{matrix}4.5625\\4.5627\end{matrix}$ ID AND MUST BE $\boxed{◎.003\ \text{TIR}}$ WITH GAGE SURFACE. MOUNTING SCREWS TO BE INSTALLED FOR THIS INSPECTION. ROTOR MUST GO ON ARBOR OF $\begin{matrix}2.9374\\2.9372\end{matrix}$ DIA AND MUST BE $\boxed{◎.0015\ \text{TIR}}$ WITH ARBOR SURFACE.
3. DESIGN REQUIREMENTS:
   - A. A VARIATION OF ±.025 IN .031 MOUNTING DIM WILL RESULT IN NOT LESS THAN 75% OF THE BRUSH WIDTH REMAINING ON THE COMMUTATOR. UNDER THESE CONDITIONS THE BRUSH WILL NOT INTERFERE WITH THE INSULATION OF THE ARMATURE.
   - B. MOTOR TO MEET REQUIREMENTS OF PS2018623 WHEN THE STATOR AND ROTOR AXES ARE ECCENTRIC BY .002 AND OUT OF PARALLEL BY .5 MILLIRADIANS.
   - C. BRUSH RING TO BE 2 SEGMENTS.
   - D. BRUSH RING TO BE FASTENED TO STATOR USING NASA PART NO. 1010628-4
   - E. A +DC VOLTAGE AT TERMINAL NO. 1 WILL RESULT IN A CCW ROTATION OF THE INNER RING WHEN VIEWED FROM THE COMMUTATOR SIDE.
   - F. COMMUTATOR: ONE OF THE FOLLOWING MATERIALS OR FINISHES MUST BE USED
     1. GOLD PLATE PER MIL-G-45204 TYPE I OR II CLASS 3
     2. SILVER PER MIL-S-13282
     3. COIN SILVER
   - G. BREAK CORNERS $\begin{matrix}.005\\.015\end{matrix}$
   - H. LEAD PULL: LEADS SHALL WITHSTAND A FOUR(4) POUND PULL IN DIRECTION SHOWN WHEN APPLIED GRADUALLY FOR TEN(10) SECONDS.
4. SPECIAL INSTRUCTIONS AND INFORMATION:
   - A. CAUTION: DO NOT REMOVE STATOR FROM ROTOR WITHOUT FIRST REPLACING BRUSH RING WITH A MAGNETIC KEEPER RING.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND1002034 FOR THIS DRAWING

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

2018610	
2018611	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ——— DECIMALS ——— ANGLES ±0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL: ———

M I T INSTRUMENTATION LAB CONTRACT NAS 9-153

		DATE
APPROVED		6-12-64
CHECKED		
DRAWN	DTB	3964
APPROVED FOR MSC		
MIT/IL APPROVAL		DATE

MOTOR, TORQUE
DC, FRAMELESS
SPECIFICATION CONTROL DRAWING

SCALE	UNIT WT.	CODE IDENT.
2/1		

M I T
INSTRUMENTATION LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018623
SHEET 1 OF 1

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED		
	B	52°30' WAS 37°30'		
	C	NOTES REVISED RELEASED PER TDRR 11883	8-19-64	wk

COLOR CODING OF SLIP RING WIRES USING MIL-STD-681

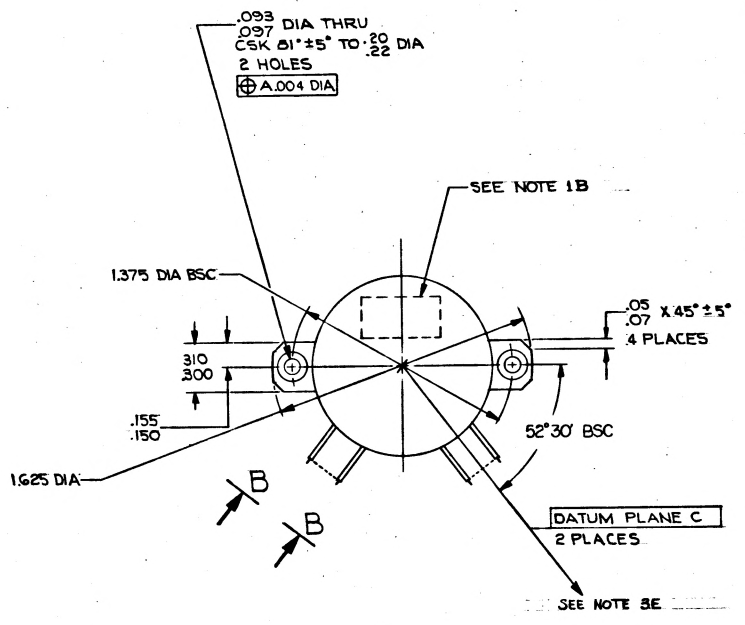
WIRE NO.	COLOR	WIRE NO.	COLOR
1	BLACK	21	WHT-BLK-RED
2	BROWN	22	WHT-BLK-ORN
3	RED	23	WHT-BLK-YEL
4	ORANGE	24	WHT-BLK-GRN
5	YELLOW	25	WHT-BLK-BLU
6	GREEN	26	WHT-BLK-VIO
7	BLUE	27	WHT-BLK-GY
8	VIOLET	28	WHT-BRN-RED
9	GRAY	29	WHT-BRN-ORN
10	WHITE	30	WHT-BRN-YEL
11	WHT-BLK	31	WHT-BRN-GRN
12	WHT-BRN	32	WHT-BRN-BLU
13	WHT-RED	33	WHT-BRN-VIO
14	WHT-ORN	34	WHT-BRN-GY
15	WHT-YEL	35	WHT-RED-ORN
16	WHT-GRN	36	WHT-RED-YEL
17	WHT-BLU	37	WHT-RED-GRN
18	WHT-VIO	38	WHT-RED-BLU
19	WHT-GY	39	WHT-RED-VIO
20	WHT-BLK-BRN	40	WHT-RED-GY

REQUIREMENTS:

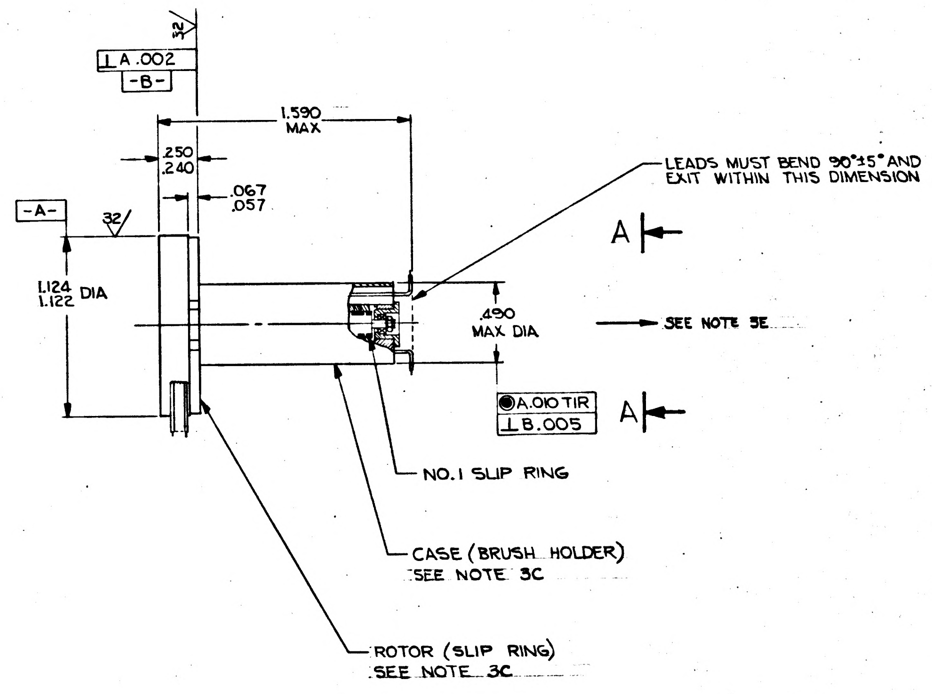
1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO., AND MANUFACTURERS SYMBOL AT INDICATED LOCATION PER ND1002023 ADHESIVE BACKED NAMEPLATE MAY NOT BE USED.
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS 2018624
   - D. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
   - E. PREPARATION FOR DELIVERY PER ND1002215 CLASS I.
2. INSPECTION AND ACCEPTANCE
   - A. INSPECTION SHALL BE PER PS 2018624
   - B. LEADS: PER MIL-W-16878 TYPE E-28 PREFERRED. ALTERNATE TYPE E-30 WIRE SIZE MUST BE CONSISTENT ON EACH ASSEMBLY.

     LENGTH: 12 INCHES MINIMUM

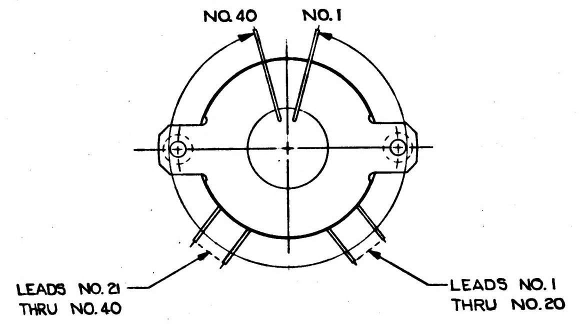
     COLOR: PER CHART
   - C. UNLESS OTHERWISE SPECIFIED DECIMAL DIAMETERS TO BE CONCENTRIC TO -A- WITHIN .015 TIR
   - D. MAX ALLOWABLE TORQUE: 80 GM-CM
3. DESIGN REQUIREMENTS
   - A. NUMBER OF RINGS: 40; MIN PITCH .020
   - B. BREAK ALL SHARP EDGES $\frac{.005}{.015}$
   - C. MATERIAL: CASE AND ROTOR FLANGE MATERIAL AND FINISH SHALL BE ONE OF THE FOLLOWING.
     1) AL6061-T6 PER QQ-A-325 - ANODIZE PER MIL-A-8625 TYPE I, CLEAR OR DYED BLACK
     2) CRES CL303 COND A PER QQ-S-763 - PASSIVATE PER MIL-F-14072 FIN E-300
   - D. $\sqrt{}^{63}$ ALL OVER UNLESS OTHERWISE SPECIFIED
   - E. LEAD PULL: LEADS SHALL WITHSTAND A TWO (2) POUND PULL WHEN APPLIED GRADUALLY FOR 10 SECONDS IN DIRECTIONS SHOWN.



.093 .097 DIA THRU
CSK 81°±5° TO .20 .22 DIA
2 HOLES
⊕ A .004 DIA
SEE NOTE 1B
1.375 DIA BSC
.05 .07 X 45°±5°
4 PLACES
310 .300
.155 .150
52°30' BSC
1.625 DIA
B
B
DATUM PLANE C
2 PLACES
SEE NOTE 3E

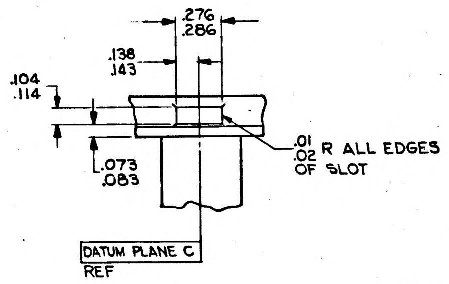


32
⊥ A .002
-B-
1.590 MAX
.250 .240
.067 .057
-A-
32
1.124 1.122 DIA
LEADS MUST BEND 90°±5° AND EXIT WITHIN THIS DIMENSION
A
.490 MAX DIA
SEE NOTE 3E
◉ A .010 TIR
⊥ B .005
A
NO. 1 SLIP RING
CASE (BRUSH HOLDER) SEE NOTE 3C
ROTOR (SLIP RING) SEE NOTE 3C



NO. 40
NO. 1
LEADS NO. 21 THRU NO. 40
LEADS NO. 1 THRU NO. 20

VIEW A-A



.276 .286
.138 .143
.104 .114
.073 .083
.01 .02 R ALL EDGES OF SLOT
DATUM PLANE C
REF

VIEW B-B
2 PLACES

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

2018610	
2018613	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ——— DECIMALS ±.005 ANGLES ———
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB CONTRACT NAS 9-153

		DATE
APPROVED		6-12-64
CHECKED		
DRAWN	R.G.S.	2-17-64
APPROVED FOR MSC	W J Rhine	8-19-64
MIT/IL APPROVAL		DATE

SLIP RING ASSEMBLY
ELECTRICAL - 40 CONTACT
(SPECIFICATION CONTROL DWG)

SCALE	UNIT WT.	CODE IDENT.
2/1		

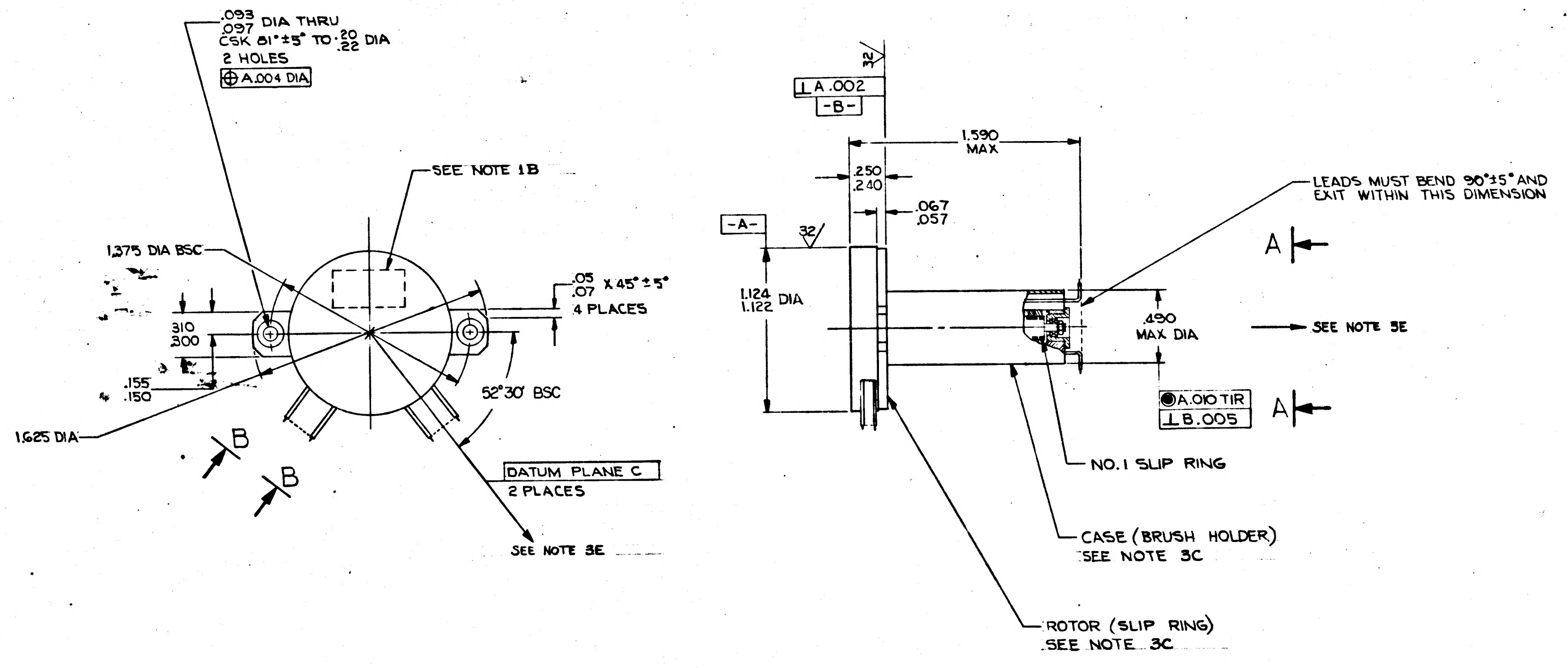
MIT INSTRUMENTATION LABORATORY
CAMBRIDGE, MASS.
DWG. NO
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018624
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS					
ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	A	REVISED			
	B	52°30' WAS 37°30'			
	C	NOTES REVISED RELEASED PER TORR 11883	8-19-64		
	D	REVISED PER TORR 19272	2 JUN 65		

COLOR CODING OF SLIP RING WIRES USING MIL-STD-681

WIRE NO.	COLOR	WIRE NO.	COLOR
1	BLACK	21	WHT-BLK-RED
2	BROWN	22	WHT-BLK-ORN
3	RED	23	WHT-BLK-YEL
4	ORANGE	24	WHT-BLK-GRN
5	YELLOW	25	WHT-BLK-BLU
6	GREEN	26	WHT-BLK-VIO
7	BLUE	27	WHT-BLK-GY
8	VIOLET	28	WHT-BRN-RED
9	GRAY	29	WHT-BRN-ORN
10	WHITE	30	WHT-BRN-YEL
11	WHT-BLK	31	WHT-BRN-GRN
12	WHT-BRN	32	WHT-BRN-BLU
13	WHT-RED	33	WHT-BRN-VIO
14	WHT-ORN	34	WHT-BRN-GY
15	WHT-YEL	35	WHT-RED-ORN
16	WHT-GRN	36	WHT-RED-YEL
17	WHT-BLU	37	WHT-RED-GRN
18	WHT-VIO	38	WHT-RED-BLU
19	WHT-GY	39	WHT-RED-VIO
20	WHT-BLK-BRN	40	WHT-RED-GY

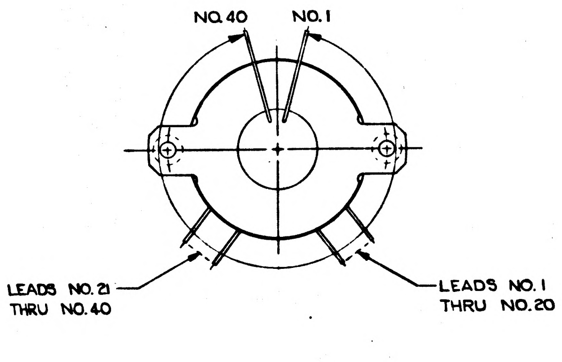

.093
.097 DIA THRU
CSK 81°±5° TO .20/.22 DIA
2 HOLES
⊕ A .004 DIA
SEE NOTE 1B
1.375 DIA BSC
.05
.07 X 45°±5°
4 PLACES
.310
.300
.155
.150
1.625 DIA
52°30' BSC
B
B
DATUM PLANE C
2 PLACES
SEE NOTE 3E
32
⊥ A .002
-B-
1.590
MAX
.250
.240
.067
.057
-A-
32
1.124
1.122 DIA
LEADS MUST BEND 90°±5° AND EXIT WITHIN THIS DIMENSION
A
.490
MAX DIA
SEE NOTE 3E
◉ A .010 TIR
⊥ B .005
A
NO. 1 SLIP RING
CASE (BRUSH HOLDER)
SEE NOTE 3C
ROTOR (SLIP RING)
SEE NOTE 3C

REQUIREMENTS:

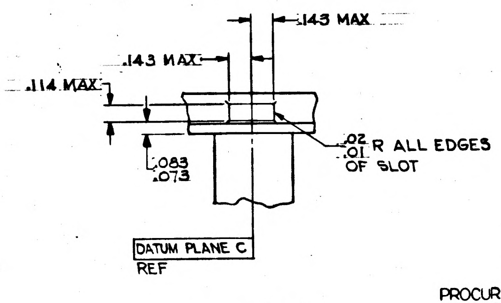
1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO., AND MANUFACTURERS SYMBOL AT INDICATED LOCATION PER ND1002023 ADHESIVE BACKED NAMEPLATE MAY NOT BE USED.
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS 2018624
   - D. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
   - E. PREPARATION FOR DELIVERY PER ND1002215 CLASS I.
2. INSPECTION AND ACCEPTANCE
   - A. INSPECTION SHALL BE PER PS 2018624
   - B. LEADS: PER MIL-W-16878 TYPE E-28 PREFERRED. ALTERNATE TYPE E-30 WIRE SIZE MUST BE CONSISTENT ON EACH ASSEMBLY.

     LENGTH: 12 INCHES MINIMUM

     COLOR: PER CHART
   - C. UNLESS OTHERWISE SPECIFIED DECIMAL DIAMETERS TO BE CONCENTRIC TO -A- WITHIN .015 TIR
   - D. MAX ALLOWABLE TORQUE: 80 GM-CM
3. DESIGN REQUIREMENTS
   - A. NUMBER OF RINGS: 40; MIN PITCH .020
   - B. BREAK ALL SHARP EDGES .005/.015
   - C. MATERIAL: CASE AND ROTOR FLANGE MATERIAL AND FINISH SHALL BE ONE OF THE FOLLOWING.
     - 1) AL6061-T6 PER QQ-A-325 - ANODIZE PER MIL-A-8625 TYPE I, CLEAR OR DYED BLACK
     - 2) CRES CL303 COND A PER QQ-S-763 - PASSIVATE PER MIL-F-14072 FIN E-300
   - D. 63√ ALL OVER UNLESS OTHERWISE SPECIFIED
   - E. LEAD PULL: LEADS SHALL WITHSTAND A TWO (2)POUND PULL WHEN APPLIED GRADUALLY FOR 10 SECONDS IN DIRECTIONS SHOWN.


NO. 40
NO. 1
LEADS NO. 21
THRU NO. 40
LEADS NO. 1
THRU NO. 20

VIEW A-A


.143 MAX
.143 MAX
.114 MAX
.02
.01 R ALL EDGES
OF SLOT
.083
.073
DATUM PLANE C
REF

VIEW B-B
2 PLACES

PROCURE ONLY FROM APPROVED
SOURCES LISTED IN ND 1002034
FOR THIS DRAWING

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018610	
2018613	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
±.005
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED		8-12-64
CHECKED		
DRAWN	R.G.S.	2-17-64
APPROVED FOR MSC	W J Rhine	8-19-64
MIT/IL APPROVAL		DATE

SLIP RING ASSEMBLY
ELECTRICAL - 40 CONTACT
(SPECIFICATION CONTROL DWG)

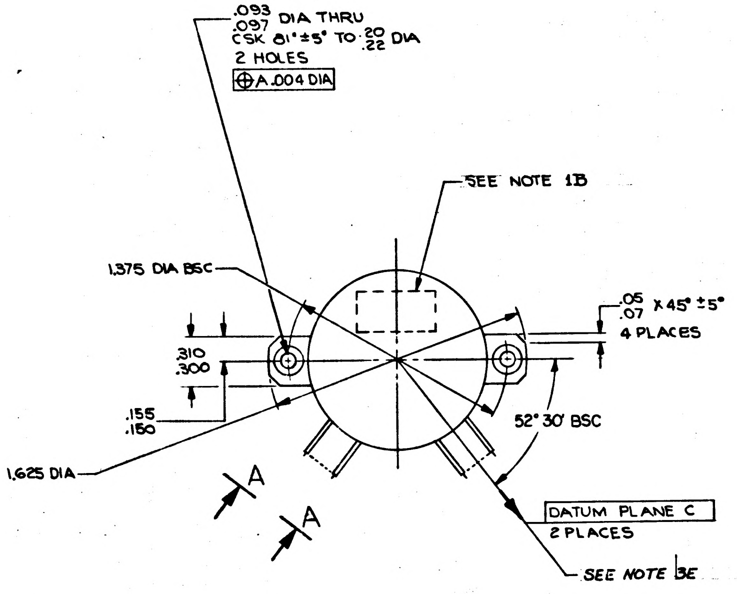
SCALE	UNIT WT.	CODE IDENT.
2/1		

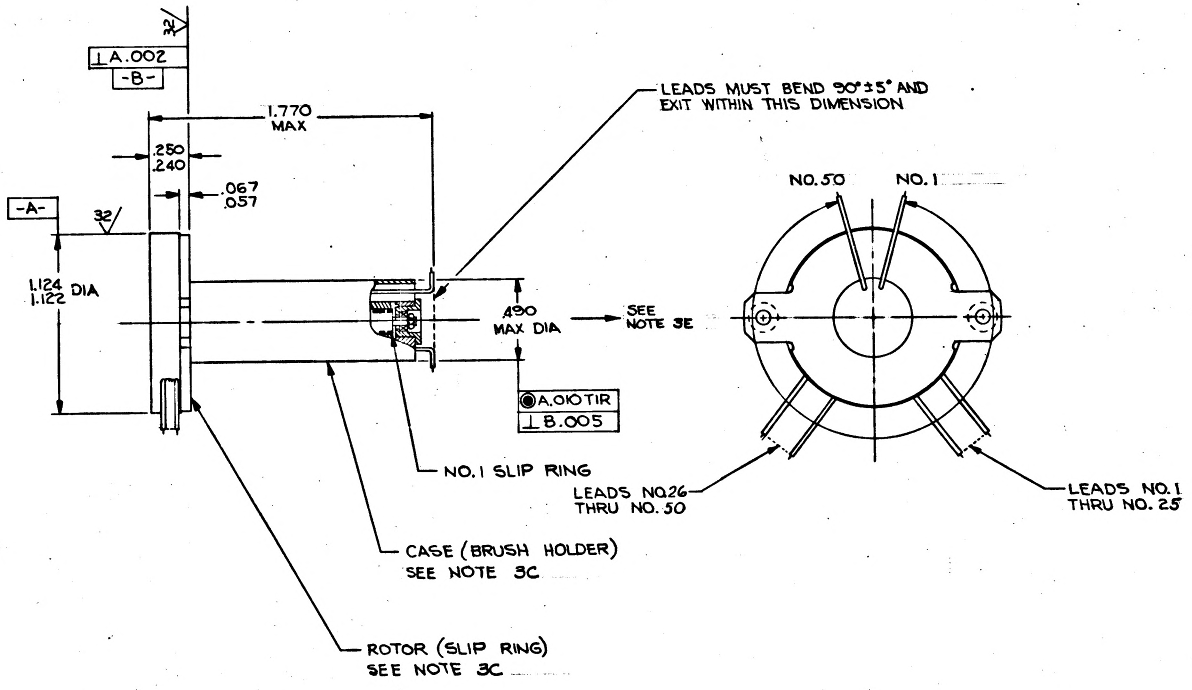
MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018624
SHEET 1 OF 1

REVISIONS					
ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	A	REVISED			
	B	52° 30' WAS 37° 30'			
	C	ADDED APPL NO & RMVD RAD			
	D	NOTES REVISED RELEASED PER TDRR 11883	8-19-64	JHB	W.K.

COLOR CODING OF SLIP RING WIRES USING MIL-STD-681

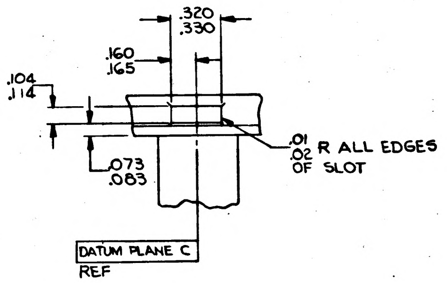
WIRE NO.	COLOR	WIRE NO.	COLOR
1	BLACK	26	WHT-BLK-VIO
2	BROWN	27	WHT-BLK-GY
3	RED	28	WHT-BRN-RED
4	ORANGE	29	WHT-BRN-ORN
5	YELLOW	30	WHT-BRN-YEL
6	GREEN	31	WHT-BRN-GRN
7	BLUE	32	WHT-BRN-BLU
8	VIOLET	33	WHT-BRN-VIO
9	GRAY	34	WHT-BRN-GY
10	WHITE	35	WHT-RED-ORN
11	WHT-BLK	36	WHT-RED-YEL
12	WHT-BRN	37	WHT-RED-GRN
13	WHT-RED	38	WHT-RED-BLU
14	WHT-ORN	39	WHT-RED-VIO
15	WHT-YEL	40	WHT-RED-GY
16	WHT-GRN	41	WHT-ORN-YEL
17	WHT-BLU	42	WHT-ORN-GRN
18	WHT-VIO	43	WHT-ORN-BLU
19	WHT-GY	44	WHT-ORN-VIO
20	WHT-BLK-BRN	45	WHT-ORN-GY
21	WHT-BLK-RED	46	WHT-YEL-GRN
22	WHT-BLK-ORN	47	WHT-YEL-BLU
23	WHT-BLK-YEL	48	WHT-YEL-VIO
24	WHT-BLK-GRN	49	WHT-YEL-GY
25	WHT-BLK-BLU	50	WHT-GRN-BLU


.093
.097 DIA THRU
CSK 81°±5° TO .20 .22 DIA
2 HOLES
⊕A .004 DIA
SEE NOTE 1B
1.375 DIA BSC
.05
.07 X 45° ±5°
4 PLACES
.310
.300
.155
.150
52° 30' BSC
1.625 DIA
A
A
DATUM PLANE C
2 PLACES
SEE NOTE 3E


32
⊥A .002
-B-
1.770
MAX
.250
.240
.067
.057
-A-
32
1.124
1.122 DIA
.490
MAX DIA
SEE
NOTE 3E
◉A .010 TIR
⊥B .005
LEADS MUST BEND 90°±5° AND
EXIT WITHIN THIS DIMENSION
NO. 50
NO. 1
NO. 1 SLIP RING
LEADS NO. 26
THRU NO. 50
LEADS NO. 1
THRU NO. 25
CASE (BRUSH HOLDER)
SEE NOTE 3C
ROTOR (SLIP RING)
SEE NOTE 3C

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO. AND MANUFACTURERS SYMBOL AT INDICATED LOCATION PER ND10020[illegible] ADHESIVE BACKED NAMEPLATE MAY NOT BE USED.
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS 2018624
   - D. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
   - E. PREPARATION FOR DELIVERY PER ND1002215 CLASS 1.
2. INSPECTION AND ACCEPTANCE
   - A. INSPECTION SHALL BE PER PS 2018624
   - B. LEADS: PER MIL-W-16878 TYPE E-20 PREFERRED. ALTERNATE TYPE E-30. WIRE SIZE MUST BE CONSISTENT ON EACH ASSEMBLY.
     LENGTH: 12 INCHES MINIMUM
     COLOR: PER CHART
   - C. UNLESS OTHERWISE SPECIFIED DECIMAL DIAMETERS TO BE CONCENTRIC TO $\boxed{-A-}$ WITHIN .015 TIR.
   - D. MAX ALLOWABLE TORQUE: 100 GM-CM
3. DESIGN REQUIREMENTS
   - A. NUMBER OF RINGS: 50; MIN PITCH .020
   - B. BREAK ALL SHARP EDGES $\genfrac{}{}{0pt}{}{.005}{.015}$
   - C. MATERIAL: CASE AND ROTOR FLANGE MATERIAL AND FINISH SHALL BE ONE OF THE FOLLOWING.
     1) AL6061-T6 PER QQ-A-325 - ANODIZE PER MIL-A-8625 TYPE I, CLEAR OR DYED BLACK.
     2) CRES CL303 COND A PER QQ-S-763- PASSIVATE PER MIL-F-14072 FIN E-300.
   - D. 63√ ALL OVER UNLESS OTHERWISE SPECIFIED.
   - E. LEAD PULL: LEADS SHALL WITHSTAND A TWO (2) POUND PULL WHEN APPLIED GRADUALLY FOR 10 SECONDS IN DIRECTIONS SHOWN.


.320
.330
.160
.165
.104
.114
.073
.083
.01
.02 R ALL EDGES
OF SLOT
DATUM PLANE C
REF

VIEW A-A
2 PLACES

PROCURE ONLY FROM APPROVED
SOURCES LISTED IN ND 1002034
FOR THIS DRAWING

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.
LIST OF PARTS AND MATERIALS					

2018609	
2018612	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS —— DECIMALS ±.005 ANGLES ——
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153
APPROVED: DATE
CHECKED:
DRAWN: R.G.S. 2-7-64
APPROVED FOR MSC: W J Rhine 8-19-64
MIT/IL APPROVAL: W Kupfer DATE 8-19-64

SLIP RING ASSEMBLY,
ELECTRICAL-50 CONTACT
(SPECIFICATION CONTROL DWG)

SCALE 2/1
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018625
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

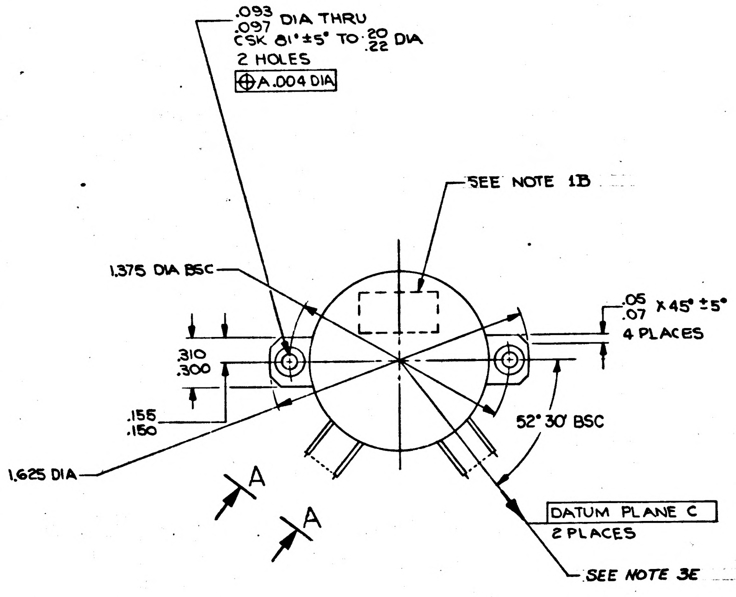
8	7	6	5	4	3	2	1

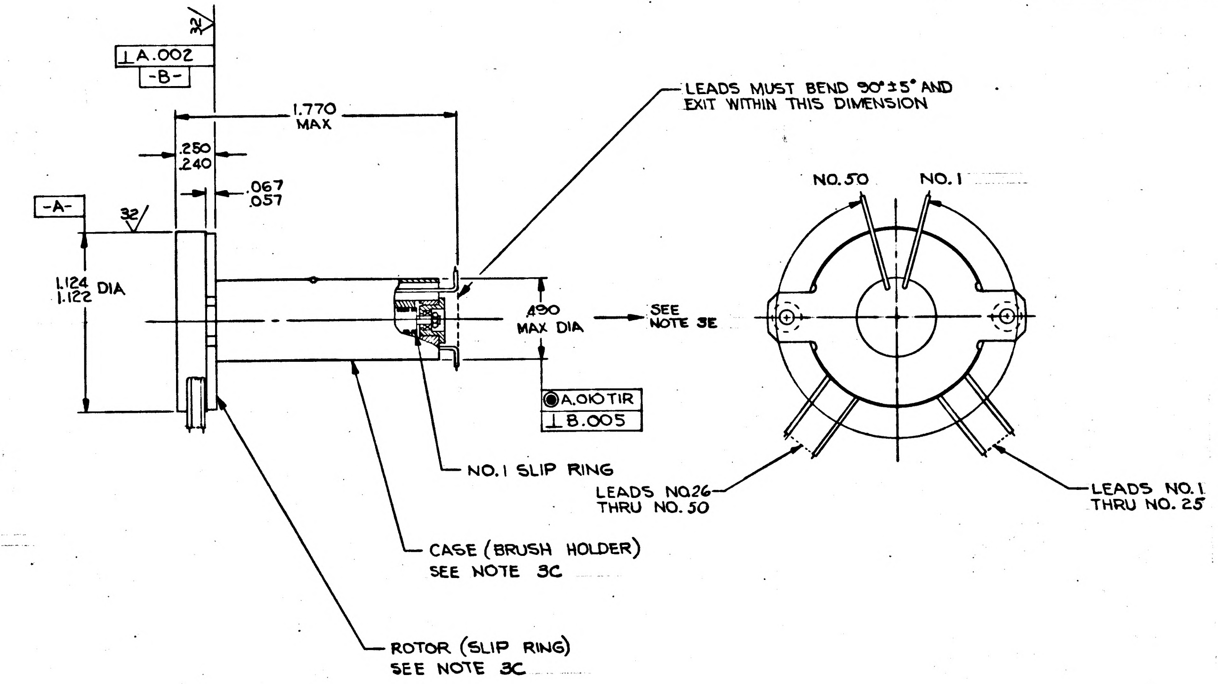
REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	A	REVISED			
	B	52° 30' WAS 37° 30'			
	C	ADDED APPL NO & RMVD RAD			
	D	NOTES REVISED RELEASED PER TDRR 11883	8-19-64		
	E	REVISED PER TDRR 19273	2 Jun 65		

COLOR CODING OF SLIP RING WIRES USING MIL-STD-681

WIRE NO.	COLOR	WIRE NO.	COLOR
1	BLACK	26	WHT-BLK-VIO
2	BROWN	27	WHT-BLK-GY
3	RED	28	WHT-BRN-RED
4	ORANGE	29	WHT-BRN-ORN
5	YELLOW	30	WHT-BRN-YEL
6	GREEN	31	WHT-BRN-GRN
7	BLUE	32	WHT-BRN-BLU
8	VIOLET	33	WHT-BRN-VIO
9	GRAY	34	WHT-BRN-GY
10	WHITE	35	WHT-RED-ORN
11	WHT-BLK	36	WHT-RED-YEL
12	WHT-BRN	37	WHT-RED-GRN
13	WHT-RED	38	WHT-RED-BLU
14	WHT-ORN	39	WHT-RED-VIO
15	WHT-YEL	40	WHT-RED-GY
16	WHT-GRN	41	WHT-ORN-YEL
17	WHT-BLU	42	WHT-ORN-GRN
18	WHT-VIO	43	WHT-ORN-BLU
19	WHT-GY	44	WHT-ORN-VIO
20	WHT-BLK-BRN	45	WHT-ORN-GY
21	WHT-BLK-RED	46	WHT-YEL-GRN
22	WHT-BLK-ORN	47	WHT-YEL-BLU
23	WHT-BLK-YEL	48	WHT-YEL-VIO
24	WHT-BLK-GRN	49	WHT-YEL-GY
25	WHT-BLK-BLU	50	WHT-GRN-BLU


.093
.097 DIA THRU
CSK 81° ±5° TO .20 .22 DIA
2 HOLES
⊕ A .004 DIA
SEE NOTE 1B
1.375 DIA BSC
.05
.07 X 45° ±5°
4 PLACES
.310
.300
.155
.150
52° 30' BSC
1.625 DIA
A
A
DATUM PLANE C
2 PLACES
SEE NOTE 3E

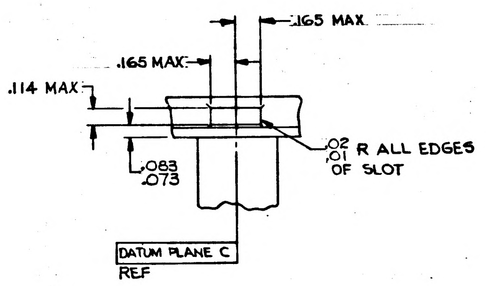

32
⊥ A .002
-B-
1.770
MAX
.250
.240
.067
.057
-A-
32
1.124
1.122 DIA
LEADS MUST BEND 90° ±5° AND
EXIT WITHIN THIS DIMENSION
.490
MAX DIA
SEE
NOTE 3E
◎ A .010 TIR
⊥ B .005
NO. 1 SLIP RING
CASE (BRUSH HOLDER)
SEE NOTE 3C
ROTOR (SLIP RING)
SEE NOTE 3C
NO. 50
NO. 1
LEADS NO. 26
THRU NO. 50
LEADS NO. 1
THRU NO. 25

REQUIREMENTS:

1. **GENERAL**
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO. AND MANUFACTURERS SYMBOL AT INDICATED LOCATION PER ND1002020 ADHESIVE BACKED NAMEPLATE MAY NOT BE USED.
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS 2018624
   - D. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
   - E. PREPARATION FOR DELIVERY PER ND1002215 CLASS 1.
2. **INSPECTION AND ACCEPTANCE**
   - A. INSPECTION SHALL BE PER PS 2018624
   - B. LEADS: PER MIL-W-16878 TYPE E-28 PREFERRED. ALTERNATE TYPE E-30. WIRE SIZE MUST BE CONSISTENT ON EACH ASSEMBLY.

     LENGTH: 12 INCHES MINIMUM

     COLOR: PER CHART
   - C. UNLESS OTHERWISE SPECIFIED DECIMAL DIAMETERS TO BE CONCENTRIC TO $\boxed{-A-}$ WITHIN .015 TIR.
   - D. MAX ALLOWABLE TORQUE: 100 GM-CM
3. **DESIGN REQUIREMENTS**
   - A. NUMBER OF RINGS: 50; MIN PITCH .020
   - B. BREAK ALL SHARP EDGES $\begin{matrix}.005\\.015\end{matrix}$
   - C. MATERIAL: CASE AND ROTOR FLANGE MATERIAL AND FINISH SHALL BE ONE OF THE FOLLOWING.
     1) AL6061-T6 PER QQ-A-325 - ANODIZE PER MIL-A-8625 TYPE I, CLEAR OR DYED BLACK.
     2) CRES CL303 COND A PER QQ-S-763- PASSIVATE PER MIL-F-14072 FIN E-300.
   - D. 63√ ALL OVER UNLESS OTHERWISE SPECIFIED.
   - E. LEAD PULL: LEADS SHALL WITHSTAND A TWO (2) POUND PULL WHEN APPLIED GRADUALLY FOR 10 SECONDS IN DIRECTIONS SHOWN.


.165 MAX
.165 MAX
.114 MAX
.083
.073
.02
.01 R ALL EDGES
OF SLOT
DATUM PLANE C
REF

VIEW A-A
2 PLACES

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018609	
2018612	DL2019601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — DECIMALS ±.005 ANGLES —
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB
CONTRACT NAS 9-153

		DATE
APPROVED		6-12-64
CHECKED		
DRAWN	R.G.S.	2-17-64

APPROVED FOR MSC W J Rhine 8-7-64
MIT/IL APPROVAL — DATE

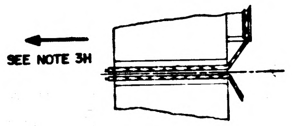
SLIP RING ASSEMBLY,
ELECTRICAL-50 CONTACT
(SPECIFICATION CONTROL DWG)

SCALE	UNIT WT.	CODE IDENT.
2/1		

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018625
SHEET 1 OF 1

8	7	6	5	4	3	2	1

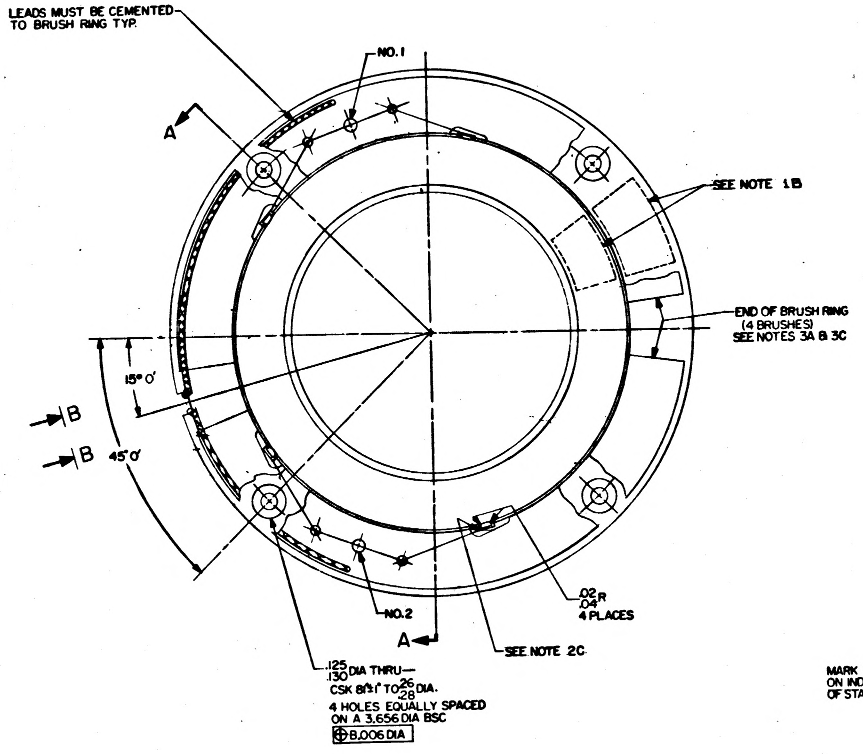
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED		
	B	NOTES REVISED RELEASED PER TDRR 15715		

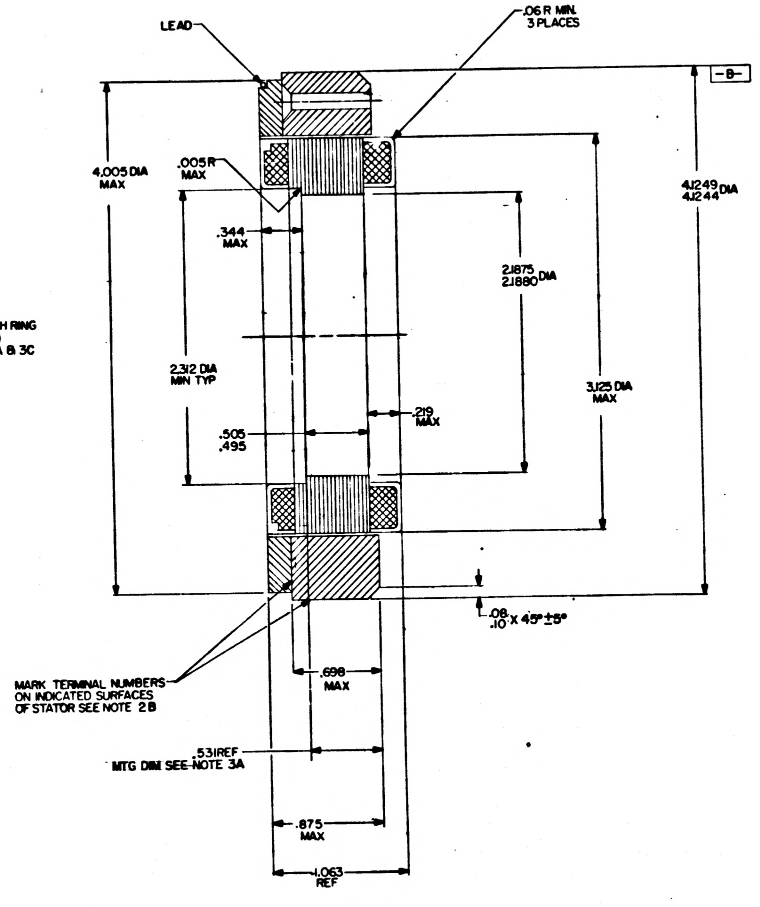


VIEW B-B

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO. AND MANUFACTURERS SYMBOL AT INDICATED LOCATION PER ND1002023 (SILK SCREEN OR RUBBER STAMP DIRECTLY ON PARTS)
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS2018629.
   - D. PREPARATION FOR DELIVERY PER ND1002215 CLASS I.
   - E. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
2. INSPECTION AND ACCEPTANCE:
   - A. INSPECTION SHALL BE PER PS2018629.
   - B. LEADS: PER MIL-W-16878 TYPE E-24
     LENGTH: 6 INCHES MIN.
     COLOR: BLACK LEAD AT TERMINAL NO. 1
     WHITE LEAD AT TERMINAL NO. 2
   - C. BRUSH FORCE: 30 - 50 GRAMS WHEN CHECKED AT HEEL OF BRUSH.
   - D. STATOR TO BE INSPECTED BY USING A GAGE OF $\frac{4.1250}{4.1252}$ ID AND MUST BE $\boxed{◉ .003 \text{ TIR}}$ WITH GAGE SURFACE. MOUNTING SCREWS TO BE INSTALLED FOR THIS INSPECTION.
     ROTOR MUST GO ON ARBOR OF $\frac{2.1874}{2.1872}$ DIA AND MUST BE $\boxed{◉ .0015 \text{ TIR}}$ WITH ARBOR SURFACE.
3. DESIGN REQUIREMENTS:
   - A. A VARIATION OF ±.025 INCH IN .531 MOUNTING DIMENSION WILL RESULT IN NOT LESS THAN 100% OF THE BRUSH WIDTH REMAINING ON THE COMMUTATOR. UNDER THESE CONDITIONS THE BRUSH WILL NOT INTERFERE WITH THE INSULATION OF THE ARMATURE.
   - B. MOTOR TO MEET REQUIREMENTS OF PS2018629 WHEN THE STATOR AND ROTOR AXES ARE ECCENTRIC BY .002 AND OUT OF PARALLEL BY .5 MILLIRADIANS.
   - C. BRUSH RING TO BE 2 SEGMENTS.
   - D. BRUSH RING TO BE FASTENED TO STATOR USING NASA PART NO. 1010628-4
   - E. A +DC VOLTAGE AT TERMINAL NO. 1 WILL RESULT IN A CCW ROTATION OF THE INNER RING WHEN VIEWED FROM THE COMMUTATOR SIDE.
   - F. COMMUTATOR: ONE OF THE FOLLOWING MATERIALS OR FINISHES MUST BE USED
     1. GOLD PLATE PER MIL-G-45204 TYPE I OR II CLASS 3
     2. SILVER PER MIL-S-13282
     3. COIN SILVER
   - G. BREAK CORNERS $\frac{.005}{.015}$
   - H. LEAD PULL: LEADS SHALL WITHSTAND A FOUR(4) POUND PULL IN DIRECTION SHOWN WHEN APPLIED GRADUALLY FOR TEN(10) SECONDS.
4. SPECIAL INSTRUCTIONS AND INFORMATION:
   - A. CAUTION: DO NOT REMOVE STATOR FROM ROTOR WITHOUT FIRST REPLACING BRUSH RING WITH A MAGNETIC KEEPER RING.


LEADS MUST BE CEMENTED TO BRUSH RING TYP.
NO. 1
A
SEE NOTE 1B
END OF BRUSH RING (4 BRUSHES) SEE NOTES 3A & 3C
15° 0'
B
B
45° 0'
NO. 2
A
.02 .04 R 4 PLACES
SEE NOTE 2C
.125 .130 DIA THRU— CSK 81°±1° TO .26 .28 DIA.
4 HOLES EQUALLY SPACED ON A 3.656 DIA BSC
⊕ B .006 DIA


LEAD
.06 R MIN. 3 PLACES
-B-
4.005 DIA MAX
.005 R MAX
.344 MAX
2.1875 2.1880 DIA
4.1249 4.1244 DIA
2.312 DIA MIN TYP
3.125 DIA MAX
.219 MAX
.505 .495
.08 .10 X 45°±5°
MARK TERMINAL NUMBERS ON INDICATED SURFACES OF STATOR SEE NOTE 2B
.698 MAX
.531 REF MTG DIM SEE NOTE 3A
.875 MAX
1.063 REF

SECTION A-A

PROCURE ONLY FROM APPROVED SOURCES
LISTED IN ND1002034 FOR THIS DRAWING

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018609	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — DECIMALS — ANGLES ±0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL:

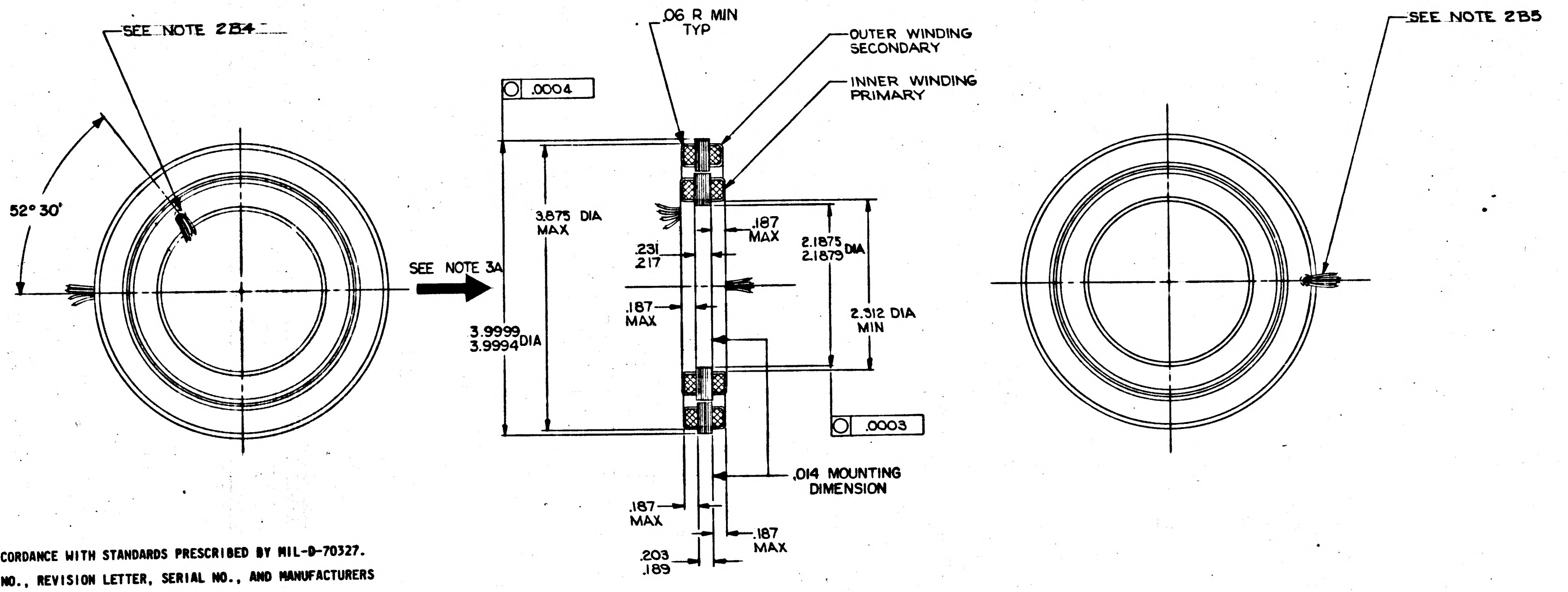
MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153
APPROVED
CHECKED
DRAWN
APPROVED FOR MSC
11/26/65
MIT/IL APPROVAL

MOTOR, TORQUE
DC, FRAMELESS
SPECIFICATION CONTROL DRAWING

SCALE 2/1
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
Cambridge, Mass.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018629
SHEET 1 OF 1

REVISIONS					
ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	A	REVISED	5-10-64		
	B	NOTES REVISED RELEASED PER TDRR 10502	6-12-64		


SEE NOTE 2B4
52° 30'
SEE NOTE 3A
.0004
.06 R MIN TYP
OUTER WINDING SECONDARY
INNER WINDING PRIMARY
3.875 DIA MAX
3.9999 3.9994 DIA
.231 .217
.187 MAX
.187 MAX
2.1875 2.1879 DIA
2.312 DIA MIN
.0003
.014 MOUNTING DIMENSION
.187 MAX
.187 MAX
.203 .189
SEE NOTE 2B5

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO., AND MANUFACTURERS SYMBOL PER ND1002023.
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS2018631 WHEN TESTED IN ASSEMBLY 2018606, OR 2018607, OR 2018608.
   - D. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
   - E. PREPARATION FOR DELIVERY PER ND1002215 CLASS I.

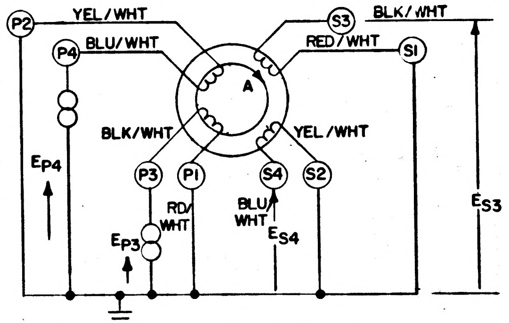
2. INSPECTION AND ACCEPTANCE
   - A. INSPECTION SHALL BE PER PS2018631.
   - B. LEADS:
     1) PER MIL-W-16878 TYPE E-28
     2) LENGTH; 12 INCHES MINIMUM
     3) POSITIONED AS SHOWN WHEN RESOLVER IS AT ELECTRICAL ZERO WITHIN ±2°
     4) TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.312 R
     5) TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.843 R

3. DESIGN REQUIREMENTS
   - A. A POSITIVE RESOLVER ANGLE "A" RESULTS WHEN THE INNER RESOLVER WINDING IS ROTATED CLOCKWISE FROM ELECTRICAL ZERO AS VIEWED IN THE DIRECTION INDICATED BY THE ORIENTATION ARROW IN SECTIONAL VIEW. POLARITY IS SUCH THAT THE FOLLOWING CONDITIONS ARE SATISFIED:

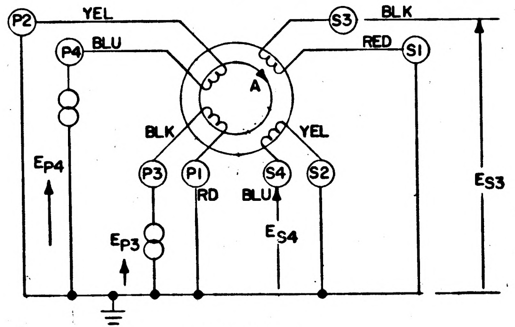
$$E_{S3} = K \left(E_{P3} \cos NA + E_{P4} \sin NA\right)$$
$$E_{S4} = K \left(E_{P4} \cos NA - E_{P3} \sin NA\right)$$

WHERE N = 16 FOR 16X RESOLVERS, N = 1 FOR 1X RESOLVERS AND K IS THE TRANSFORMATION RATIO

   - B. LEAD PULL: UNIT SHALL WITHSTAND A 4 POUND AXIAL PULL WHEN APPLIED GRADUALLY FOR 10 SECONDS.


P2
YEL/WHT
P4
BLU/WHT
S3
BLK/WHT
RED/WHT
S1
A
BLK/WHT
YEL/WHT
P3
P1
S4
S2
RD/WHT
BLU/WHT
E_{P4}
E_{P3}
E_{S4}
E_{S3}

16X RESOLVER


P2
YEL
P4
BLU
S3
BLK
RED
S1
A
BLK
YEL
P3
P1
S4
S2
RD
BLU
E_{P4}
E_{P3}
E_{S4}
E_{S3}

1X RESOLVER

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018608	
2018607	
2018606	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — DECIMALS — ANGLES —
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB CONTRACT NAS 9-153

		DATE
APPROVED		6-12-64
CHECKED		
DRAWN	R.G.S.	12-31-63
APPROVED FOR MSC		
MIT/IL APPROVAL		6/23/64

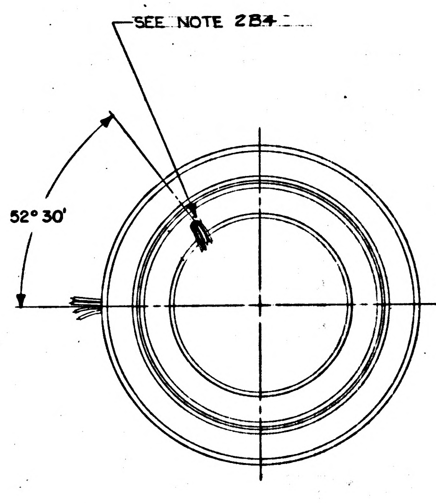
RESOLVER, MULTIPLE SPEED (16X AND 1X)
SPECIFICATION CONTROL DRAWING

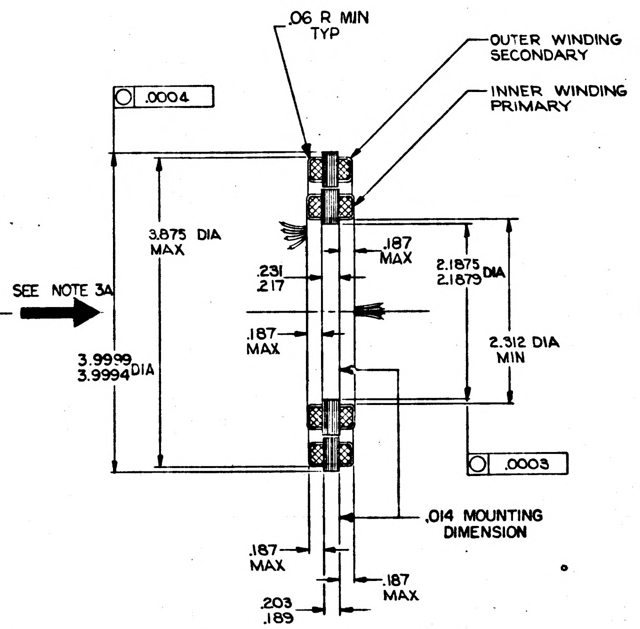
SCALE	UNIT WT.	CODE IDENT.
1/1		

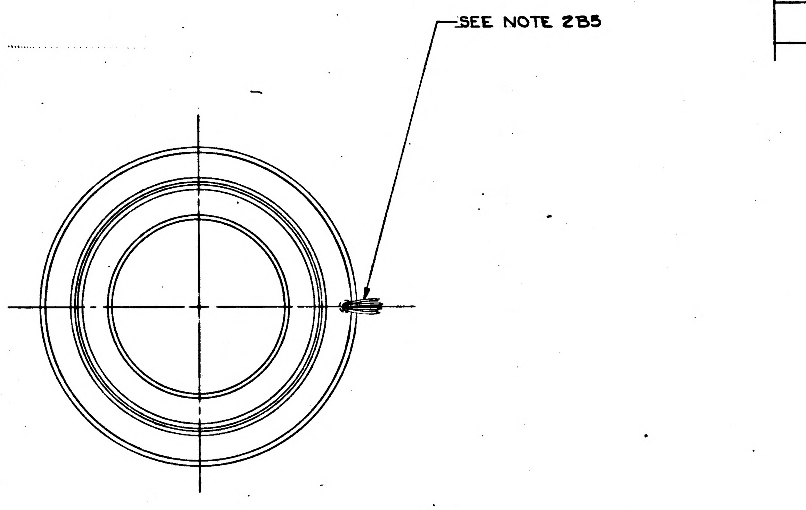
MIT INSTRUMENTATION LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018631
SHEET 1 OF 1

INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED	5-10-64	
	B	NOTES REVISED RELEASED PER TDRR 10502	6-12-64	AJB
	C	REVISED PER TDRR 10876	7-28-64	WK.


SEE NOTE 2B4
52° 30'


SEE NOTE 3A
.06 R MIN TYP
OUTER WINDING SECONDARY
INNER WINDING PRIMARY
.0004
3.875 DIA MAX
.187 MAX
2.1875 2.1879 DIA
.231 .217
.187 MAX
2.312 DIA MIN
3.9999 3.9994 DIA
.0003
.014 MOUNTING DIMENSION
.187 MAX
.187 MAX
.203 .189


SEE NOTE 2B5

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO., AND MANUFACTURERS SYMBOL PER ND1002023.
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS2018631 WHEN TESTED IN ASSEMBLY 2018606, OR 2018607, OR 2018608.
   - D. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
   - E. PREPARATION FOR DELIVERY PER ND1002215 CLASS I.

2. INSPECTION AND ACCEPTANCE
   - A. INSPECTION SHALL BE PER PS2018631.
   - B. LEADS: 1) PER MIL-W-16878 TYPE E-28
     - 2) LENGTH; 12 INCHES MINIMUM
     - 3) POSITIONED AS SHOWN WHEN RESOLVER IS AT ELECTRICAL ZERO WITHIN ±2°
     - 4) TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.312 R
     - 5) TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.843 R

3. DESIGN REQUIREMENTS
   - A. A POSITIVE RESOLVER ANGLE "A" RESULTS WHEN THE INNER RESOLVER WINDING IS ROTATED CLOCKWISE FROM ELECTRICAL ZERO AS VIEWED IN THE DIRECTION INDICATED BY THE ORIENTATION ARROW IN SECTIONAL VIEW. POLARITY IS SUCH THAT THE FOLLOWING CONDITIONS ARE SATISFIED FOR THE 16X RESOLVER:

$$E_{S3} = K \left(E_{P3} \text{ COS } 16A + E_{P4} \text{ SIN } 16A\right)$$

$$E_{S4} = K \left(E_{P4} \text{ COS } 16A - E_{P3} \text{ SIN } 16A\right)$$

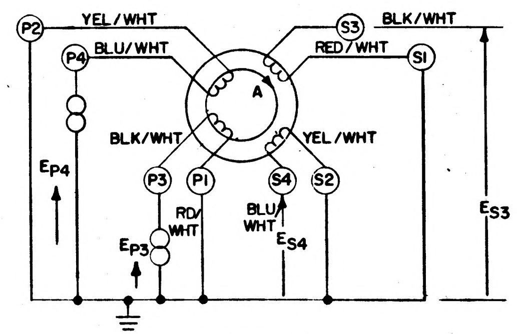
WHERE K IS THE 16X TRANSFORMATION RATIO. POLARITY FOR THE 1X RESOLVER IS SUCH THAT

$$E_{S3} = K' E_{P3} \text{ COS } A$$

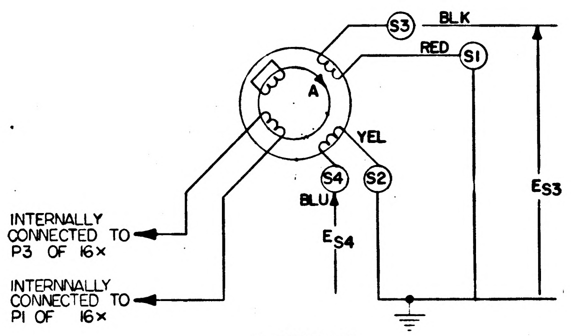
$$E_{S4} = -K' E_{P3} \text{ SIN } A$$

WHERE K' IS THE 1X TRANSFORMATION RATIO.

   - B. LEAD PULL: UNIT SHALL WITHSTAND A 4 POUND AXIAL PULL WHEN APPLIED GRADUALLY FOR 10 SECOND.


P2
YEL/WHT
P4
BLU/WHT
S3
BLK/WHT
RED/WHT
S1
A
BLK/WHT
YEL/WHT
EP4
P3
P1
S4
S2
RD/WHT
BLU/WHT
EP3
ES4
ES3

16X RESOLVER


S3
BLK
RED
S1
A
YEL
S4
S2
BLU
ES4
ES3
INTERNALLY CONNECTED TO P3 OF 16X
INTERNNALLY CONNECTED TO P1 OF 16X

1X RESOLVER

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
2018608	
2018607	
2018606	DL2018601

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB
CONTRACT NAS 9-153

		DATE
APPROVED	AJB	6-12-64
CHECKED		
DRAWN	R.G.S.	12-31-63
APPROVED FOR MSC		
MIT/IL APPROVAL	WTrageser	6/23/64

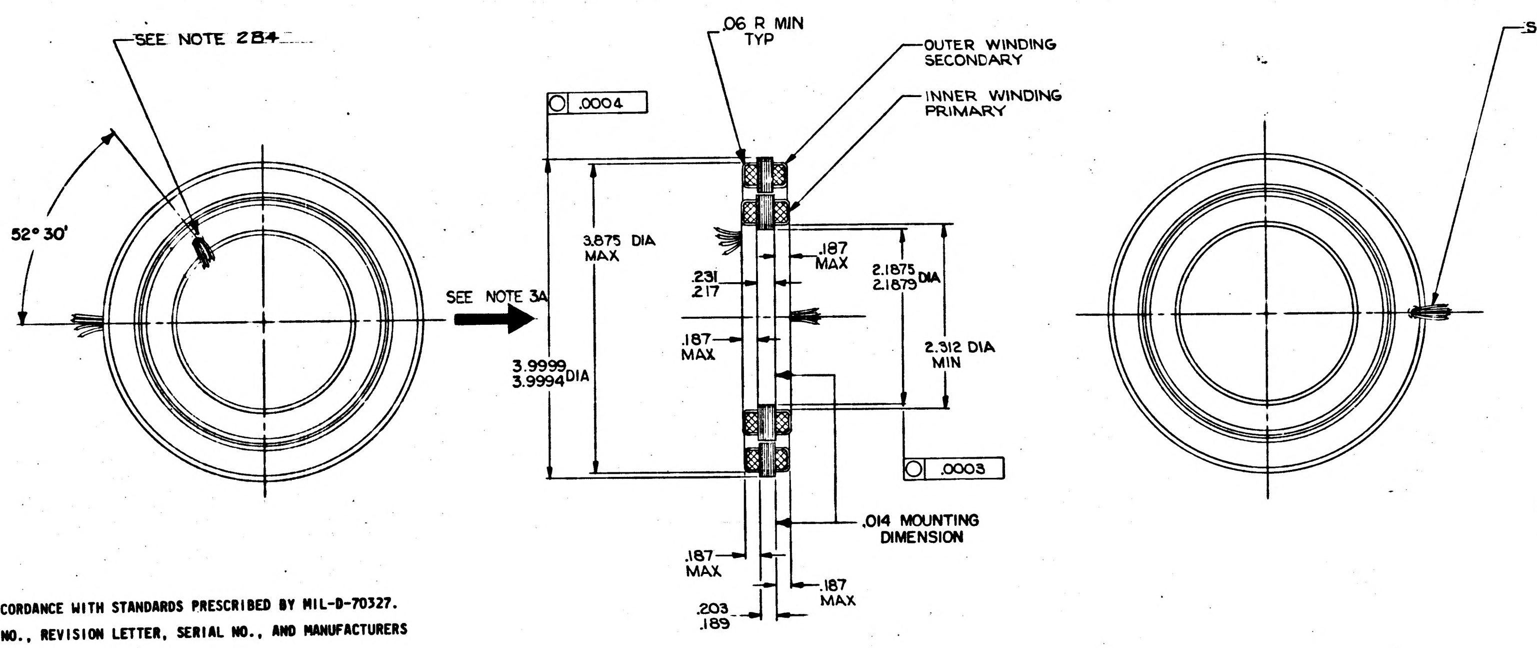
RESOLVER, MULTIPLE SPEED (16X AND 1X)

SPECIFICATION CONTROL DRAWING

SCALE	UNIT WT.	CODE IDENT.
1/1		

MIT INSTRUMENTATION LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO. 2018631
SHEET 1 OF 1

ZONE	SYM	DESCRIPTION	DATE	APPROVAL	
	A	REVISED	5-10-64		
②	B	NOTES REVISED RELEASED PER TDRR 10502	6-12-64	ajB	wR
④	C	REVISED PER TDRR 10876	7-28-64		WR.
	D	TDRR 12135	9-1-64		WR.



SEE NOTE 2B4
52° 30'
SEE NOTE 3A
.06 R MIN TYP
OUTER WINDING SECONDARY
INNER WINDING PRIMARY
.0004
3.875 DIA MAX
.231 .217
.187 MAX
2.1875 2.1879 DIA
.187 MAX
2.312 DIA MIN
3.9999 3.9994 DIA
.0003
.014 MOUNTING DIMENSION
.187 MAX
.203 .189
.187 MAX
SEE NOTE 2B5

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO., AND MANUFACTURERS SYMBOL PER ND1002023.
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS2018631 WHEN TESTED IN ASSEMBLY 2018606, OR 2018607, OR 2018608.
   - D. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
   - E. PREPARATION FOR DELIVERY PER ND1002215 CLASS I.

2. INSPECTION AND ACCEPTANCE
   - A. INSPECTION SHALL BE PER PS2018631.
   - B. LEADS: 1) PER MIL-W-16878 TYPE E-28
     - 2) LENGTH; 10 INCHES MINIMUM
     - 3) POSITIONED AS SHOWN WHEN RESOLVER IS AT ELECTRICAL ZERO WITHIN ±2°
     - 4) TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.312 R
     - 5) TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.843 R

3. DESIGN REQUIREMENTS
   - A. A POSITIVE RESOLVER ANGLE "A" RESULTS WHEN THE INNER RESOLVER WINDING IS ROTATED CLOCKWISE FROM ELECTRICAL ZERO AS VIEWED IN THE DIRECTION INDICATED BY THE ORIENTATION ARROW IN SECTIONAL VIEW. POLARITY IS SUCH THAT THE FOLLOWING CONDITIONS ARE SATISFIED FOR THE 16X RESOLVER:

$$E_{S3} = K \left(E_{P3} \cos 16A + E_{P4} \sin 16A\right)$$

$$E_{S4} = K \left(E_{P4} \cos 16A - E_{P3} \sin 16A\right)$$

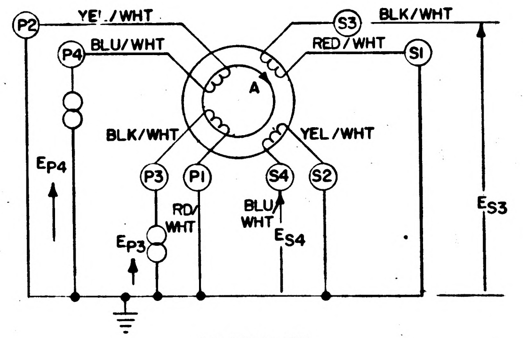
WHERE K IS THE 16X TRANSFORMATION RATIO. POLARITY FOR THE 1X RESOLVER IS SUCH THAT

$$E_{S3} = K' E_{P3} \cos A$$

$$E_{S4} = -K' E_{P3} \sin A$$

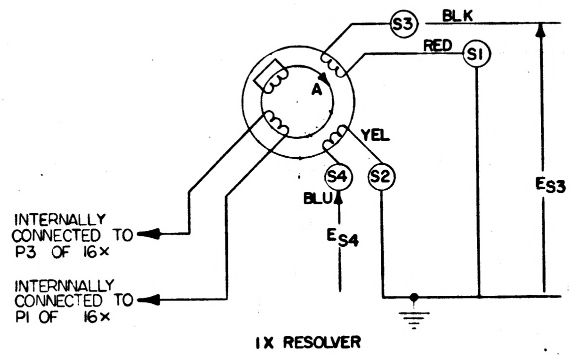
WHERE K' IS THE 1X TRANSFORMATION RATIO.

④ LEAD PULL: UNIT SHALL WITHSTAND A 4 POUND AXIAL PULL WHEN APPLIED GRADUALLY FOR 10 SECOND.



P2
YEL/WHT
P4
BLU/WHT
S3
BLK/WHT
RED/WHT
S1
A
BLK/WHT
YEL/WHT
P3
P1
S4
S2
EP4
EP3
RD/WHT
BLU/WHT
ES4
ES3

16X RESOLVER



S3
BLK
RED
S1
A
YEL
S4
S2
BLU
ES4
ES3
INTERNALLY CONNECTED TO P3 OF 16×
INTERNNALLY CONNECTED TO P1 OF 16×

1X RESOLVER

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

2018608	
2018607	
2018606	DL2018601
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB CONTRACT
NAS 9-153

		DATE
APPROVED	ajB	6-12-64
CHECKED		
DRAWN	R.G.S.	12-31-63

APPROVED FOR MSC
MIT/IL APPROVAL DATE
WR 6/23/64

RESOLVER,
MULTIPLE SPEED
(16X AND 1X)
SPECIFICATION CONTROL DRAWING

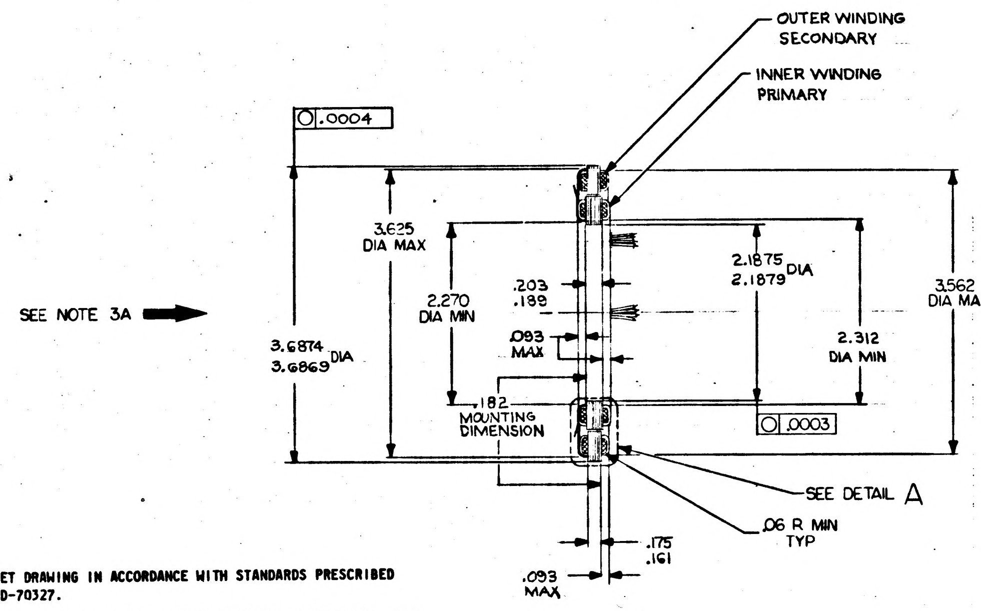
SCALE	UNIT WT.	CODE IDENT.
1/1		

MIT
INSTRUMENTATION LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
2018631
SHEET 1 OF 1

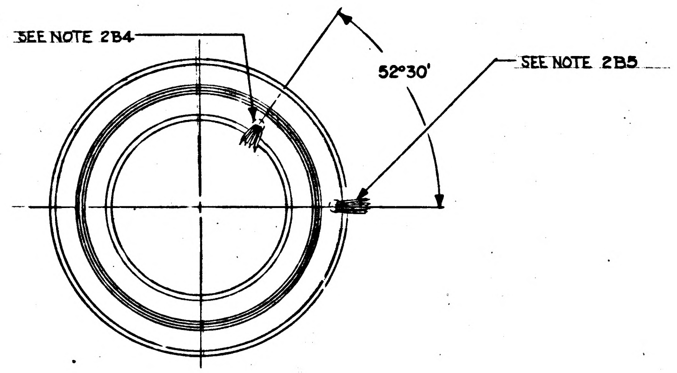
2018631 D

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

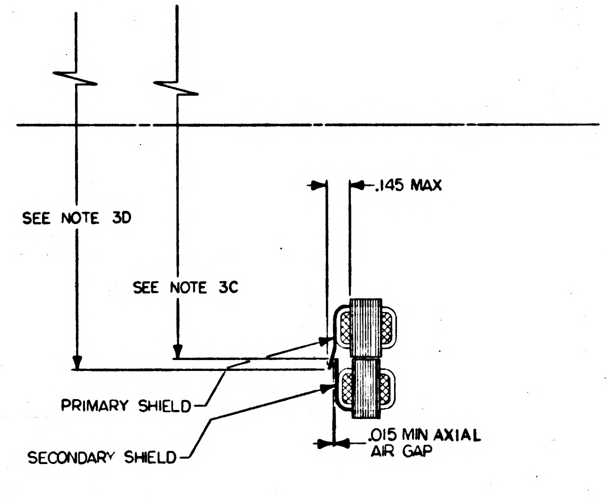
REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	NOTES REVISED RELEASED PER TDRR 10502	6-12-64	



OUTER WINDING SECONDARY
INNER WINDING PRIMARY
.0004
3.625 DIA MAX
2.270 DIA MIN
.203 .188
.093 MAX
2.1875 2.1879 DIA
2.312 DIA MIN
3.562 DIA MAX
SEE NOTE 3A
3.6874 3.6869 DIA
.182 MOUNTING DIMENSION
.0003
SEE DETAIL A
.06 R MIN TYP
.175 .161
.093 MAX

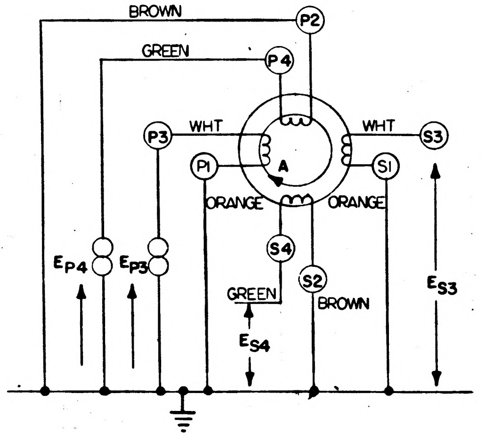


SEE NOTE 2B4
52°30'
SEE NOTE 2B5



.145 MAX
SEE NOTE 3D
SEE NOTE 3C
PRIMARY SHIELD
SECONDARY SHIELD
.015 MIN AXIAL AIR GAP

DETAIL A
SCALE 2/1



BROWN
P2
GREEN
P4
P3
WHT
WHT
S3
P1
A
S1
ORANGE
ORANGE
S4
S2
GREEN
BROWN
E_{P4}
E_{P3}
E_{S4}
E_{S3}

REQUIREMENTS:

1. GENERAL
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. IDENTIFY USING DRAWING NO., REVISION LETTER, SERIAL NO., AND MANUFACTURERS SYMBOL PER ND 1002023.
   - C. UNIT SHALL MEET THE REQUIREMENTS OF PS2018632 WHEN TESTED IN ASSEMBLY 2018608.
   - D. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND1015404 CLASS 1.
   - E. PREPARATION FOR DELIVERY PER ND1002215 CLASS I.
2. INSPECTION AND ACCEPTANCE
   - A. INSPECTION SHALL BE PER PS2018632.
   - B. LEADS:
     1) PER MIL-W-16878 TYPE E-28
     2) LENGTH; 12 INCHES MINIMUM
     3) POSITIONED AS SHOWN WHEN RESOLVER IS AT ELECTRICAL ZERO WITHIN ±2°
     4) TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.250 R
     5) TO EXIT THRU A .156 DIA HOLE LOCATED ON A 1.688 R
3. DESIGN REQUIREMENTS
   - A. A POSITIVE RESOLVER ANGLE "A" RESULTS WHEN THE INNER RESOLVER WINDING IS ROTATED CLOCKWISE FROM ELECTRICAL ZERO AS VIEWED IN THE DIRECTION INDICATED BY THE ORIENTATION ARROW IN THE SECTIONAL VIEW. POLARITY IS SUCH THAT THE FOLLOWING CONDITIONS ARE SATISFIED:

$$E_{S3} = K \left(E_{P3} \text{ COS } A + E_{P4} \text{ SIN } A\right)$$

$$E_{S4} = K \left(E_{P4} \text{ COS } A - E_{P3} \text{ SIN } A\right)$$

WHERE K IS THE TRANSFORMATION RATIO

   - B. LEAD PULL: UNIT SHALL WITHSTAND A 4 POUND AXIAL PULL WHEN APPLIED GRADUALLY FOR 10 SECONDS.
   - C. MINIMUM INSIDE DIAMETER OF SECONDARY SHIELD: AIR GAP DIAMETER OF OUTER WINDING.
   - D. MAXIMUM OUTSIDE DIAMETER OF PRIMARY SHIELD: AIR GAP DIAMETER OF INNER WINDING, RESOLVER, MULTIPLE SPEED, 2018631.

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

2018608	DL2018601	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES DO NOT SCALE THIS DRAWING MATERIAL:	MIT INSTRUMENTATION LAB CONTRACT NAS 9-153 APPROVED GJB DATE 6-12-64 CHECKED DRAWN DTB 1-6-64 APPROVED FOR MSC MIT/IL APPROVAL DATE 2-3-64	RESOLVER GYRO ERROR SPECIFICATION CONTROL DRAWING SCALE 1/1 UNIT WT. CODE IDENT.	MIT INSTRUMENTATION LABORATORY CAMBRIDGE, MASS. DWG. NO. MANNED SPACECRAFT CENTER HOUSTON TEXAS NASA DRAWING NO 2018632 SHEET 1 OF 1
NEXT ASSY	USED ON				
APPLICATION					

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY